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The 2006 Dutch Public Health Status and Forecasts Report

National Institute for Public Health and the Enviroment

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A.E.M. de Hollander, N. Hoeymans, J.M. Melse, J.A.M van Oers, J.J. Polder (executive editors)

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PREFACE

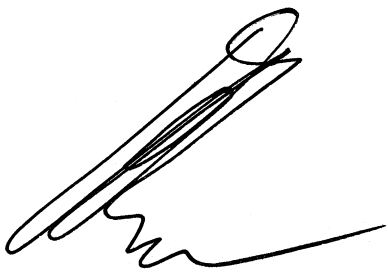
Welcome to the fourth edition of the Public Health Status and Forecasts Report, 'Care for Health'. The original Dutch title Zorg voor gezondheid is also a word play, alluding to various topical features of the public health landscape in the Netherlands. It hints at the fact that there are reasons to be concerned about the future, such as the unhealthy lifestyle decisions being made by many young people, and the increase in disease burden and demand for care services that may be expected as people born in the post war 'baby boom' enter the later phases of life. On the other hand, the Netherlands' health care system has over the last few decades contributed to the phenomenon that most people enjoy more healthy years of life and that most of those who are (chronically) ill enjoy a better quality of life. Finally, the Dutch title also suggests that we all share responsibility for health: both individually, through the lifestyle decisions we make and the way we utilize medical care, and collectively, through our communities and our government. The government has the ultimate responsibility for ensuring that the health care system functions properly and that we live in safe and healthy circumstances. In relation to the latter field in particular, the European authorities play an increasingly important role.

Up-to-date information about health and health care in the Netherlands is required not only for the evaluation and, where appropriate, adjustment of government policy, but also for the definition of new priorities and targets. Therefore, four years on from the previous edition, the RIVM has at my request produced a new Public Health Status and Forecasts Report (PHSF). The Ministry of Health, Welfare and Sport (VWS) will seek to utilize the PHSF wherever possible to support and inform its public health policy. So, for example, the compilers of this PHSF are closely involved in the preparation of the forthcoming prevention policy document Kiezen voor gezond leven (Opting for a healthy life) that appeared in autumn 2006.

The development of policies on health and health care is increasingly not only the realm of the central government, but also of other parties active in the field. Such parties – local governments, care providers, health insurers, patients' organizations, other ministries and other actors across the public health domain, including educational and research establishments – can benefit from the insight provided by this PHSF as well.
Like its predecessor Gezondheid op koers? (Health on Course?), this PHSF provides a summary and, in certain instances, a more detailed analysis of all the available information concerning public health in the Netherlands. The PHSF draws heavily upon the continuous systematic health information collection work that the RIVM's PHSF Centre undertakes for its Internet products Nationaal Kompas Volksgezondheid (National Compass on Public Health), Nationale Atlas Volksgezondheid (National Atlas of Public Health) and for the website Kosten van ziekten in Nederland (The Cost of Illness in the Netherlands). In addition, a great deal of information and analytical material has been drawn from the series of reports on specific topical themes, such as diet, primary care and the elderly, which the Centre has produced in recent years.

The Centre has compiled the various supporting documents in close collaboration with numerous leading researchers and institutes in the Netherlands. Furthermore, the authors of this overview report have been supported by a national Scientific Advisory Committee and a Steering Committee made up of representatives from the various departments within the Ministry of VWS. The involvement of so many people has meant that the PHSF was once again a national undertaking. I would like to take this opportunity to thank them for their input.

Minister of Health, Welfare and Sport



H. Hoogervorst

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KEY POINTS

Public health continues to improve in the Netherlands

Dutch people are living longer and in good health

Life expectancy for the average Dutch person was again higher in 2003 than in the preceding years. Since 1950, average life expectancy has risen by 5.8 years for men and 8.3 years for women, to stand at 76.2 and 80.9 years, respectively. The gap between male and female life spans has gradually been narrowing, following a period of expansion in the 1960s and early 1970s. The diminishing differential comes in spite of the fact that female life expectancy has been increasing again, after the stagnation reported in the previous survey (see *figure 1*).

Generally speaking, it is healthy years that have been gained. In particular, the number of years spent without disability has risen significantly. Since the 1980s, disability-free life expectancy has increased by between six and seven years, mainly due to reductions in auditory and visual impairment and in loss of mobility.

Legacy of ill health

Current life expectancy is always a legacy from the past. Illnesses that cause premature death and reduce quality of life are often associated with the lifestyle earlier in life. At present, for example, the burden caused by smoking-related diseases, such as lung cancer and COPD, are in decline among men because they quit tobacco use massively since the 1960s and 1970s. However, smoking has actually become more common

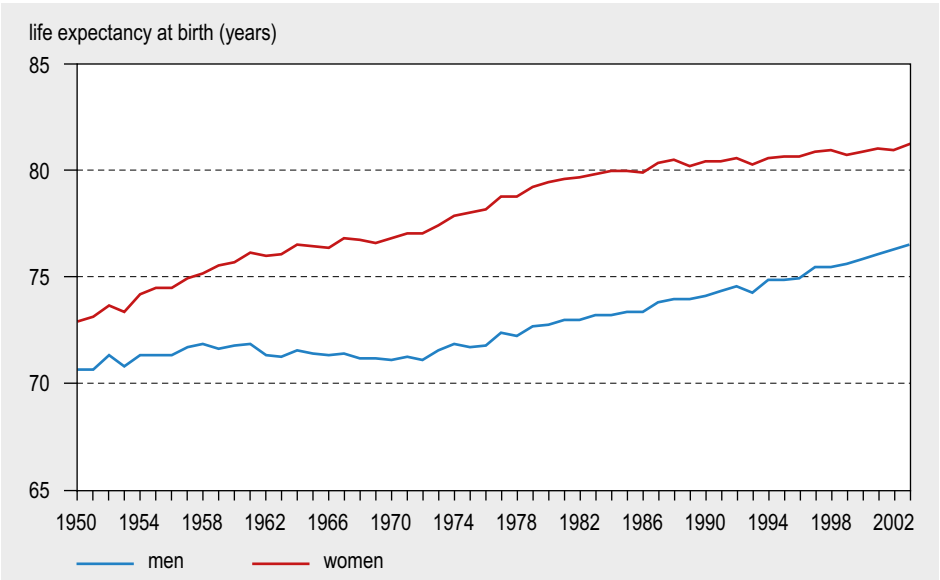


Figure 1: Life expectancy at birth in the Netherlands between 1950 and 2003 (Source: CBS Mortality Statistics).

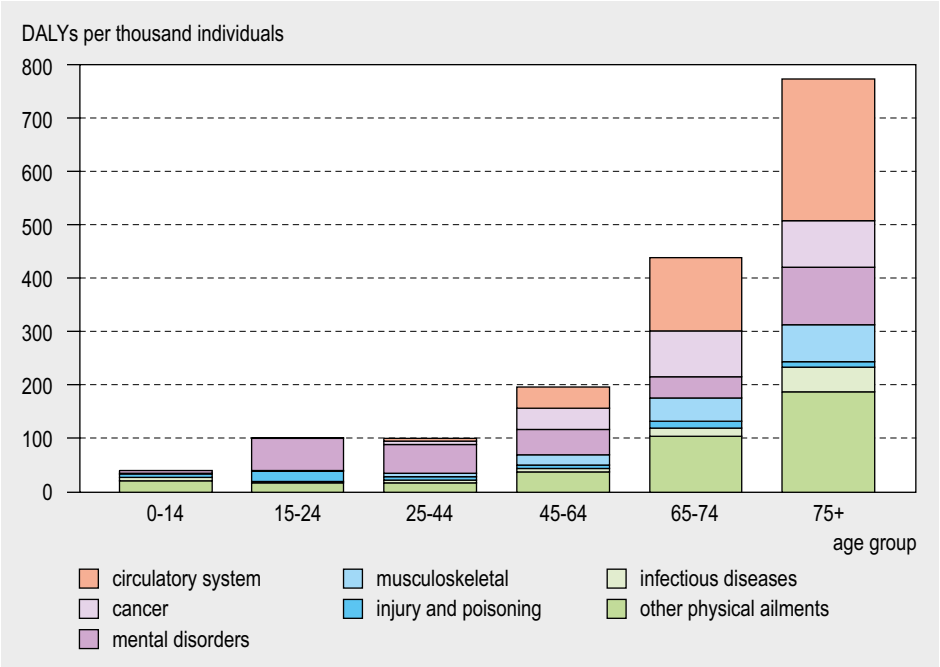


Figure 2: Disease burden (DALYs per one thousand individuals) by age and condition (other physical ailments include diabetes, asthma and COPD, visual and auditory impairment).

among women in recent decades, and the health implications are now becoming evident. Meanwhile, the number of Dutch people who are overweight or obese (seriously overweight) has soared in the last decades, leading to a higher incidence of diabetes.

Among adults and elderly people, conditions associated with unhealthy behaviour, such as cardiovascular disease and cancer, are predominant (see *figure 2*). Such conditions are less influential among other age groups. The most common causes of death among children are birth complications, congenital abnormalities and accidents. Among juveniles and young adults, the most important causes of death are suicide and road traffic accidents, while mental disorders are the main cause of reduced quality-of-life at that age.

The rise in the incidence of asthma appears gradually to be levelling off. As a matter of fact, the number of children with asthma has actually fallen a little. Death from coronary heart disease has been falling, under the influence of better treatment, such as the pharmaceutical reduction of high blood pressure and elevated cholesterol levels. Cancer-related mortality is also declining, but not so quickly; as a result, cancer will be the predominant cause of death in the years ahead.

Health through prosperity

Over the longer term, the steady improvements seen in public health are attributable largely to increased prosperity. Greater prosperity results in improved physical and

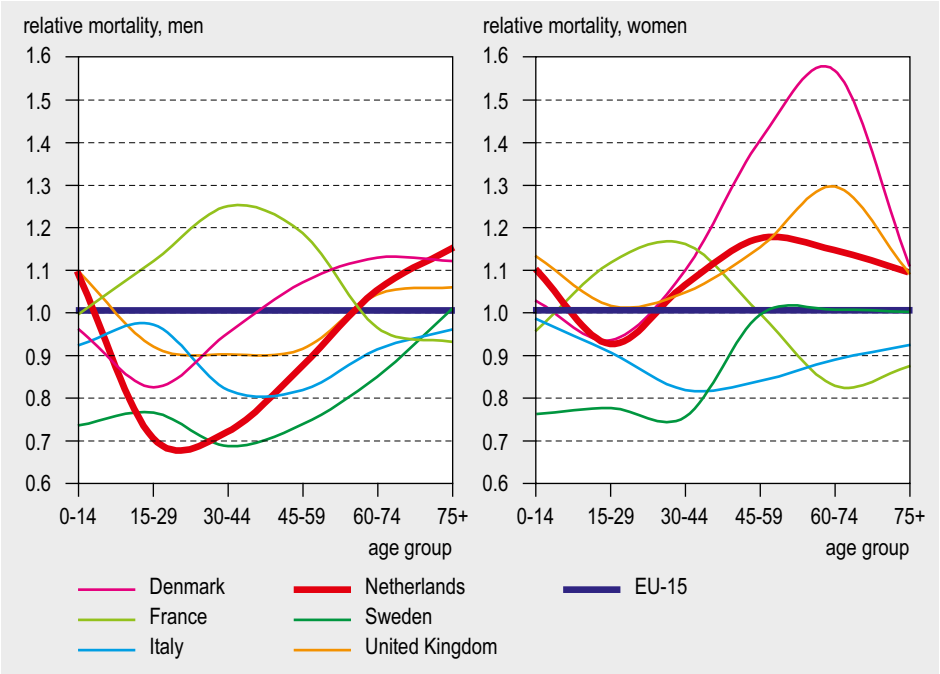


Figure 3: Relative mortality according to age among men and women in the EU-15 (Source: WHO-HFA, 2005).

social circumstances (including better education). In recent decades, economic growth has also increasingly provided a foundation for investment in successful treatments and prevention programmes.

Further health gains possible

Netherlands lags behind leading European nations

Among women in particular, life expectancy is not rising as quickly in the Netherlands as it is in most other EU countries. Even after the admission of five new member states, the Netherlands remains half way down the EU's 'league table' for female life expectancy. Male life expectancy compares only slightly better, being about average for the fifteen original EU member states. When comparison is made on the basis of health-adjusted life expectancy (HALE), the Netherlands is just above the EU average, but the differences between the various countries are small.

Mortality among adolescents and young adults – particularly males – is fairly low in the Netherlands compared with other EU member states, mainly due to better road traffic casualty rates. Among the elderly, however, mortality levels are higher in the Netherlands than most other EU countries (see *figure 3*). The life expectancy of the octogenarians has for some years barely increased in the Netherlands, while neighbouring countries have succeeded in improving the survival of this group.

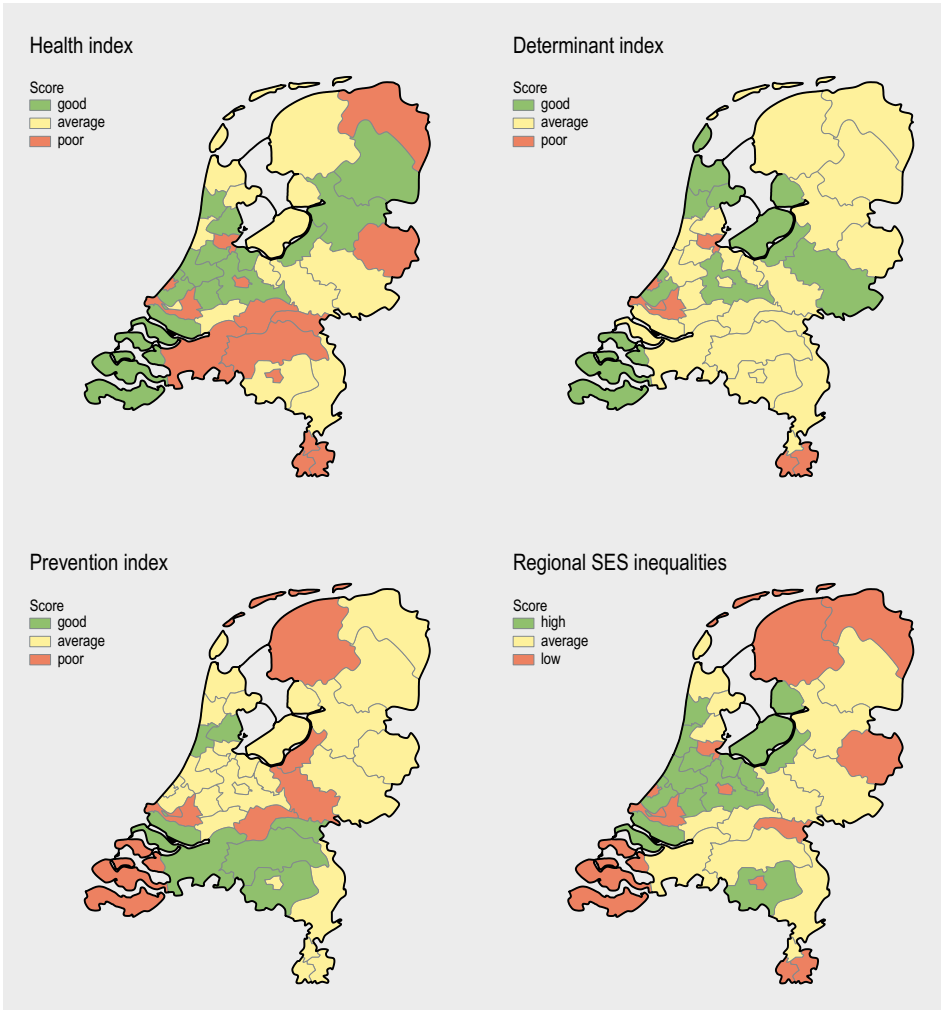


Figure 4: Aggregated public health index, determinant index, prevention index and socio-economic status per municipal health service region.

Regional inequalities: considerable scope for improvement

Considerable differences exist between the Netherlands' 39 municipal health service regions, in terms of health and the prevalence of health risk factors. In the 'healthiest' region, healthy life expectancy is nearly twelve years greater than in the 'least healthy' region. The percentage of smokers varies from less than 28% to more than 36%, while the percentage of people with obesity ranges from 6 to 16%. Often disadvantageous scores for health and risk factors are directly associated with a region's lower average socio-economic status. This is particularly the case in the big cities, in the northern Netherlands and in South Limburg (see *figure 4*). The extent of the inequalities and their geographical distribution has barely changed since the mid-1990s. The magnitude of these differences within the Dutch regions shows how much still can be gained for the overall health status of the Netherlands.

Figure 5: Percentages of boys and girls who were overweight and obese in 1997 and in 2002-2004 (Source: Van den Hurk et al., 2006).

Present-day lifestyles and obesity: concern for future health status

Just as today's public health situation is influenced by the way people lived in the past, the future health status of the nation will reflect the lifestyle choices people are making today. Although the picture is not entirely positive, grounds for optimism do exist. After years at a fairly steady level, the percentage of adults who smoke has fallen recently, from about 33% in the 1990s to 28% in 2004. Alcohol consumption among adults has also declined slightly since 2001.

Physical activity levels in the Netherlands have improved only slightly, however. Only half of the Dutch population is currently getting enough physical exercise. The nation's dietary habits are also far from ideal. The average Dutch person eats too much saturated fat and trans-fatty acid, but too little fruit, vegetables and fish. While consumption of fatty acids is at least decreasing, only 5 to 10% of the Dutch population has what may be described as a healthy diet. Where fruit and vegetables are concerned, the trend is actually towards less healthy consumption.

Overweight results from a combination of excessive calorie intake and insufficient physical activity. In the last quarter-century, the fraction of the adult population that is overweight has risen from a third to nearly half. The percentage of adults who are obese has doubled since 1980, from 5 to 11 percent. Almost all strata of society are affected by this 'epidemic'. However, there are signs that the trend is levelling off, particularly among the well educated.

Many people develop unhealthy habits early in life. Among teenagers of 15-19 years some 45% of boys and 36% of girls smoke: roughly the same as four years ago. Alcohol use among adolescents, and particularly among girls, is increasing. Binge drinking on evenings out has become popular. Only just over a quarter of young people gets enough exercise. It is among children that the prevalence of overweight and obesity is increasing most rapidly. In some age groups, the percentage of overweight children has doubled since 1997 (see *figure 5*).

Sound lifestyle choices can extend healthy life expectancy with many years
Tobacco use is the largest single cause of morbidity and mortality in the Netherlands. 13% of the total disease burden is directly attributable to tobacco use, with lung cancer, COPD and coronary heart disease as the largest causes. Excessive alcohol consumption is responsible for 4.5% of the disease burden in the Netherlands, mainly in the form of alcohol dependency. Overweight makes a notable contribution to the disease burden, accounting for nearly 10 percent of disease burden. Overweight is an important risk factor for chronic diseases such as diabetes and cardiovascular disease. Disorders associated with smoking, overweight and raised blood pressure also account for considerable amounts of the care budget: 3.7, 2.0 and 3.3%, respectively.

Improving health is not an easy task

Entrenched health inequalities
According to nearly all statistics, people of low socio-economic status are less healthy than people of high socio-economic status. They often do perceive themselves to be less healthy and are more likely to suffer from chronic disorders and disabilities. The ethnic minorities also form a vulnerable group where health is concerned; mortality among ethnic-minority children is higher, for example, than the national average. There has been little change in these socio-economic and ethnic health inequalities since the previous survey. People of low socio-economic status, including the ethnic minorities (i.e. those not of west-European descent), make above-average use of the care system. However, this is in accordance with their greater health problems.

Health inequalities are closely related to other forms of inequality
Geographical health inequalities are most marked at the neighbourhood level. There, a process of selection takes place. A deprived neighbourhood with low-quality housing, less favourable environmental conditions and a relative shortage of social provisions draws in those with poor prospects, while those with better prospects move away. Health inequalities are therefore concentrated at the neighbourhood level. But neighbourhood status is also a direct contributor to health inequality, since poor housing and environmental conditions, such as high levels of air pollution and noise, have an adverse effect on health. Furthermore, the prevailing norms of behaviour and social interaction can impact negatively on health in a neighbourhood as well. In short, health inequalities are closely related to numerous other forms of deprivation. As a result, the scope for making healthy lifestyle choices is in practice often limited, particularly for people of low socio-economic status.

Established and new challenges for prevention and care

Intensive, integrated approach to health promotion is promising
Unhealthy habits are deep-rooted in the Netherlands such as the series of three surveys preceding the present one (from 1993, 1997, 2002) has shown. One of the main reasons for the persistence of such habits is that unhealthy lifestyles do not exist in isolation, but are closely related to the social and physical circumstances in which people are born, raised and spend their lives.

An intensive, integrated approach to prevention, involving the use of various tools, is therefore required. Such an approach needs to address not only the individual, but also his or her environment. Tobacco use has for some years been strongly discouraged by the combined use of various policy instruments, including smoking bans, restrictions on the sale and advertising of tobacco products, and explicit health warnings. Over time, this integrated approach has borne fruit. Similarly, the number of road traffic victims has been reduced substantially since the 1970s, by addressing vehicle design, road-user behaviour and infra structural design. The consistent use of these integrated preventive packages is also a promising strategy to tackle life-style problems such as overweight and excessive alcohol consumption.

In the Netherlands, increasing emphasis is being placed on personal responsibility, certainly where health and healthy lifestyle choices are concerned. However, the individual's freedom of choice is often compromised, particularly by the social and physical environmental influences referred to above, in conjunction with personal traits. The healthy choices therefore not only need to be made attractive and easy to take, but also realistically achievable for all.

Scope for integrated public health policy
An integrated public health policy is potentially very powerful in terms of improving health and reducing (socio-economic) health inequalities. At both the national and local government levels, there is considerable unexploited scope for exercising a positive influence on health within other policy domains, such as occupational health and safety, environmental management, education, socio-economical policy, spatial planning and housing. If this scope is to be utilised, both the health sector and other sectors need to be alert to the emergence of health improvement opportunities that offer potential benefits for various policy domains.

In the public health care sector, it is increasingly the municipalities that take the initiative, particularly in the context of the Public Health (Preventive Measures) Act (WCPV). The Social Support Act (WMO) is expected to add momentum to this trend. However, not all municipalities have the capacity, expertise, (long-term) vision, funding or power necessary to take full advantage of the opportunities. The national government therefore has a role in actively supporting the municipalities.

In various other European countries, such as Sweden and the UK, there is greater explicit focus on socio-economic health inequalities and on the systematic pursuit of integrated health policies than in the Netherlands. Such a systematic approach may entail long-term general political consensus with regard to the approach required to tackle health inequalities, the provision of support with a view to empowering people to take personal responsibility for their habits, or the active encouragement of individuals, communities, agencies and local authorities to work together on improving living conditions and lifestyles.

Health promotion: better evaluation and more knowledge sharing required
Health promotion is important, but the initiatives taking place are not being evaluated as well as they might be. This is partly because it is very difficult to measure their effects, particularly over the longer term. Information about the effectiveness of health promotion policies and their implementation needs to be made generally available. This would facilitate the propagation of best practices, tailored to local circumstances wherever possible. It would therefore be helpful to have a central system for the collection, assessment and dissemination of information about health promotion, backed up by continuous interaction between researchers, policy makers and those working in policy implementation.

Many cost-effective prevention measures are not being implemented systematically
Cost-effect analyses performed elsewhere indicate that there are many cost-saving or relatively cheap preventive measures that have yet to be systematically implemented in the Netherlands. In many cases, the measures involve the prevention of disease among high-risk groups or preventing the worsening of the condition of people who are already ill. Various forms of health promotion or protection are actually cost-effective ('cheap'), such as discouraging tobacco use and specific interventions to reduce the risk of falling among the elderly.

Prevention and care are not separate domains
In countries such as the Netherlands, where health care is funded by a social insurance system, prevention is often more distinct from care than it is in countries where health care is fully funded by the government. This can lead to the neglect of preventive activities in the health care sector. It remains to be seen how the introduction of a new care system in the Netherlands will impact upon this separation. Whatever the outcome may be, it is important that health insurers and care providers are given adequate incentive to develop ('evidence-based') preventive activities inside and outside the care domain.

Prevention recommendations made in the last survey report remain valid
Over the last few years, various parties have developed initiatives that have contributed to the incorporation of preventive activities within the care domain and other social policy domains, to the use of settings (school, neighbourhood, work, care) and to broad-based knowledge sharing. As a result, many new preventive activities are underway. However, their coordination still has to be improved. A great deal has been

accomplished since the previous survey, but there is still much room for further improvement, such as sustainable programmatic approaches, including durable organisation and funding of the activities, and systematic evaluation of prevention activities in the Netherlands.

In this context, lessons can be learned from other European countries, which are also constantly working to rationalise health policy, e.g. through the creation of far-reaching, integrated programmes aiming at interrelated health objectives. Success factors in this regard include the shared 'ownership' of health problems by involved stakeholders, visible governmental stewardship and good communication.

Infectious diseases prepared for predictable and alert to unforeseen events
In the development of an epidemic or pandemic, two factors are decisive: the extent to which the responsible pathogen is transmissible between humans and the infectiousness of carriers in the period prior to diagnosis. In addition, the level of motivation and commitment to the control and prevention required from patients, health workers and the authorities is often a major factor.

Recent developments like SARS and avian flu have shown that infectious diseases can create global problems – from which the Netherlands is not immune. Hence, as well as being ready for developments we can expect, it is important to be alert to the possibility of unforeseen events. It can be crucial, for instance, to monitor any sudden increase in the incidence of an infectious disease as early as possible. There is also a need for flexible response systems, cooperation and information sharing among experts, nationally and internationally.

An aging population will need more and different care
One of the main driving forces shaping future developments in health and care is the demographic build-up of the population. In 2010, the first of the 'baby boomers' will reach the age of sixty-five. Thereafter, the ageing of the population will continue, until it is expected to peak in about 2040. Since health problems are more common among the elderly than among younger people, the total disease burden and therefore the demand for care will increase in line with the population ageing. Over the next twenty years, this phenomenon, combined with the effects of present day lifestyle choices and weight problems, will result in increases of 40% or more in some of the chronic illnesses associated with elder age. This will necessitate not only the provision of more care, but also different care, including a further shift from curative care to supportive care.

Demographic developments alone may be expected to necessitate a rise in the health care budget, from 57 billion euro in 2003 to nearly 70 billion euro by 2025. Of this increase, just less than 5 billion will result from population growth and 10 billion from changes in the composition of the population (primarily population ageing). These forecasts take no account of the impact of medical technological innovation or changing care demands by the public – factors which to date have had a larger impact than the demographic developments.

Insight into the quality of care

One of the main challenges facing the health care sector is to provide the government and other actors involved, plus the public, with a transparent picture of the quality of care. Health care performance can be measured in a variety of ways. There is increasing interest in performance indicators: statistics that provide insight into the quality of care and other aspects of the health care system, such as accessibility and affordability.

Health care performance assessment is a very dynamic field, and much is expected of it in the near future. However, many obstacles associated with the development and application of performance indicators remain to be overcome; for example, many of the data on which assessment might be based are neither standardized and comparable nor of sufficient quality, and the financial and administrative implications are considerable. Furthermore, the various participants involved tend to have radically different perspectives on performance and performance information and in some cases the expertise to develop indicators is lacking. Finally, performance indicators are not without their shortcomings. They will inevitably focus on particular aspects of a complex process. Much remains to be done before the indicators concept can be optimally applied for the assessment of performance within the Netherlands' health care system in all its aspects. Nevertheless, it is certainly no longer acceptable *not* to measure performance.

Health care brings both costs and benefits

Health care spending has risen sharply in recent years

In 2003, some 57.5 billion euro was spent on health care in the Netherlands. Between 1999 and 2003, spending rose by nearly 10% a year. More than 5% of the rise was attributable to price rises. Within the other 5% more than 4% resulted from growth in the volume of care provided, and only a quarter of this volume growth (1%) was associated with demographic developments. Compared with other European countries, the Netherlands has seen pronounced growth of the care quote (the percentage of the GDP devoted to health care) in the last few years. Nevertheless, the Netherlands' care quote is at the moment only slightly above the European average in absolute terms. The rise followed the adoption of a more liberal funding policy, partly directed at shortening or eradicating waiting lists.

Within the care budget, the largest share is taken by hospital care (27%) and care for the elderly (nursing, supportive care and home care: just over 21%). The next biggest share is for drugs and medical devices, accounting for somewhat more than 10%. Despite its importance within the system, GP care absorbs only 3.7% of the budget. The figure attributed to preventive care is relatively small (1.3% of overall expenditure), but this does not in fact cover all preventive activities, as will be explained later.

The allocation of funds to different diseases and care sectors in the Netherlands is generally consistent with the pattern in countries like Germany, Australia and France.

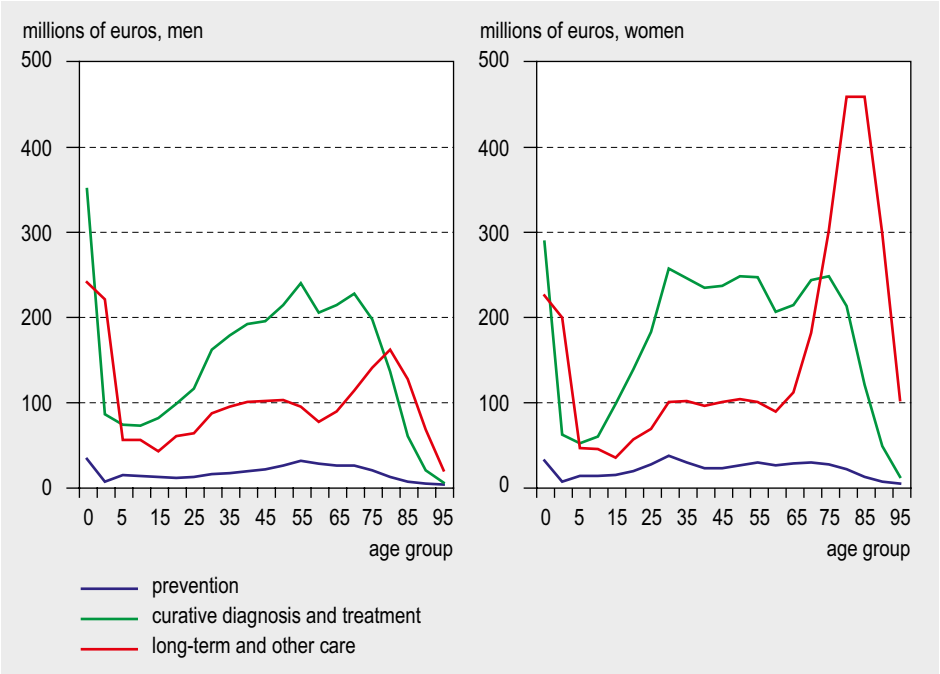


Figure 6: Health care expenditure in the Netherlands in 2003, broken down by function and by recipient age and gender (Source: Slobbe et al., 2006).

Expenditure on long-term care forms an exception in this regard, however, being considerably higher in the Netherlands than in comparable countries. This is reflected in the relatively large sums spent on mental disorders, including dementia and mental disabilities.

Considerable sums spent on prevention, but mainly outside the health domain

In 2003, at least 12.5 billion euro was spent on prevention in the Netherlands. Of this sum, 80% was devoted to health protection, 17% went to disease prevention (vaccination, early detection and treatment) and 3% to health promotion (measures aimed at promoting healthy behaviour). In other words, the bulk of the money – roughly 10 billion euro – was spent outside the health care sector on health protection initiatives in fields such as road traffic safety, waste disposal, air and drinking water quality management and food safety.

Care expenditure and phase of life

Age-related patterns of illness in the course of life are reflected in the demand for care. Young and middle-aged people mainly require curative care, while the elderly tend to be increasingly dependent on nursing and supportive care. The cost of preventive activities is more evenly distributed, with vaccinations provided for the very young and programmatic initiatives for the elderly (*figure 6*).

The need for care is largest in the last year of life. But the amount of care required is age-related. Generally speaking, the older a person is when he or she dies, the lower the cost of care in the final year of life. This has implications for health care expenditure forecasting. As the population ages, the average age in the final year of life will be gradually higher, so the total lifetime cost of care provision will not rise as sharply as many people assume.

Nevertheless, improved public health is more likely to result in more spending on health care than less, since, as people live longer, they develop new care requirement. Simulation models suggest that, if everyone in the Netherlands stopped smoking immediately, the amount spent on medical care over a lifetime would rise by more than 6.5%. Similarly, if everyone maintained a healthy weight and exercised regularly, the lifetime care cost would increase by about 2%. However, in that case many healthy life years are gained.

Health care: expenditures but also much 'production' of health

An ageing population is not merely a cause of expenditure; first and foremost, it is a triumph of health care. Whereas in the second half of the nineteenth and in the early twentieth century the main factors behind improved public health were increased prosperity and improved public hygiene, nowadays enhanced diagnosis and treatment play an increasingly important role. The rates of mortality associated with infectious and cardiovascular disease in particular have been reduced considerably in recent decades, thanks to medical care and collective prevention. In the case of cancer that contribution has been smaller until now. Research conducted in other countries suggests that the provision of mental health care has substantially reduced the disease burden associated with mental disorders. It is estimated that, to date, the total effect of health care has increased overall life expectancy by 3 to 4 years since the 1950s. It is reasonable to conclude that health care has made a major contribution to the health of the Dutch population, particularly in recent times.

Since the 1980s, the healthy life expectancy has increased by six or seven years, despite the rise in prevalence of chronic illness. This is probably due to the positive influence of medical devices and technologies, such as hearing aids, prosthetic hips and cataract surgery. Chronically ill people suffer less from their disability or are more able to cope with it. Less restriction implies increased self-sufficiency, extended social participation and ultimately less dependence on long-term care.

As indicated in the (Dutch) Health Care Performance Report recently published by the RIVM, the Netherlands has a universally accessible care system, with a performance comparable with other European countries. Nevertheless, much could still be gained by effective prevention, chain care and improved patient safety.

Investment in care has a high return

Macro-economic analyses show that investing in health and care has a high return. Improved public health increases prosperity. It does so in the first place by facilitating

economic growth. Health may therefore be regarded as a production factor, which enhances personal and communal prosperity by boosting productivity. Furthermore, health stimulates prosperity by serving as a tradable commodity. People attach considerable value to health, just as they do to material goods. A comparison has been made for the US situation, from which it was concluded that improvements in public health during the twentieth century have contributed as much to prosperity as the growth in personal consumption. Evaluated on this basis, investments in health and care may be considered to have a high economic return.

Need for information larger than ever

Availability of information: positives and negatives

Compared with 2002, access to information for this survey has been improved by an increase in the cross-linkage possibilities of existing data sources. However, a number of important information sources lack continuity. As a result, it is difficult to establish how a number of key public health elements have changed in the last few years. Prominent is the lack of information regarding, for example, individual health risk factors such as blood pressure and cholesterol level, and the mental health status of the population. The most recent national data on these factors are now more than ten years old. Furthermore, the existence of certain valuable data sources – including the General Public Health and Lifestyle Survey (Dutch initials: POLS) and the Hospital Patient Discharge Data Register (LMR) – is threatened.

New developments, new information requirements

New developments in the field of public health create new information requirements. It would be very helpful, for instance, to know more about the relationship between the prevalence of chronic disease and the restrictions experienced, and about the role of medical treatment and devices in this context. Greater insight is also needed into the way care and prevention impact on health, and into the effectiveness of implementation of preventive measures. The introduction of the new care system urges well-defined research in the effects on the accessibility and quality of care, and thus ultimately on public health (for example, health inequalities). Finally, coordination is needed to enable the utilisation of local data on health, prevention and care, for instance by local systems for public health monitoring.

Central government supervision vital in the information society

Social developments such as the emergence of the 'information society', the introduction of market mechanisms, privatisation and, a retreating government have major information-related implications. There is an information explosion and it is unclear what the quality and continuity of the data sources is. Furthermore, the number of participants – in particular private parties – involved in the collection and provision of information is increasing. This heightens the need for careful assessment of the available information that may be used in the public interest. Supervision by the central government, supported by national expertise centres such as the ICT, is vital in this context.

The importance of Brussels

European legislation and policy influence public health and health care in the Netherlands. Much of the legislation originates in policy sectors other than health, such as the internal market and social security. Through the European social agenda, the European Commission and the member states pursue common objectives on the quality, accessibility and affordability of care. The Dutch care sector should be actively involved in this process.

By participating in European networks and projects, the Netherlands can keep in touch with innovative thinking, methods and 'best practices' in other member states. This will be beneficial to public health and health care in the Netherlands, particularly where European initiatives endorse Dutch policy priorities. The prospects for success can be improved by ensuring the involvement of field organisations, the business community and government. It is therefore important that the government facilitates such involvement by, for example, the creation of a national 'European Incentive Fund'. As a relatively small country, the Netherlands needs to orientate extensively on Brussels. In order to get a firm grip on the cycle of the European policy development and implementation, close cooperation and interchange between the Dutch government and actors in the field is very important.

1 PUBLIC HEALTH STATUS AND FORECASTS 2006

1.1 The new Public Health Status and Forecasts Report

Government information campaigns, tax on tobacco products and alcohol, smoking bans in more and more public buildings and 'healthy' labels on supermarket products. All these techniques and more are used by the government, often working in tandem with other parties, to help and persuade us to live healthier lifes. Why does the national government concern itself with our behaviour and our health? Upon which aspects of health and whose health is that concern focused? And are we addressing the real threats to public health, or becoming preoccupied with side issues blown out of proportion by the media and others? Can initiatives aimed at promoting healthy lifestyle decisions actually improve the health status of key target groups? Or would it be more effective to tackle socio-economic inequalities, such as those associated with inner-city deprivation?

Increasingly, healthy behaviour is regarded as the personal responsibility of the individual citizen. Some commentators have suggested that perhaps people who pursue unhealthy lifestyles should be required to pay higher health insurance premiums. But is it actually the case that such people are a disproportionate financial burden on the health care system? It may be argued that what we should really be concerned about is the financial implications for the health care of people becoming healthier and living longer. Such questions cannot sensibly be debated – in parliament, in the local council or at the dinner table – without reliable data, analyses and insights.

Since 1993, the National Institute for Public Health and the Environment (RIVM) has accordingly published a Public Health Status and Forecasts Report (PHSF) every four years. The PHSF uses statistical information and analyses to shed light on the health status of the average Dutch person, on the (avoidable) causes of health impairment, on developments in care requirements, the demand for care, the consumption and cost of care, and on the scope for and cost of improving public health through prevention and care. The PHSF also identifies opportunities, threats and dilemmas that are likely to arise in the future (see *box text 1.1*).

The PHSF is more than a statistical publication; it is also intended to make the complex public health domain more transparent and manageable, and to support the processes of policy development and implementation. Particular emphasis was placed on these objectives in the first two, somewhat more 'academic', editions of the PHSF (the 1993 PHSF, of 800 pages, and the 1997 PHSF, which was in eight volumes, totalling around 2,500 pages). The pursuit of these objectives finds expression in, for example, the use of a conceptual framework for the logical organization of information (see *subsection 1.3*), the explanation of concepts such as health inequalities between social groups or neighbourhoods and the application of the disability-adjusted life year as an index for quantifying the impact of health policy.

Box text 1.1: The three-tier PHSF method.

The Public Health Status and Forecasts Report is part of a wider, continuous process whose purpose is to supply information to support policy-makers and professionals working in the public health domain, not only at the central government level, but also at the regional and local levels. The latest detailed information is published on websites (www.nationaalkompas.nl, www.zorgatlas.nl, www.kostenvanziekten.nl and www.kiesbeter.nl, which in particular is aimed at the general public). In addition, PHSF theme reports are produced, which provide medium-term explorations of particular policy issues. Among the more significant publications that appeared between 2002 and 2006 were Zorg in de grote steden (Health Care in the Large Cities of the Netherlands), Ons eten gemeten. Gezonde voeding en veilig voedsel in Nederland (Our food, our health - Healthy diet and safe food in the Netherlands) and Op één lijn. Toekomstverkenning eerstelijnszorg 2020 (Public health forecast for primary care in the Netherlands in 2020).

Published every four years, the Public Health Status and Forecasts Report summarizes the key developments in the public health domain and examines a number of themes – selected in consultation with the Ministry of Public health, Welfare and Sport (VWS) – in more detail. It draws heavily on the work done for the Kompas and Atlas websites, i.e. the continuous collation, processing and updating of health-related information. Thus, the websites may be regarded as the 'shop floor' of the PHSF business.

In the 2002 PHSF, Gezondheid op koers? (Health on Course?), the emphasis was more on the evaluation of public health in the Netherlands. By that time, it was felt that the data should serve not merely as a national reference resource, but also as an indicator of the performance of the nation's health care system (including the preventive mechanisms). It followed that the PHSF should address questions such as 'What trends may be identified?', 'Are things improving?', 'How well does the Netherlands compare with other EU countries?' and 'How do municipalities and regions compare with one another, and what does this say about where public health care can be improved?'

Over the last fifteen years, the PHSF has built up an authoritative reputation and, research indicates, has become better aligned with the policy agenda (see *box text 1.2*). In the 2006 PHSF, at the minister's request, greater attention is paid to the use of indicators to measure performance within the health care system, to regional and international comparisons and to the relationship between investment and return in the context of health care facilities. In other words, this PHSF is even more focused on the evaluation of health care than its predecessor. The PHSF's modified role is consistent with the present government's emphasis on the individual responsibilities of private citizens, health care users, local governments (to whom authority is increasingly delegated), care providers and health insurers (see *subsection 1.2*). As the state seeks to reduce its direct involvement, the insurers have been given a managing role in the new health care system. The central government now sees its function as supervisory; the executive parties are merely required to answer to the centre with regard to any potential inadequacies that may arise in terms of the quality, accessibility and affordability of care. In this context, the PHSF is a valuable resource.

The Minister of Public health, Welfare and Sport (VWS) has asked the RIVM to produce a (Dutch) Health Care Performance Report (HCPR), in addition to the four-yearly PHSF. The (Dutch) HCPR will appear every two years, and will use a set performance

Box text 1.2: The PHSF as science for policy: policy support and coordination work.

Recent research by the Institute of Health Policy and Management has shown that the PHSF has acquired an authoritative reputation over the last fifteen years (Van Egmond et al., 2006). The PHSF has become increasingly well aligned with the policy issues of the day. This has been achieved by, for example, using websites and publishing interim reports to make the PHSF more dynamic, providing more explicit explanations of the significance of PHSF findings for the various parties and statistical support for policy recommendations, and involving the Ministry more closely as both client and user. The significance of the PHSF in relation to government policy is further emphasized by its use in the formulation of documents such as the Prevention Policy Document, published every four years.

So how has the PHSF secured this reputation and how does it influence policy and politics? The parameters of the PHSF are defined in the context of a formal relationship with the Ministry, which has an interest in obtaining data to inform government policy (front-stage role). In this way, the PHSF fits the classic rational model of science as the supplier of facts, upon which policy may subsequently be based. However, the PHSF's reputation derives also from the largely invisible but very important informal coordination of science and policy, which both defines and transcends boundaries. For example, choices are made (often implicitly) by individuals and establishments regarding the provision of data and texts, alliances are formed and decisions taken, and all these matters have implications for the finished document and the role that it can play. Factors such as the creation of ties between important research groups and the PHSF and the standardization of data mean that the PHSF has become an obligatory point of passage and a platform for consensus, both in the context of policy development and in the field. It is these largely invisible, but by no means secretive backstage activities that make the PHSF's formal front-stage role as information provider possible. This combination of formal and informal relationships appears to be essential for the position of the PHSF.

indicators to shed light on the quality, accessibility and affordability of health care: prevention, medical care ('cure'), nursing and supportive care ('care'). The relationship between the PHSF and the (Dutch) HCPR, whose first edition appeared in May 2006, is considered more closely in *subsection 1.3*.

1.2 Shifting perspectives on health, disease and care

Health: from gift to obligation?

In science, in government policy and in society at large, perceptions of health and illness have shifted dramatically over the last few centuries. Illness was once regarded as fate or some form of punishment, while health was something perhaps to be prayed for, but primarily to be accepted as a gift. With the world, this view of health began to change: ailments were initially seen largely as chance occurrences, but, as time went by, increasingly as the results of scientifically definable causes. Initially, the emphasis was on causes at the collective level. As a result, around the start of the twentieth century, various hygiene and housing measures were introduced, which improved public health by focusing on the prevention of disease. Later, the emphasis shifted to curing the ill, as science provided greater insight into biological mechanisms and ways of influencing them. Creating the financial and institutional circumstances in which such care could be made available to everyone as an entitlement was one of the main functions of the welfare state, and remains an important policy objective. The enormous progress made in the fields of medical therapy and treatment has resulted

in people living longer and consequently becoming prone to different illnesses. Where such illnesses are concerned, care is aimed primarily at maintaining the best possible quality of life for the patient. In parallel with this development, government policy has increasingly come to focus on promoting (health-related) quality of life. This trend has been supported by growing scientific understanding of person-related lifestyle, risk factors, and causes of disease and the way a person's physical and social environment affects his or her health.

As attention has focused more on lifestyle and other risk factors, health has increasingly become seen as something for which each individual has a personal responsibility. The predominant factor influencing an individual citizen's health is considered to be the citizen him or herself; thus, health is looked upon as something that one can choose. Indeed, it seems from the pressure exerted by various advertising and information campaigns, that health is something a Dutch citizen has a duty to choose, in order to avoid becoming a burden on public resources. Diet, for example, is no longer dictated merely by personal preferences and/or health requirements, but also by moral considerations. Impetus has been given to the shift towards such thinking by advances in genetics, which have caused people to view illness increasingly in terms of family or even individual risk, rather than in terms of statistical associations with larger groups. As well as leading to the definition of a new group – the potentially ill – the rise of genetics has led to greater understanding of how the individual can avoid becoming ill by changing his/her personal behaviour. It is then a relatively small step to regard what the individual can do as what the individual should do.

Adjusting personal behaviour patterns on the basis of genetic personal health forecasts is indeed likely to improve the individual's health prospects. However, someone with a poor genetic risk profile could find it more difficult to obtain insurance, employment, etc. Furthermore, a personal obligation to avoid illness may be inconsistent with the right to determine one's own future and strike one's own balance between enjoyments and risks (Horstman et al., 1999). As the perception of healthy behaviour as a personal choice has gained ground, so the perceived importance of socio-economic health determinants and the role that the government might play in influencing such determinants in line with the principles of collective responsibility and solidarity has diminished.

To sum up, in the last century and a half, health has gone from being seen as a gift or the result of chance occurrences to being regarded as something for which one is personally responsible or even has a social duty to protect. Health and illness can therefore mean different things to different people, especially in our pluriform modern society. Hence, it is important to always be alert to potential tensions between the promotion of health (in certain ways) and other personal and public values.

Management by a retreating government

The emphasis on health as a personal responsibility is generally associated with the adoption of a more withdrawn role by all tiers of government, as reflected in, for

example, the Social Support Act (WMO) and the health care system reforms. Of course, as stated in the policy document Kwaliteit van Zorg: hoog op de agenda (Quality of care: high on the agenda), the government does in the public interest seek to ensure that the standards of care are appropriate in terms of safety, client focus and efficiency. To this end, it defines parameters and analyses results. Where everything between parameterization and outcome is concerned, the care sector actors together provide horizontal quality supervision, with the Health Care Inspectorate (IGZ) as final supervisor. The policy document states that care providers are primarily responsible for concretising the concept of 'appropriate care' by defining standards, guidelines and protocols, by working to quality systems and by formulating outcome indicators and standards. The government supports this process by, for example, organizing programmes such as Sneller Beter (Getting Better Sooner) and Zorg voor Beter (Caring for Better Health).

The policy document Kwaliteit van zorg (The Quality of Care) identifies client focus as one of the three dimensions of quality in care. However, it is pertinent to ask whether the standardization and monitoring of quality referred to above remains in tune with what the primary 'clients' and other stakeholders (care providers and recipients) perceive as the quality of care. People working in the field are, for example, concerned about bureaucratization and its implications for the time available to provide treatment, and about compulsory standardization and diminishing professional autonomy, which are sometimes perceived to have a negative influence on quality, rather than the intended positive influence (Van den Brink et al., 2005). Care is – implicitly in most cases – interpreted as a restrictively definable product, or as an impersonal standardized service quantifiable in terms of the home-care minutes. Such an outlook risks subordinating important aspects of what care relationships and the relationship aspects of care actually entail – aspects that can have a curative or health-promoting effect. These aspects include attention, the recognition of individuality and autonomy (which will lead one person to leave many matters to a trusted carer, while another benefits from exercising influence and personal choice), learning to cope with and find meaning in illness and impending death, and pleasure, human contact, etc. Taking account of such important dimensions of the quality by means of indicators and protocols is likely to fall short. Furthermore, little consideration so far appears to have been given to the potential for conflict between the movements towards personal responsibility on the one hand, and towards monitoring and control through standardization and the use of indicators and protocols on the other.

The desire to shift responsibility for health and disease away from central government and towards the municipalities, market players and private citizens may be interpreted as a justified recognition of the complexity of health (care) and illness in a non-reparable society. Nevertheless, various dilemmas can arise, as outlined above. Views differ as to the domains in which and the extent to which this shift is desirable and sensible (see, for example, Hurenkamp & Kremer, 2005). Greater emphasis on personal responsibility can certainly be interpreted as recognition of the individual's capacity to resolve his/her own problems, but it may also be seen as the government shirking

responsibility for problems the state appears unable to resolve. Furthermore, the advancement of personal responsibility could lead to the erosion of solidarity. Among private citizens, as patients or consumers of care, there is a similar spectrum of opinion regarding the merit of the realignments, in the context of which personal responsibility is often regarded as equal to personal choice. Research undertaken in the environmental policy domain indicates that the public still expects the government to lead the way in tackling problems, partly because of the issue of free riders and other social dilemmas (MNP, 2006a). The way that the above issues, dilemmas and expectations are interpreted obviously depends partly on one's view of the relationship between citizen and state.

It may be concluded that, when seeking to promote healthy living and quality in care, it is important always to consider the extent to which one's efforts are consistent with the actual determinants of health (care) and illness. In this context, allowance has to be made for the fact that, in a pluriform society, there will inevitably be divergent views of responsibility, health, care and the quality of care.

Differing perspectives in the PHSF

In this PHSF, a number of views of health and illness are considered, some more explicitly than others. In the *PHSF model* used as a conceptual framework, illness is interpreted as a multi-causal process with various determinants (physical, social and lifestyle-related, as well as person-related hereditary or acquired characteristics) shaping the individual's health status (see *subsection 1.3*). Aggregation of individual data results in a definition of public health and the factors that determine it (*subsections 2.1* and *2.2*). This deterministic view is consistent with the general scientific outlook that underpins the PHSF's intended function as a provider of science in service of policy. However, within this outlook, both collective and individual prevention figure only as determinants of determinants. This model does not therefore say anything about the extent to which the individual may be reckoned responsible for his/her own health, since terms such as responsibility, obligation and autonomy belong to the vocabulary of politics and ethics, rather than the vocabulary of scientific determinism. Because diversity, autonomy and vulnerability are very important issues in the context of policy and politics, they are considered in more detail in various parts of the PHSF.

Diversity in health is addressed, for example, through consideration of the relationship between health and life pattern and the way that relationship has changed in recent years. It will be apparent that any opportunity to 'opt for health' must always be seen in the context of personal and family circumstances and that personal circumstances and life patterns have become increasingly diverse (*subsection 3.1*). People are not only autonomous individuals; each person is also an actor in a network of children, partners, parents and friends, who influence his or her personal lifestyle in ways that are generally unintended and uncontrollable. In the section of the report dealing with vulnerable groups (*subsection 3.2*), the point is also made that the premise that health is something that an autonomous citizen may choose is one that at least requires qualification. The influence on health of cultural and socio-economic circumstances, such

as living conditions, ethnicity and income – all factors over which the individual has at best limited control – remains as great as ever, for example. Furthermore, autonomy is compromised or at least modified by illness.

Studies of people with chronic illnesses have shown that, although personal involvement remains strong, the ability to participate is diminished by illness (*subsection 2.1.1*). This also demonstrates that health should not be regarded simply as an objective; it is also an important medium for social participation and therefore for personal fulfilment (see, for example, *subsections 3.5* and *3.6*). At the same time, it is often the case that illness-related diminishing participation can be tackled by providing more and better facilities, and by generally restructuring society to being not principally focussed on the healthy 'standard person' (Van Houten, 1999). It is also apparent that illness is a burden not only on those who suffer it, but also in many cases on the people around the patient. Hence, health and illness should not be seen exclusively or primarily in terms of the individual and personal responsibility.

1.3 The PHSF model: relationships, performance, indicators

The (Dutch) Health Care Performance Report (HCPR) and the PHSF

In the PHSF model, health status is interpreted as the outcome of a multi-causal process with various determinants. This model is an adaptation of that put forward by the Canadian minister Marc Lalonde (Lalonde, 1974), which places public health in the centre of four groups of determinants: (1) endogenic or person-related characteristics (genetic, biological), (2) lifestyle, (3) physical and social environment and (4) health care (including preventive action). The PHSF model differs from the Lalonde model insofar as it more explicitly reflects the various (causal) relationships, such as the interactions between the determinant groups and the various types of preventive intervention. *Figure 1.1* illustrates the model in its simplest form. The diagram also shows that health status influences care consumption and the cost of care provision. The model treats demographic, economic, technological and socio-cultural developments as autonomous developments originating outside the public health domain.

This model provides a structure for the information presented in the PHSF. Some of that information is qualitative, while other information is quantitative. For example, the link between education and health at the neighbourhood level, or the importance of national coverage for certain preventive measures, may be considered purely qualitative. Typically quantitative information includes data on the incidence or prevalence of particular diseases (part of the Health Status block), the percentage of people taking sufficient physical exercise (part of the Determinants of Health block), or the vaccination rate in the child population (part of the Prevention and Care block).

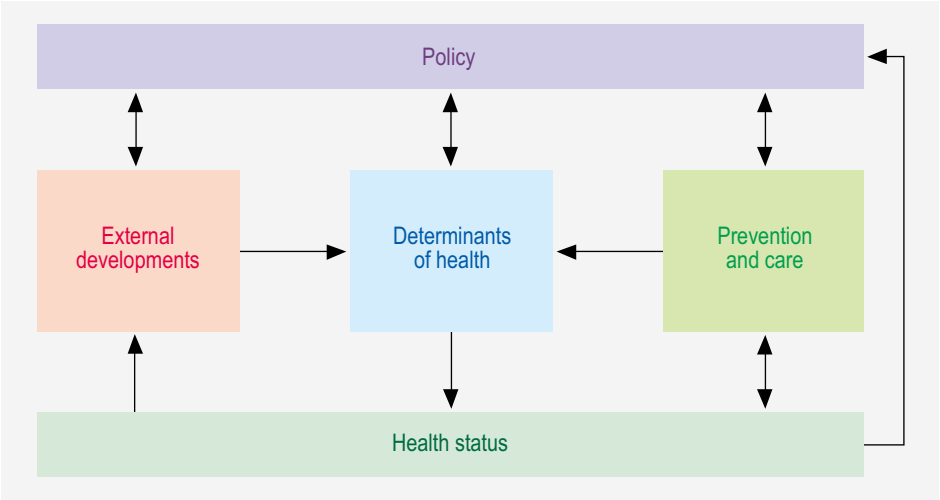


Figure 1.1: Conceptual model of the basic principles governing public health.

Indicators of public health

The term 'indicator' is usually used to mean a 'statistic', which provides a carefully weighted reflection of a series of supporting data on a particular topic. By looking at such an indicator, one can follow trends or make comparisons between countries or regions. If indicators are linked to policy objectives or proposals, they can also be used to measure the effectiveness of a policy or the performance of an actor; under such circumstances, an indicator is referred to as a performance indicator. The selection of a set of performance indicators depends largely on one's objectives, on the actors and on the aggregation level. The science of measuring performance in the care sector is still very much under development (Arah, 2005).

Using a carefully chosen collection of quantitative indicators, one can effectively reveal trends over time, make comparisons between regions within the Netherlands or between the Netherlands and other appropriate countries. In this way, 'bald' statistics can be given meaning. Is the Netherlands doing better than ten years ago? How do we compare with other EU countries? What sort of gap exists between the worst performing region in the Netherlands and the best? Do regional comparisons reveal a consistent pattern between high and low scores? Questions such as these are addressed mainly in *chapter 2*.

The (Dutch) Health Care Performance Report (HCPR) and the PHSF

One example of performance measurement is the HCPR, the first draft of which was submitted to the minister in May 2006 (Westert & Verkleij, 2006). The government wishes to use this new tool to monitor health care and thus protect the public interest following introduction of the new health care system. The indicators used in the context of the HCPR are concerned first and foremost with performance – i.e. quality, accessibility and affordability – within health care (including preventive care). The HCPR

does not merely provide information about some of the indicators considered by the PHSF, but to a significant extent provides additional information. The rationale being that the performance required of the sector is a matter not only of 'producing health benefits', but also of realizing certain other functional objectives.

The HCPR is intended primarily for the Ministry and the Lower House of Parliament. However, it is also of relevance to local governments, care practitioners, the scientific community and other actors in the community. The HCPR seeks to reduce information to the smallest practicable number of quantitative indicators and to use these to reflect performance in health care. The PHSF is more descriptive, explanatory and exploratory; it seeks to provide clarification and illumination. Unlike the HCPR, the PHSF covers the full breadth of the public health domain, including social and physical environmental factors, lifestyle and the many health-determining factors external to the health care system. The PHSF indicators may be seen as indicators of the performance of the health system as a whole, i.e. of all activities intended to improve public health, including care, prevention and inter-sectoral policies, with a distant time horizon. Comparative indicators of similar breadth have previously been presented in, for example, the World Health Report 2000 (WHO, 2000a). The HCPR monitors the pulse of the system, while the PHSF also highlights new developments and helps to set the agenda of public debate.

1.4 Information supply

PHSF depends on high-quality data supply

The information presented in the PHSF serves to support the health policy of the national government and is increasingly important for evaluating the performance of the health care system. The PHSF is in its turn dependent upon the underlying data flows. It is crucial that the data supply is transparent, high quality and comprehensive.

The PHSF makes use of a large volume of data obtained from surveys, registration programmes, screening programmes and such like. These include questionnaire-based health and care consumption surveys of the general public (designed mainly to provide information about perceptions and behaviour), screening programmes (aimed at the objective measurement of data on, for example, blood pressure, overweight, early manifestations of disease, and the prevalence of diagnosed or undiagnosed physical and mental illnesses in the population), and health care registration programmes (focusing on diseases, diagnoses and care consumption by people who have sought the help of care providers). This variety of data sources is vital: each complements the others; they are not alternatives to one another.

Information supply could be improved by the linkage of data sources

Creation of the Gezondheid Statistisch Bestand (Health Statistics Database, or GSB) maintained by the Statistics Netherlands is a welcome recent development. In this database, information from various care registers is anonymously linked to personal data

from the Register of Births, Deaths and Marriages. Using the GSB, it is possible to track care consumption and personal health status over time. It is possible to see changes in, for example, the numbers of people readmitted to hospital with particular diseases. The recent Statistics Netherlands publication Gezondheid en zorg in cijfers 2005 highlights the increased scope for the linkage of data sources (CBS, 2005).

In other fields too, the linkage of data sources has played a greater role in the compilation of the 2006 PHSF than in the preparation of its predecessor. Nevertheless, there remain numerous national databases, containing regional, local, district or neighbourhood data, which are barely interlinked. Hence, considerable further scope exists for improving scientific understanding of the influence of environmental factors on public health. One example of the benefits attainable is the way insight into the combined influence of neighbourhood inequalities and individual characteristics on health and health inequalities have been enhanced by intelligent linkage of neighbourhood data to the findings of health surveys and mortality statistics (Kunst et al., 2005).

Continuity of various key information sources threatened

Encouraging though the developments outlined above may be, the data-supply benefits of source linkage may be more than offset by another less welcome trend. The 2006 PHSF has been much more reliant on information from care registration programmes than its predecessor, because a number of sources of general epidemiological data, including screening programmes such as Regenboog and ERGO, have dried up. Furthermore, the continuity of important sources such as POLS (health and lifestyle in the general population) and LMR (hospital admissions and discharge) is threatened. As a result, the basis of the PHSF products (see *box text 1.1*) has become smaller and more vulnerable, potentially compromising the PHSF's ability to fulfil its primary function. Some of the data used for this PHSF, such as those on mental public health, are already ten years old, while numerous epidemiological data series now lack reliable recent national figures. These include the series relating to:

- Blood pressure, cholesterol, overweight and energy use through physical activity in the general population
- Eating habits in the general population
- Mental public health
- Cardiovascular disease, arthritis and diabetes
- Mortality in different socio-economic groups

Upcoming advances mainly involve linkage and harmonization

One of the most important upcoming changes is the introduction of the unique personal ID number, as recently endorsed by the government. Every Dutch citizen will be issued with a unique Citizen Service Number (Dutch initials: BSN), under a system based on the existing social-fiscal (SoFi) numbering system. The introduction of this universal number should encourage the cross-linkage of databases. It is presently anticipated that the new number will be introduced in autumn 2006, with the timing depending partly on the parliamentary decision-making process (www.programmabsn.nl).

In addition, two monitoring systems are under development, with harmonization as one of the primary aims. The systems in question are the local and national public health and youth health monitoring systems. Both will seek to harmonize the local and regional records maintained by the municipal health services and home care organizations, with a view to enabling collective benchmarking. However, it is very unlikely that the harmonization of local PHSF activities will make national PHSF programmes such as POLS redundant.

Gaps in the information supply in various policy domains

In a number of policy domains, the information supply is inadequate, potentially complicating the process of policy development. The problem areas are as follows:

- *Perinatal and youth health.* The midwifery and neonatal databases are being modified and combined to create a single perinatal data register, containing information about matters such as risk factors and screening activities. At present, the midwifery data registers cover almost the entire country, while participation in the perinatal data registration programme is growing. However, only a small amount of information concerning congenital abnormalities is recorded in the register. More detailed, but equally incomplete registers are maintained only at the regional level (Eurocat). We do not have a proper overview of the health status of the youth population. Although systems for the collection of data in the field are under development (the local and national public health and youth health monitoring systems), they cannot be expected to provide a comprehensive picture in the short term without a substantially greater level of commitment.
- *Trends in disabilities, particularly among the elderly.* Health status of certain vulnerable groups. In the big cities in particular, the ethnic minorities form an increasingly diverse and diffuse population group. Research into the health status of the ethnic minorities therefore needs to differentiate on the basis of country of origin and health issue. To this end, the questionnaires used in such research need to be tailored to individual target groups. There is a serious shortage of information about the health status of the most vulnerable groups in society, such as homeless and shelterless people, extramural psychiatric patients and addicts, mainly because these groups are not represented among the respondents to general health surveys.
- *Health status of certain vulnerable groups.* In the big cities in particular, the ethnic minorities form an increasingly diverse and diffuse population group. Research into the health status of the ethnic minorities therefore needs to differentiate on the basis of country of origin and health issue. To this end, the questionnaires used in such research need to be tailored to individual target groups. There is a serious shortage of information about the health status of the most vulnerable groups in society, such as homeless and shelterless people, extramural psychiatric patients and addicts, mainly because these groups are not represented among the respondents to general health surveys.
- *Cost of illness and diagnosis data.* In various important respects, the supply of data on the cost of illness has improved considerably, partly as a result of the creation of the Health Statistics Database (GSB). In various fields – such as outpatient care,

rehabilitation and the care provided by certain primary care professions – little or no diagnosis data is recorded.

- *Impact of the new health care system*. The switch from a supply-led health care system to a demand-led one has stimulated interest in the health care 'yield' – the payback from the provision of health care, in terms of improved public health, increased quality of life and reduced morbidity and mortality. However, information about these matters is scarce. In addition, there is a need for research focusing specifically on the effects of the new health care system on the accessibility of care and the implications for public health.
- *Harmonized regional data for use in the context of the Social Support Act*. National data do not provide a proper basis for the formulation of local or regional policy. The local and national public health and youth health monitoring systems, together with the establishment of regional PHSF systems in various parts of the country, are promoting the cross-linkage of regional data sources. In the development of the local monitoring systems, a balance is being sought between local autonomy and national harmonization. A similar balance must also be sought in the development of the monitoring systems that are being created to provide the data needed for local implementation of the Social Support Act (WMO).

Influence of the information society on the collection of health and care data

Technological developments such as the enormous growth of electronic storage capacity, the rapid expansion of the worldwide web and the emergence of so many new communications options have considerable implications for information supply in the public health domain. A well-thought-out information policy is accordingly required.

The burgeoning volume of information available makes its structuring – both at the point of collection and for analysis – ever more important. Furthermore, as the information pool grows, the identification of relevant, reliable and valid information becomes increasingly critical to the process of shedding light on (trends in) public health.

Epidemiological surveys are likely to undergo something of a metamorphosis in the years ahead. For one thing, participation levels are falling, even where the most long-running programmes are concerned. Furthermore, there is increasing population group diversity, and there is a constant stream of findings from 'instant' surveys conducted via the Internet and other communications media, which enable researchers to gather information from large numbers of people. Although it is usually not known or unclear whether such surveys are representative, they often have considerable impact on the impressions created in the media, at least in the short run.

Information concerning the primary public health and health care processes is increasingly recorded in electronic form; we now have electronic medical records (EMRs) and electronic child records (ECRs), for example. Such records are potentially very useful sources of information, whose utilization could improve the national information supply. However, it is a long way from the recording of data to the aggregation of data into useful national information pools. New registers are being set up in increasing num-

bers, simply because of the ease with which data may nowadays be saved in electronic files. The downside of this trend is that it is becoming more difficult to harmonize the various information sources. This is particularly important in the context of national and international uniform registers intended to enable the identification and monitoring of long-term trends. Flexibility is also an increasingly important characteristic of a long-term data registration programme, since such programmes need to be able to respond to rapid developments in the public health domain and in the scientific world.

The Netherlands as part of the European information supply network

The need for international comparison continues to grow. The Netherlands is in the vanguard of indicator development of the European Union and the OECD (ECHI(M), HCQI), but is less progressive in terms of participation in international health data collection programmes. The nation's provision of data to international organizations is not organized as well as it might be. In many cases, information from the Netherlands is available, but not in a form that facilitates international comparison, partly because the Netherlands does not participate in a number of international programmes. The harmonization of international data collection activities is a complex and time-consuming process. It is nevertheless an area in which the Netherlands should invest by, for example, setting up a national development fund to support participation in European data registration initiatives and research.

Good information supply of considerable public benefit

Where disease prevention is concerned, many of the necessary tasks fall to the government. As a result, the government is also an important player in the supply of public health care information. In the fields of curative and long-term care and at the interface between care and prevention, it tends to be much less clear who has primary responsibility for the development of a systematic vision of how appropriate information should be collected for policy support and in service of the general public interest. The government is looking to play an increasingly withdrawn role where health care is concerned, and will ultimately make the other actors responsible for the information supply and its standardization. Nevertheless, the government will remain responsible for the performance of the health care system as a whole (Prismant, 2005a). Furthermore, the decentralization of other government activities could suffocate the supply of national data.

Introduction of the new health care system is expected to lead to further privatisation. It is therefore important that the public interest is protected, since there is a tendency for privatisation to result in information that was in the public domain becoming a commodity to which access is restricted. As market forces are given freer rein, commercial considerations may deter market players from sharing data. The emergence of strategic registration practices is also a possibility. At the same time, the more removed government will have an increasing need for reliable and impartial data to enable it to perform its assessment and supervision tasks. Hence, in order to fulfil its role, the

government will have to demonstrate greater commitment to ensuring a good data supply than has been evident in the past.

In the interest of the primary care process and in the public interest, there is a need for a shared vision, shared responsibility and joint funding by the government and other actors. In its supervisory role, the government should be striving to ensure unity of language (where appropriate), and transparency on the part of all players, and to secure an overview of the information supply (meta-information). There is likely to be increasing need for impartial 'trusted third parties', who can combine different actors' databases and make the data available for use in the public interest, subject to agreed conditions. The ability to record data in electronic form should mean that administrative loads are reduced, as the necessity to record information more than once is removed.

Numerous types of information required

In its report on the public health knowledge infrastructure, the Advisory Council on Health Research (RGO) observed that the most serious gaps were in intervention research: the development of new forms of intervention and research into their efficacy and cost-effectiveness. Other fields where gaps were identified included determinant research, cohort research and secondary (causal) analyses of existing data sources (RGO, 2003). The analysis of knowledge gaps presented here is largely consistent with the RGO report, but additionally highlights the importance of having sufficient primary data sources, the influence of social developments and the responsibility that the government has to ensure an efficient, high-quality information supply in the public interest.

1.5 The future of the PHSF

Formalization and coordination between VWS and RIVM's PHSF Centre

The PHSF has acquired an authoritative reputation over the last fifteen years and has become increasingly well aligned with the policy issues of the day (Van Egmond et al., 2006; see *box text 1.2*). The combination of formal and informal processes – the provision of factual information and the fulfilment of a coordinating role between science and policy – has apparently been crucial in this regard. However, there is a danger that the increasingly formal relationship between VWS and RIVM's PHSF Centre might lead to a reduction in informal contacts, particularly given that much of the informal coordination work goes on behind the scenes and cannot easily be made more visible. Hence, the extension of formal working relationships would tend to increase the need for coordination with the various VWS clients, rather than reduce it. The way the combination of formal and informal relationships is in future shaped – both implicitly and explicitly – is a subject that requires ongoing attention.

New users: one major PHSF and thirty-six minor ones?

So far, the Ministry of VWS has been the primary audience for the PHSF. However, in line with the decentralization referred to earlier, it will in future become more important to involve other parties in the PHSF process in order to provide a platform for consensus among all those who participate or have an interest in the PHSF. Extending involvement in this way would also facilitate the inclusion of a wider variety of perspectives on illness and health (care). Furthermore, it is not only the central government that has an interest in reliable information on health and illness; regional and local governments also need such information to inform their health policies. The municipalities are, for example, obliged by the Public Health (Preventive Measures) Act (WCPV) to publish a (local) public health policy document every four years. However, given its present predominantly national structure, the PHSF can at the moment not adequately inform local health policy.

Municipal health services (MHSs) are maintained by individual municipal authorities or, in many cases, by collaborative groups of municipal authorities in order to carry out the municipalities' public health care duties. The thirty-six MHSs together form a nationwide network and report on matters such as health and health care in the municipalities. However, the comparison of local statistics with national and other municipal figures is often complicated by differences in the way data are collected, analysed, interpreted and presented. Such differences can also lead to unnecessary inter-regional variations in the prioritization of health problems. If regional versions of the PHSF were produced, this would satisfy the need for local health-related policy-support information while also addressing the data-comparability issues. A regional PHSF programme would collect, analyse and integrate regional and local data on public health and health care in a nationally comparable manner. As a result, the municipalities would have a better picture of the local public health situation and its determinants, and could more easily compare themselves with their peers, with the regions and with the Netherlands as a whole. Greater insight into the local health situation and into the municipality's standing relative to others would facilitate improvement and provide a platform for more evidence-based local health policies. A municipality would be able to benchmark its local health policy and learn from others' experiences.

In the MHS areas Hart voor Brabant and West-Brabant, work has started to establish a regional PHSF system along the lines described above. For the project, the MHSs in question are collaborating with the Academic Public Health Workshop, in which the RIVM and the University of Tilburg also participate (De Goede et al., 2005). The intention is to produce both a report covering the whole of the MHS region, plus a list of locally relevant key points for each municipality. The local key points will identify, in the most concrete terms possible, the options open to the municipalities for addressing the problems faced by the municipality. The development of a regional PHSF model promises to be a further step towards a fine-meshed integrated network for the supply of public health and health care information, which is not only at the service of local government, but also could in future make an increasing contribution to the development of national PHSFs.

1.6 Structure of the report

Chapter 2 begins by describing the health of the Dutch population (*subsection 2.1*) and the factors that influence it (*subsection 2.2*). Attention is then given to the significance of prevention for the nation's health (*subsection 2.3*). The contribution to public health in the Netherlands made by the health care system is discussed in *subsection 2.4*. This is followed by an analysis of care consumption patterns and the associated costs (*subsection 2.5*). Supporting data, statistics and methods can be found on the various websites (www.nationaalkompas.nl, www.zorgatlas.nl and www.kostenvanziekten.nl).

In *chapter 3*, public health in the Netherlands is examined from a number of other angles. First, diversity in health and in health problems is considered in relation to life patterns (*subsection 3.1*), vulnerable groups and spatial differences (*subsection 3.2*). *Subsection 3.3* provides a risk-based assessment of the Netherlands' vulnerability to (new) infectious disease epidemics. In *subsection 3.4*, the Netherlands is compared with Europe as a whole, and the Dutch system of public health care with those in other EU states; where lessons are to be learnt, these are highlighted. The latter subsection also considers the significance of Europe for public health in the Netherlands. Thereafter, in *subsection 3.5*, demographic projections are used as a basis for forecasting how disease patterns will develop and what the cost implications are likely to be. Two contrasting future scenarios are then used to examine dilemmas for public health in the Netherlands. The PHSF is concluded with a look at themes of economics of health care (*subsection 3.6*). After considering the interaction between health and prosperity, this final subsection ends with a closer look at the 'yield' of health care is.

2 HEALTH, PREVENTION AND CARE IN THE NETHERLANDS

The PHSF model and the organization of information

In this chapter, we present information on health, prevention and care. Significant trends are highlighted, as are the fields in which clear regional or international variations exist, with a view to identifying where improvements can be made.

Since the first PHSF in 1993, the information referred to above has been organized according to a conceptual model: the 'PHSF model'. In the PHSF model, health status is interpreted as the outcome of a multi-causal process with various determinants. This model is an adaptation of that put forward by the Canadian minister Marc Lalonde (Lalonde, 1974), which places public health in the centre of four groups of determinants: (1) endogenic or person-related characteristics (genetic, biological), (2) lifestyle, (3) physical and social environment and (4) health care (including preventive action). The PHSF model differs from the Lalonde model insofar as it more explicitly reflects the various (causal) relationships, such as the interactions between the determinant groups and the various types of preventive intervention.

Figure 2.1 illustrates the PHSF model in more detail (expanding upon the simplified illustration in *subsection 1.3*). The Health Status block shows how diseases and afflictions can result in reduced functional capability, reduced quality of life and sometimes death. Together, these effects can be expressed in terms of healthy life expectancy. The Health Status block is considered in *subsection 2.1*. The Determinants of Health block identifies three groups of determinants that are external to the care domain: environment, lifestyle and person-related factors. These are discussed in *subsection 2.2*. The three elements of prevention (health protection, health promotion and disease prevention) each have their own particular relationships with the three external determinant groups, and these are described in *subsection 2.3*. The Care block covers matters such as quality and accessibility, which influence health, plus matters that are also primarily the consequences of health status, such as facility usage and cost. These matters are dealt with in *subsections 2.4* and *2.5*. The external developments identified in the diagram are developments that, although they take place outside the health domain, do influence health status via the determinants. Finally, the Policy block includes not only health and care policies that are intended to influence the determinants of health, particularly through preventive initiatives and the provision of care, but also integrated health policy, namely policy that seeks to address matters in other domains (covered by the External Developments block), which influence health.

The model illustrated below is not quite the same as the one used in the context of the three previous PHSFs (1993, 1997, 2002). Revision of the model was motivated mainly by the wish to better reflect the dual role of care and integrated health policy. This general model provides a structure for the information presented in the PHSF. Some of that information is qualitative, while other information is quantitative. For example,

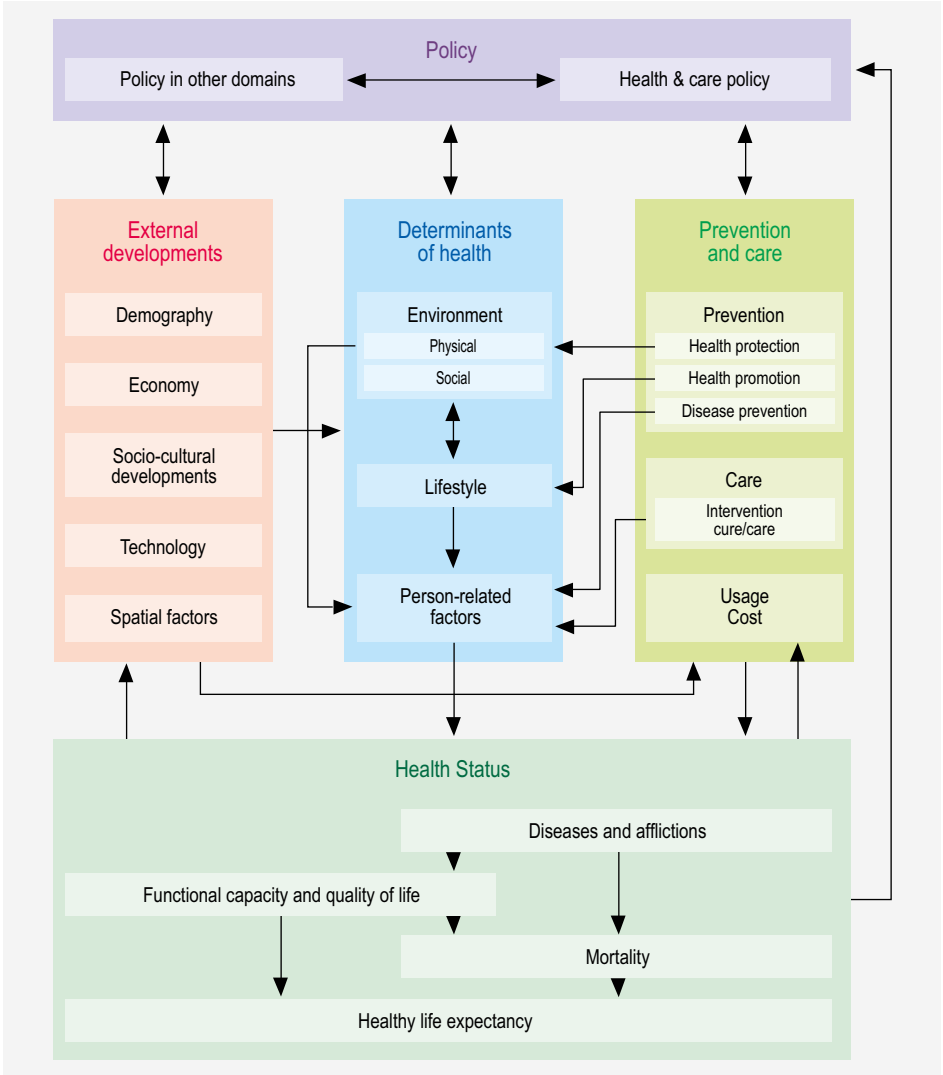


Figure 2.1: Extension of the conceptual model of public health (see figure 1.1).

the link between education and health at the neighbourhood level, or the importance of national coverage for certain preventive measures, may be considered purely qualitative. Typically quantitative information includes data on the incidence or prevalence of particular diseases (part of the Health Status block), the percentage of people taking sufficient physical exercise (part of the Determinants of Health block), or the vaccination rate in the child population (part of the Prevention and Care block).

This chapter considers a small number of key statistics. Underlying studies, detailed information and references to supporting data sources may be found on the following websites: the National Compass on Public Health (www.nationaalkompas.nl), the National Atlas of Public Health (www.zorgatlas.nl) and the Cost of Illness (www.costoffillness.nl).

2.1 What is the health situation in the Netherlands?

Illness is a burden on the patient and those around him/her

Coronary heart disease, anxiety disorders, strokes, depression and COPD account for the bulk of the burden of disease in the Netherlands (by causing premature mortality and/or reduced quality of life). However, illness is a burden not only on the patient, but also on those around him or her. The immediate relatives of people with chronic diseases are deprived of support and burdened by the need to provide physical and emotional supportive care. Furthermore, sick individuals can sometimes cause problems for the wider community.

Noticeable shift in disease and mortality patterns

There has been very little change since the previous PHSF in the top ten causes of disease burden. However, certain shifts in the pattern of disease are apparent. Cardiovascular disease remains the largest single cause of death in the Netherlands, but the number of people dying from cardiovascular diseases has been falling sharply. Cancer mortality rates have not been declining as quickly, so that in relative terms cancer is an increasingly significant killer. While the overall disease burden associated with smoking-related disorders such as COPD and lung cancer remains relatively stable, there has been a substantial rise among women and a substantial decline among men. Furthermore, the numbers of people affected by diabetes and asthma have risen considerably in the last ten years. However, the growth in the number of asthma patients now appears to be levelling off; the incidence of the disorder has stabilized since the late 1990s, while the number of children with asthma has even fallen slightly.

More illness, but possibly less disability

The percentage of the population suffering illness is rising, but the percentage affected by physical disability appears to be declining. The obvious explanation to the reduced disability is improving medical technology, combined with more widespread use of medical devices. It has been convincingly demonstrated that this is the case in the USA, but proof remains absent in the Netherlands.

Life expectancy remains close to European average

The average Dutch person's life expectancy is gradually rising, but less quickly than in most other European countries. In the previous PHSF, it was reported that life expectancy for Dutch women was lower than the average for the EU. This remains the case even after enlargement of the EU to twenty-five countries. For men too, life expectancy in the Netherlands is significantly less than in the healthiest European countries. Dutch male life expectancy is roughly average for the fifteen old EU member states.

National health inequalities also apparent

Average life expectancy in the healthiest of the old EU countries is four years greater than in the least healthy country. Within the Netherlands, the life expectancy differential between the healthiest and least healthy regions is three years. Generally speaking, the healthiest regions are in the west. However, the major urban areas form health

black spots within this part of the country; the cities of the west share the lowest life expectancy levels with certain regions in South Limburg. Other health indicators show a similar pattern of regional inequality.

What is health and how does one measure it?

The formulation of appropriate public health policies depends on the availability of information regarding the health status of the population and how that status is changing. However, it is necessary to ask at the outset what exactly constitutes health and how can it be measured. Traditionally, the most widely used indicator of health has been mortality. On their own, however, numbers of deaths present an incomplete picture; the age of those who die must also be considered. Hence, this report presents not only mortality figures, but also life expectancy and lost life-years. Where lost life-years are concerned, it is assumed that someone who dies young has lost more life-years than someone who dies old. Nevertheless, statistics on mortality and lost life-years still present an incomplete picture, because illness does not always lead to death. This report accordingly details the numbers of people suffering from particular diseases and the implications for functional capacity and quality of life. Finally, illnesses are ranked in order of significance by combining all the above measures of health to form a single index, the DALY (disability-adjusted life-year). *Subsection 2.1.1* identifies the ten most significant diseases in the Netherlands in terms of mortality, lost life-years, numbers of patients and quality-of-life reduction. Social participation among the chronically ill is also briefly considered, along with the burden of disease on people other than the patient. Most of the data presented relate to the year 2003, but in some cases more recent statistics are presented.

Subsection 2.1.2 looks at the most important developments in public health over the last few years. Consideration is given to questions such as: Is our life expectancy still increasing? How many years of good health can the average person expect? What developments can be discerned in the patterns of disease and physical disability? And what are the main causes of the observed changes? Finally, *subsection 2.1.3* compares the health situation in the Netherlands with that in other European countries: in what respect is the Netherlands doing well, and in what respect are we under performing? This international comparison is supplemented by an analysis of regional health inequalities within the Netherlands.

In this chapter, little or no attention is paid to health in relation to age or to the health of vulnerable groups in the Netherlands. These topics are addressed in *chapter 3*. Since infectious diseases do not at present represent a major public health problem, they receive very little attention in this chapter. However, because such diseases do form a potential threat, the Netherlands' vulnerability to infectious disease is considered in *chapter 3*.

2.1.1 Mortality, morbidity and quality of life

Average life expectancy: seventy-six for men and eighty-one for women
In 2003, roughly 142,000 people died in the Netherlands: 69,000 men and 73,000 women. The number of deaths equated to nearly 1% of the total population of roughly sixteen million. More than half of the men and nearly three quarters of the women were seventy-five years old or older when they passed away (Statistics Netherlands StatLine, 2006). In 2003, average life expectancy in the Netherlands was 76.2 years for men and 80.9 years for women.

Cardiovascular disease and cancer cause the most deaths
The biggest killers in the Netherlands are cardiovascular disease (47,000 deaths) and cancer (40,000). This has been the case for several decades, but the relative significance of these causes is changing: mortality due to cardiovascular disease is declining, while mortality due to cancer is increasing (see also *subsection 2.1.2* regarding trends). The most significant forms of cardiovascular disease are coronary heart disease and stroke (see *table 2.1*). Since the 2002 PHSF, stroke has overtaken coronary heart disease as the biggest killer among women. Out of the various forms of cancer, lung cancer causes the most deaths.

After cardiovascular disease and cancer, lung diseases represent the third largest number of fatalities. In 2003, around 14,000 people died from lung diseases, nearly half of them (6,500) from COPD (chronic obstructive pulmonary disease, like pulmonary emphysema and chronic bronchitis). Dementia appears in the top five causes of death for the first time. In 1990 less than a thousand people died from dementia, but by 2003 the figure had reached more than 7,000. The increase is only to a small extent attributable to population ageing; it is mainly the result of changes in the way deaths are classified. Since the 1990s, it has become much more common to cite dementia as the primary cause of death. Consequently, if one looks at the number of mortality cases in which dementia is either the primary or a secondary cause of death, one finds that the rise is nowhere near as great. Between 1996 and 2001, the number of deaths involving dementia as one of the causes increased from fourteen to sixteen thousand (i.e. from 10.0 to 11.5% of all deaths (Van der Meulen & Keij-Deerenberg, 2003).

If age at the time of death is taken into account by expressing mortality in terms of lost life-years, the same diseases (coronary heart disease, lung cancer and stroke) still prove to be the biggest killers of men and women collectively. However, dementia drops out of the top five, since it accounts for fewer lost life-years than breast cancer, which tends to claim the lives of women long before their average life expectancy. Similarly, suicide is also high on the list, because it is relatively common among young men in particular.

Table 2.1: Top five causes of death and lost life-years for the population as a whole and for men and women separately (Source: CBS Mortality Statistics, 2003).

Ranking	Mortality			Lost life-years		
	Total	Men	Women	Total	Men	Women
1	CHD	CHD	Stroke	CHD	CHD	CHD
2	Stroke	Lung cancer	CHD	Lung cancer	Lung cancer	Breast cancer
3	Lung cancer	Stroke	Dementia	Stroke	Stroke	Stroke
4	Dementia	COPD	Heart failure	Breast cancer	Suicide	Lung cancer
5	COPD	Heart failure	Breast cancer	COPD	COPD	Dementia

CHD = coronary heart disease
COPD = Chronic Obstructive Pulmonary Disease (e.g. pulmonary emphysema and chronic bronchitis)

Neck and back problems most common

There are many afflictions that do not kill, but are very common. *Table 2.2* lists the five diseases and afflictions with the highest incidences (number of new cases) and highest prevalence levels (overall number of patients) in the Netherlands in 2003. The diseases with the highest incidences were infectious diseases (particularly affecting the upper respiratory tract and urinary tract) and injuries (associated with sport and home and leisure activities). Because they are often quite short-lived, the highest-incidence health problems are not the most prevalent afflictions in the Netherlands. Neck and back problems, which themselves have a reasonably high incidence, are more prevalent because on average their duration is greater. The next most prevalent disorders are contact eczema and arthritis. Coronary heart disease, diabetes mellitus, hearing impairment and asthma are also very prevalent. These seven disorders are the most common affecting both men and women, although their order of prevalence is different for each sex. Coronary heart disease, for example, is the second most prevalent disorder among men, but only the sixth most prevalent among women. By contrast, arthrosis is more common among women than among men. A comprehensive summary of prevalence and incidence data for fifty disorders is presented in *appendix 4*, together with details of the sources.

Table 2.2: The five most common diseases in the Netherlands in 2003 (for details and sources, see appendix 4).

Ranking	Incidence	Prevalence
1	Upper respiratory tract infections	Neck and back problems
2	Neck and back problems	Contact eczema
3	Sports injuries	Arthrosis
4	Acute urinary tract infections	Coronary heart disease
5	Home and leisure accidents	Diabetes mellitus

The data presented above comes from medical registers, such as the Dutch Cancer Registry (NKR), general practice registers and accident and emergency registers. However, where some diseases and afflictions are concerned, records maintained within the

health care system are not the best source of information. This is because many people do not seek professional help with certain conditions. Depression, for example, is more than twice as common in the general population than general practice registers would suggest. Under reporting of anxiety disorders and alcohol problems is even greater. It is nevertheless worth noting that the numbers of people diagnosed by GPs as suffering from anxiety disorders and depression have been rising sharply, partly because people are becoming more inclined to talk to their general practioners about such problems at an early stage, and partly because GPs are becoming better at recognizing mental disorders. Nevertheless, mental disorders often go undiagnosed (Schoemaker et al., 2006). Even where physical problems such as respiratory tract infections and neck and back problems are concerned, not all patients seek medical help. There are also afflictions that people may be unaware of. Diabetes screening programmes, for example, indicate that there are many more people with this condition than are known to the primary care sector.

Reduced quality of life associated with mental disorders

The common disorders referred to above are not necessarily the most serious diseases affecting the population. The public health significance of a disorder therefore depends not only on the number of people that have it, but also on its impact on quality of life. Quality-of-life reduction may be expressed in terms of the number of years that people spend with a given disease weighted according to the severity of that disorder (years lived with disability). Quality of life may be affected by various factors, including physical disability, pain and social functioning. The greatest cause of impaired quality of life in the Netherlands is anxiety disorders, followed by coronary heart disease and depression (see *table 2.3*). People with mental disorders, including depression and anxiety disorders, feel deprived of vitality and often suffer seriously impaired social functioning. Furthermore, their emotional problems diminish their ability to undertake their normal daily tasks (Bijl & Ravelli, 2000; Kruijshaar et al., 2003a).

Table 2.3: The five diseases that caused the largest reductions in quality of life in the Netherlands in 2003 (for details and sources, see appendix 4).

Ranking	Total	Men	Women
1	Anxiety disorders	Coronary heart disease	Anxiety disorders
2	Coronary heart disease	Alcohol dependency	Depressie en dysthymie
3	Depressie en dysthymie	Anxiety disorders	Arthrosis
4	Stroke	Depressie en dysthymie	Coronary heart disease
5	Arthrosis	Stroke	Stroke

The prominence of depression and anxiety disorders in the top five is due not only to the effect that such problems have on quality of life, but also to the fact that they affect a large number of people, often for extended periods. Similarly, coronary heart disease, stroke and arthritis are relatively common, are chronic in nature and have a major impact on quality of life. Such afflictions affect patient's physical capabilities, preventing them from going about their daily lives as normal. Furthermore, many people who have suffered a myocardial infarction quite often report mental prob-

lems afterwards, caused by concerns that they could suffer another at any time (Visser, 1996). People with arthritis mainly suffer pain, leading to impaired physical capabilities (Sharma & Fries, 2000). The number of people suffering strokes is a little smaller, but a stroke frequently has serious implications for quality of life: more than half of all stroke survivors are still unable to lead independent lives six months after the incident (Van Straten et al., 2001).

Largest burden of disease due to cardiovascular disease and mental disorders

Heading the list of the ten diseases and afflictions that make the largest contribution to disease burden are coronary heart disease, anxiety disorders, stroke, depression and COPD (see *table 2.4*). Coronary heart disease, strokes and COPD are all responsible for both high levels of premature mortality and serious quality-of-life reductions among patients. Anxiety disorders and depression figure high up the DALY list because they cause substantial quality-of- life losses for many people (see *box text 2.2* for an explanation of the term 'DALY'). Diabetes, lung cancer, arthritis and dementia also figure well up the DALY list. Where men are concerned, so do accidental injuries (associated with traffic accidents and home and leisure accidents); where women are concerned, breast cancer appears in the list as well. Notably, there are few differences between the men's and women's DALY lists.

Table 2.4: The ten afflictions causing the largest burden of disease (in lost DALYs) in the Netherlands in 2003 (for details and sources, see appendix 4).

	Total	% of total [a]	Men	Women
1	Coronary heart disease	7.6	Coronary heart disease	Anxiety disorders
2	Anxiety disorders	5.1	Stroke	Coronary heart disease
3	Stroke	4.9	Alcohol dependency	Stroke
4	Depression and dysthymia	3.9	Lung cancer	Depression and dysthymia
5	COPD	3.2	COPD	Breast cancer
6	Diabetes mellitus	3.2	Anxiety disorders	Diabetes mellitus
7	Lung cancer	3.0	Diabetes mellitus	Arthrosis
8	Alcohol dependency	2.5	Depression and dysthymia	Dementia
9	Arthrosis	2.5	Accidental injuries (RTAs) [b]	COPD
10	Dementia	2.3	Home and leisure accidents [b]	Lung cancer

[a] Total disease burden is taken to be that associated with the fifty-plus PHSF disorders, plus an estimate of that associated with all other disorders (35%), on the basis of the Global Burden of Disease study (Murray & Lopez, 1996).

[b] The calculation of the disease burden associated with accidental injury has recently been improved in four ways. First, the estimates of the permanent consequences of accidents have been supplemented by figures on the disease burden associated with short-duration injuries. Second, the disease burden associated with sports injuries and occupational accident injuries has been estimated. Third, the estimate is no longer based on expert opinion, but on feedback from patients. Finally, the seriousness of the consequences of accidents can now be much more precisely determined, because disability weights have been set for many more types of injury (e.g. wrist fractures and ankle distortions).

The tabulated data show little change since the previous PHSF: the same ten disorders still figure. However, there have been two notable changes in the order of the diseases.

The disease burden associated with diabetes mellitus has increased, taking this illness from ninth in the list to sixth. Meanwhile, alcohol dependency has gone down from fifth to eighth, albeit not because fewer people are dependent on alcohol, but because of a downward revision of the estimated quality-of-life impairment associated with alcohol abuse (Meijer et al., 2006). Where men are concerned, a change is also apparent in the disease burden associated with accidents. Improved estimation of the disease burden associated with injuries has led to upward revision of the disease burden associated with home and leisure accidents, but downward revision of the burden associated with road traffic accidents (RTAs). Finally, lung cancer is a new addition to the top sources of disease burden among women (see *subsection 2.1.2*).

Reduced social participation among the chronically ill

The burden of disease expressed in DALYs mainly reflects the direct physical and/or practical consequences of the disorders in question, such as pain, inability to undertake normal day-to-day activities and the mental state. The DALY takes little or no account of any effect that a disorder may have on social participation. People with chronic disorders are prevented from participating in normal social life, as a consequence of their functional disabilities. Someone who is in pain, or cannot walk well or becomes fatigued very easily cannot participate in society as they might do otherwise. This is very significant, since social participation enables people to feel usefull, to develop personally, to get involvement in what is happening and maintain contact with others. Social participation by the individual is also advantageous to the wider community, which benefits if someone is able to take paid employment or voluntary work to provide informal help. In this context, the main effect of most illnesses is to prevent patients getting paid employment or voluntary work (see *table 2.5*); their influence on patients' private social involvement is not so big. Illness also tends not to affect seriously patients' ability to give informal help; this may be because the chronically ill participate less in the labour market and simply have more time on their hands to provide informal help.

A study conducted among elderly people has found that social participation tends to be impaired most seriously among people with mental disorders, such as depression, anxiety disorders or cognitive disorders (Hoeymans et al., 2005b). Such impairment affects all forms of participation, including the maintenance of personal contacts. The personal and cognitive capacities of people suffering from cognitive disorders, depression or anxiety are apparently diminished to the point where such individuals find it hard to join in what is happening in a 'threatening' outside world.

Chronically ill people themselves also report experiencing participation problems. More than 40% say that they are not able to function socially as they would like. The most serious problems are perceived to be work-related. Despite various attempts by the government to promote labour participation by the chronically ill, there has been no rise since 2001 in the percentage of people in this group who are able to undertake paid or voluntary work (Heijmans et al., 2005).

Table 2.5: Relationship between presence of one or more disorders and participation among people from twenty-five years of age (Source: AVO, 2003, data processed by RIVM).

	Participation without illness (%)	Participation with illness [a] (%)	Odds ratio [b]
Paid employment	70	42	1.8*
Voluntary work	23	17	1.2*
Informal help	13	15	0.9
Membership of clubs etc.	67	61	1.1
Cultural participation	42	32	1.1*
Recreational participation	52	52	0.9

* Significantly different from 1.0 ($p<0.05$).

[a] Illness: cardiac disease, diseases of the nervous system, musculoskeletal disorders, asthma and COPD, cancer, stroke, diabetes mellitus and the consequences of accidents.

[b] The odds ratio is an estimate of the extent to which someone with a disease is less likely to participate than someone without the disease in question; the odds ratios quoted here are corrected for sex, age, educational status, financial status and marital status.

It is worth noting that the relationship between participation, income and health is characterized by a two-way pattern of influence. Poor health leads to reduced participation and opportunities, and thus to lower income; conversely, low income or a low level of participation has an adverse effect on health. Elderly people can, for example, become depressed as a result of feeling unable to participate in society (Bath & Deeg, 2005).

Disease is a burden not restricted to the patient

Another feature of disease burden that is not reflected in mortality and morbidity statistics is that illness and infirmity have an impact not only on the patient, but also on the people around him or her. The effects are felt both by immediate family members, and by the wider community. Consider, for example, dementia, the latter stages of which may be said to be worse for the patient's partner than for the patient himself, who ultimately becomes unaware of his/her condition. However, less extreme disorders can also place considerable pressure on the patient's partner or parents, with implications for private and/or family life. The relationship between a couple changes if one of them is (chronically) ill, while the children of someone with an illness are more likely to be given responsibilities and jobs around the house than their contemporaries. Affected individuals miss out on the support they otherwise could have expected from their relative, and have to provide physical and emotional supportive care (lay care) to the chronically ill or disabled family member, and this can place a strain on their private lives. The subject of lay care is considered in more detail in *chapter 3*, where health is examined in relation to life pattern.

As well as affecting the patient's immediate contact circle, some disorders can generate feelings of insecurity within the wider community. People with certain disorders are, for example, less able to lead a normal life, or are inclined to become addicted, homeless or delinquent. The disease burden expressed in DALYs does not reflect such effects; hence, in some cases, the DALY score is not an adequate measure of the total

Box text 2.1: Antisocial personality disorder: a greater burden on others than on the patient.

According to the Diagnostic and Statistical Manual of the American Psychiatric Association (DSM-IV), antisocial personality disorder (ASP) is characterized by a deep-rooted pattern of lack of respect for and infringement of the rights of others. People with ASP are typically habitual criminals and liars, easily annoyed and aggressive. They are also indifferent to their own or other people's safety and feel no remorse after hurting, abusing or stealing from others. The diagnosis is applied only to adults, but many of the characteristics are evident well before adulthood.

ASP is found in about 2 to 3% of the population, being particularly common among men between the ages of twenty and forty. The patients almost never seek help, because they do not perceive their disorder to be a problem. However, compulsory use of forensic care is considerably higher among people with ASP. Roughly half of all male detainees in the Netherlands' prisons have ASP, and a slightly higher proportion of patients at secure clinics suffer from the disorder.

The disease burden associated with ASP is comparable with that associated with somatic disorders such as Parkinson's disease or diabetes mellitus. Someone with ASP is much more likely to suffer a premature death than an average person. This is the result of higher levels of problematic substance abuse, suicide and involvement in fatal crime.

However, the antisocial behaviour of ASP patients often has serious consequences for other people as well. People with the disorder are often violent towards their partners and children, and towards strangers. These considerable external effects of ASP are not reflected in the DALY score.

Source: Schoemaker & De Ruiter, 2005

impact of a disease. The most extreme example is perhaps antisocial personality disorder, a mental condition whose consequences are most onerous for people other than the patient, who is apparently unperturbed by it (see *box text 2.1*).

2.1.2 Shifts in the pattern of mortality, morbidity and disability

The previous subsection outlined the present health situation in the Netherlands; in this subsection, the focus moves on to important developments in health seen over the last few years, beginning with developments in overall and healthy life expectancy. The previous PHSF reported that the increases seen in life expectancy were accounted for mainly by a rise in the number of years that the average person can expect to spend free of physical disability. In the current PHSF, this subject is explored in more depth. What trends in disability are discernible? What important shifts have taken place in the pattern of morbidity? And are diseases probably not decreasing in numbers of patients or duration, but in their consequences?

Life expectancy continues to increase

Life expectancy at birth for the average Dutch person was slightly higher in 2003 than in the preceding years (see *figure 2.2*). Since 1950, average life expectancy has risen by 5.8 years for men and 8.3 years for women, to stand at 76.2 and 80.9 years, respectively. Between 1950 and 1980, the greatest increases in life expectancy were seen among women; from 1970 to 2003, it was male life expectancy that was increasing the most. Compared with the figures reported in the previous PHSF, which related to the year 2000, the latest statistics show increases in both male and female life expectancy, particularly in the former. However, female life expectancy has increased again, albeit

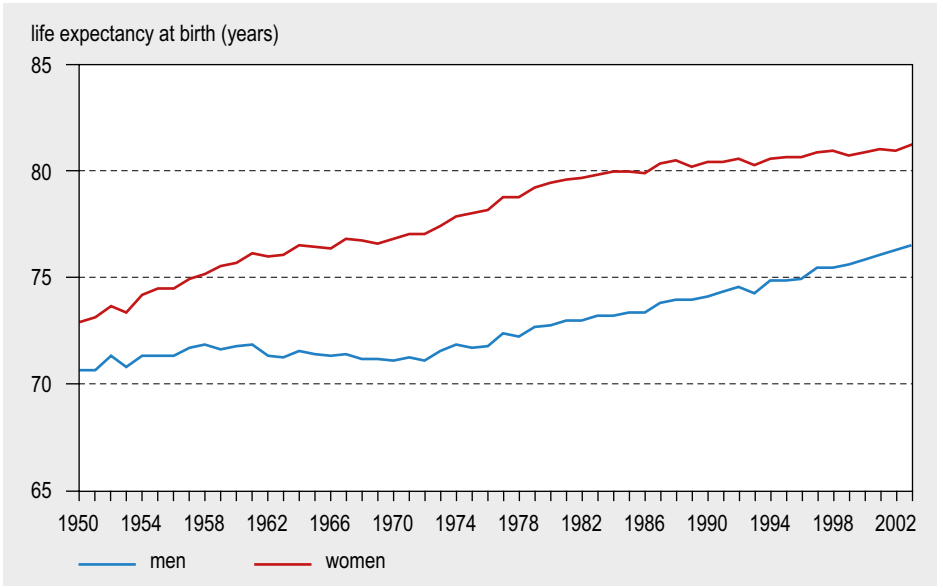


Figure 2.2: Life expectancy at birth in the Netherlands between 1950 and 2003 (Source: CBS Mortality Statistics).

only a little, after the stagnation reported in the previous PHSF. The rise in life expectancy is attributable mainly to a sharp decline in mortality associated with cardiovascular disease. Cancer mortality has also fallen, albeit mainly among men.

Statistics for 2004 have recently become available as well. A striking feature of these statistics is that, compared with 2003, life expectancy for both men and women has increased by more than six months: to 76.9 years for men and 81.4 years for women. This phenomenon is attributable to an unexpectedly sharp fall in the mortality rate for 2004, resulting largely from relatively favourable weather conditions and the absence of an influenza epidemic (Garssen & Hoogenboezem, 2005). It is therefore possible that 2004 does not mark the start of a new trend, but a chance fluctuation. For example, mortality among the over-eighties rose sharply in the first quarter of 2005 because of an influenza epidemic.

Life expectancy of the elderly not increasing as quickly

Although life expectancy at birth has risen considerably in recent decades, this has largely been because of more people living into old age, not because of the elderly living to a greater age. For those that reach old age, life expectancy has not increased much, especially for men. In about 1950, the average man of sixty-five had a life expectancy of fourteen years. Since then, this figure has increased by 'only' a year and a half. The increase among women has been much greater, at 4.5 years. The present life expectancy of sixty-five-year-olds is now 15.4 years for men and 19.0 years for women. This does not mean that there is little difference between the health of the elderly then and now. *Chapter 3* focuses on health in relation to life pattern and looks more closely at mortality differences during life. It is worth noting that in recent years the life ex-

pectancy of elderly Dutch has not risen a great deal, and certainly by less than in most other European countries (see *subsection 3.1.2*).

Healthy life expectancy is also up

Women live longer than men, but the two sexes have a broadly similar healthy life expectancy (see *table 2.6*). In other words, the extra years of life that the average woman has are spent with physical disabilities and a reduced subjective standard of health. However, if the health-impaired years are not entirely discounted, but included in the life expectancy figure on a disability-weight basis, a more complex picture emerges. In terms of HALE (health-adjusted life expectancy, see *box text 2.2*), women do enjoy more healthy years of life than men. HALE is the sum of the full number of healthy years, plus a fraction of the number of health-impaired years, with the fraction reflecting the degree of impairment. The main difference between HALE and healthy life expectancy is that a HALE figure is based on disease prevalence, not on generic indexes, such as perceived health and disability. HALE figures are calculated using DALY data, using the prevalence of each disease and the associated disability weight to estimate the average quality of life per age group (see *subsection 2.1.1*). The quality-of-life figures calculated in this way are then combined with life expectancy data to produce a HALE number (Van Baal et al., 2006).

Table 2.6: Life expectancy and healthy life expectancy at birth of the Dutch population in 2003, together with changes over the period 1989 to 2003 (Source: CBS Mortality Statistics; POLS, gezondheid en arbeid; OII) (See also: Perenboom, 2005).

	Men		Women	
	2003	1989-2003 [a]	2003	1989-2003 [a]
Life expectancy	76.2	+ 2.5	80.9	+ 0.8
Life expectancy in perceived good health	62.2	+ 2.1	61.1	n.s.
Life expectancy without physical disabilities	69.9	+ 6.0	69.8	+ 6.7
HALE [b]	67.7		70.9	

[a] All changes: significant trend ($p<0,05$); n.s. = not significant.

[b] HALE = health-adjusted life expectancy is based on the DALY concept. No trend data on the Hale are available.

Disability less prevalent

Particularly striking is the trend in the number of years the average person may expect to live without disabilities: since the 1980s, this has increased by no less than six to seven years. This rise in the disability-free life expectancy is attributable to falls in the numbers of people living with impaired mobility, hearing and or sight. There does not appear to have been any decline in impaired ability to perform activities of daily living (ADL): things such as getting in and out of bed, going to the toilet and washing and dressing. Although there is no obvious explanation for this, it is the case that other Dutch studies have also found that the prevalence of disability appears to be falling. For example, comparison of the findings of the first and second Dutch National Survey of General Practice reveals that the prevalence of mobility impairment among the elderly fell from more than 40% in 1987 to about 25% by 2001 (Puts et al., 2006). The picture does vary across the country, however: some researchers have found no decline

Box text 2.2: Healthy life expectancy, HALE and DALY.

The theory

There is now an entire family of so-called summary measures of population health. These are indicators compiled using data on both mortality and (ill) health. They may be divided into two groups: health expectancy indicators and health gap indicators. Indicators of the first type are measures of the number of healthy life-years that people may expect. One is healthy life expectancy. As defined here, this is one of the simplest indicators, which includes only the number of years that a person can expect to live in good health (area A in *figure 2.3*). HALE (health-adjusted life expectancy) additionally takes unhealthy life-years into account, but discounted in proportion to the degree of health impairment. The best-known health gap indicator is the DALY (disability-adjusted life-year). A DALY figure reflects the number of years spent in ill health and the number of years lost due to premature mortality.

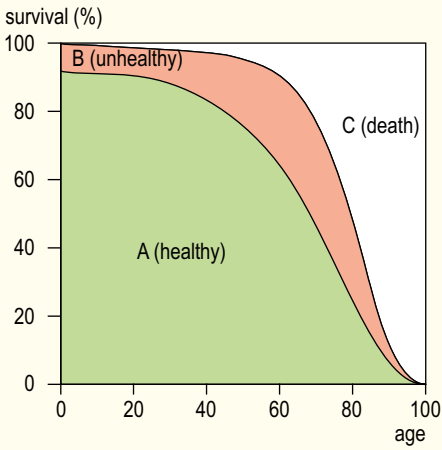


Figure 2.3: Hypothetical survival curve, divided into healthy and unhealthy years.

A = time lived in good health
C = time lost due to premature mortality
Life expectancy = A + B
Health expectancy indicators (e.g. healthy life expectancy and HALE) = A + f(B)
Health gaps indicators (e.g. DALYs) = C + g(B)

Another difference between healthy life expectancy and a DALY statistic is that the former is based on generic measures of health (e.g. perceived health and physical disability), whereas the latter is based on disease-specific measures of health (the incidence and prevalence of diseases). Furthermore, because DALYs are calculated as the contribution that diseases make to total ill health in the population, they reflect the disease burden. The great advantage of this indicator is therefore that total loss of health (mortality and disease) may be attributed to specific diseases and risk factors. So policy makers have a point of reference for acting to improve the health of the population. HALE may be calculated using both generic and disease-specific data.

The practice

The DALY and HALE were developed by the World Bank, the University of Harvard and the World Health Organization (WHO). In the World Health Report 2000, the WHO ranked all countries on the basis of average health status, as expressed in terms of HALE. HALE was also used as one of the main measures of the performance of health care systems. The appearance of this report shook the health world to its foundations. There was a great deal of criticism, which somewhat swamped the plaudits that the report's visionary approach also received. Policy-makers complained that the information was of no value to them, because it was too general. Many in the scientific community also pointed to the high degree of uncertainty in the calculations and the lack of transparency. Consequently, in subsequent WHO reports, less emphasis was attached to the DALY and HALE. Furthermore, the focus shifted from the estimation of overall disease burden to avoidable disease burden. Nevertheless, many national and regional governments (Australia, Sweden, the UK and others besides the Netherlands) adopted the principle as a means of defining the health situation in their country or region and prioritising health risks. WHO Europe also took up the disease burden approach in its European Health Report 2005.

Source: Bowie et al., 1997; Mathers et al., 1999; Melse et al., 2000; Moradi et al., 2006; WHO, 2005a

in disability (De Boer, 2006; Deeg, 2006). This has to be considered in the context of reported disability reductions in most other countries in Europe, and in the USA in particular (Bogers et al., 2005; Malmberg et al., 2002; Freedman et al., 2002).

One of the first questions that come to mind in connection with the possible decline in disability is to what extent the disease prevalence has also decreased. In other words: is there less disability because fewer people are falling ill? Or is there some other explanation? We will return to this question at the end of this subsection.

Changes in the morbidity and mortality patterns apparent

Growth in the population in general and the elderly population in particular is pushing up the absolute number of people affected by diseases. If the statistics are corrected for such growth, it is possible to discern the underlying epidemiological trends in morbidity. The main changes to have taken place are summarized in *table 2.7*, which identifies the main fallers and climbers over the last ten years. Most striking is the decrease in mortality attributable to cardiovascular disease and heart failure, and the rise in the incidences of some forms of cancer. Another notable change has been the growth in the prevalence of asthma and diabetes. In some fields, the trends for men and women are diametrically opposed. Lung cancer, for example, has the fastest growing incidence of any diseases among women, but the fastest declining incidence among men. Mortality attributable to COPD is also rising among women, while declining among men. These trends are directly related to earlier smoking habits. In the 1960s and 1970s, smoking rates fell sharply in the male population (from 90% in the late 1950s to 40% in 1982), but rose in the female population (from 29 to 33%) (STIVORO, 2006). Since the early 1980s, the percentage of people who smoke has fallen slightly, both among men and among women (see also *subsection 2.2*).

This and other significant developments are considered in more detail below. Incidence and prevalence trends are based largely on medical registers (particularly the records kept by GPs). Where this has implications for interpretation of the trend, this is highlighted.

Further fall in mortality attributable to cardiovascular disease

Mortality attributable to coronary heart disease has been falling since the late 1980s. This has been due partly to better therapeutic treatment (more bypass operations, dotter procedures and) and partly to the reduction of risk factors (increased use of statins and anti-hypertensive drugs). There have also been important developments in the field of prevention, such as encouraging people to stop smoking and modify their diets (see *subsection 2.2*).

In recent decades, increased rates of survival following myocardial infarction have contributed to a rise in the number of people with the chronic cardiac disease, such as heart failure. What is notable now is that, for the first time, the incidence of and mortality associated with heart failure are also falling. This is very probably due to the declining seriousness of coronary heart disease and the improved acute and follow-up treatment of infarction.

Where strokes are concerned, the situation is somewhat different. Mortality attributable to strokes has been falling for some time, due to improvements in the care avail-

Table 2.7: Ranking of diseases based on the degree of statistically significant change in the period 1993-2003, after correction for age [a] (Source: CMR-Nijmegen e.o., RNH, NKR, LIS).

	Incidence	Prevalence	Mortality
Biggest climbers	Diabetes	Asthma	Dementia
	Arthrosis (w)	Diabetes	Lung cancer (w)
	Cataract	Depression	COPD (w)
	Dementia	Anxiety disorders	Oesophageal cancer (m)
	Lung cancer (w)	Stroke	Accidental falls
Biggest descenders	Influenza	COPD	Coronary heart disease
	Accidents	Gastric and duodenal ulcers	Lung cancer (m)
	Heart failure	Hearing impairment	Stroke
	Gastric and duodenal ulcers	Heart failure (w)	Heart failure
	Lung cancer (m)	Parkinson's disease	COPD (m)

COPD = Chronic Obstructive Pulmonary Disease (e.g. pulmonary emphysema and chronic bronchitis).
[a] Figures obtained by linear regression analysis of data on the incidence, prevalence and mortality associated with the five illnesses selected for the PHSF. Correction was made for age.
[b] W = trend is significant for women, M = trend is significant for men; in all other cases, the trend is significant for both women and men.

able to stroke patients. However, because the number of people suffering strokes has not declined (among women it has actually risen slightly), there are now more people alive who have had strokes (i.e. the prevalence is greater).

Cancer on the increase among women, but declining among men

The incidence of various forms of cancer is rising (see *table 2.7*). Melanoma incidence, for example, has nearly doubled in the last ten years. Other skin cancers, breast cancer and colorectal cancer have increased in incidence as well. Most notably, the incidence of all forms of cancer collectively has risen among women and fallen among men in the last ten years. These opposing trends are to some extent simply a reflection of the contrasting developments involving lung cancer, as outlined above. Furthermore, the rise in the incidence of breast cancer obviously affects only women. The overall incidence of cancer between the two sexes collectively remains fairly stable. Nevertheless, mortality attributable to cancer has been falling. Between 1993 and 2003, cancer mortality dropped by 14% among men and 2% among women.

The rise in the incidence of skin, breast and colorectal cancer is partly due to lifestyle changes and partly to the fact that these cancers are now being detected earlier. Lifestyle factors that influence cancer incidence include diet, physical activity, overweight, exposure to UV radiation and various reproduction-related factors (number of children, age at first motherhood and breastfeeding). The extent to which these factors account for the rise in the incidence of the relevant forms of cancer is not yet clear; hence the increase is to some degree unexplained. The downturn in cancer mortality is mainly the result of improved treatment. More effective treatment is in turn due partly

to early detection (e.g. of breast cancer), which enables prompt medical intervention (see also *subsection 3.4*).

Mortality attributable to cardiovascular disease has been falling more quickly than cancer mortality. Between 1970 and 1980, nearly half of all deaths were due to cardiovascular disease; now the figure is a third. The expectation is that, within a few years, cancer will be claiming more lives than cardiovascular disease (Garssen & Hoogenboezem, 2005) and will therefore become the biggest single cause of death in the Netherlands. The latest mortality statistics show that cancer is already the main cause of death among men and, given the continuation of present trends, will become the biggest cause of death among women by about 2010 (Hoogenboezem & Garssen, 2006).

Diabetes increasing, due to prevalence of overweight and improved detection
During the first half of the 1990s, the number of people with diabetes mellitus remained fairly constant. However, the figure has since risen sharply to about 600,000 people. This rise is to some extent attributable to the increase in the number of people who are overweight. However, greater reported prevalence also partly reflects the fact that GPs have become more alert to the possibility of patients having the disease. An active GP confronted with an elderly patient, a patient with vague complains or a patient who is at risk from factors such as overweight, familial diabetes or high blood pressure will nowadays soon think to test the patient's blood glucose level, and will consequently find and record more cases of diabetes. In addition, the public is more aware of the disease because of campaigns organized by the Diabetes Fund, which have encouraged people with a big thirst, diabetes in the family or high blood pressure to ask their GPs to test them for diabetes.

The fact that the number of diabetes patients known to GPs has risen sharply does not therefore necessarily indicate that the total number of people with diabetes has increased. It is believed, for example, that in the early 1990s there were as many undiagnosed diabetics as known diabetics (Mooy et al., 1995). Improved detection has brought about a shift between the known and hidden prevalence of the disease, but it is not possible to ascertain exactly how many people now have diabetes, without them or their GPs being aware of it. Repetition of the screening campaigns run in the 1990s would help to clarify the position.

Overall prevalence of asthma no longer rising; prevalence among children falling
Since the 1990s, the prevalence of asthma has increased considerably. In 2003, more than half a million people in the Netherlands suffered from asthma. The reported increases in asthma morbidity in the 1990s have been followed, however, by more recent data indicating stabilization in the disorder's prevalence, particularly among children. To begin with, the signs of change came from abroad (Braun-Fahrländer et al., 2004; Ronchetti et al., 2001; Toelle et al., 2004). However, since the end of the 1990s, overall asthma prevalence in the Netherlands has also stopped rising and the number of children with asthma has actually fallen slightly (see *figure 2.4*).

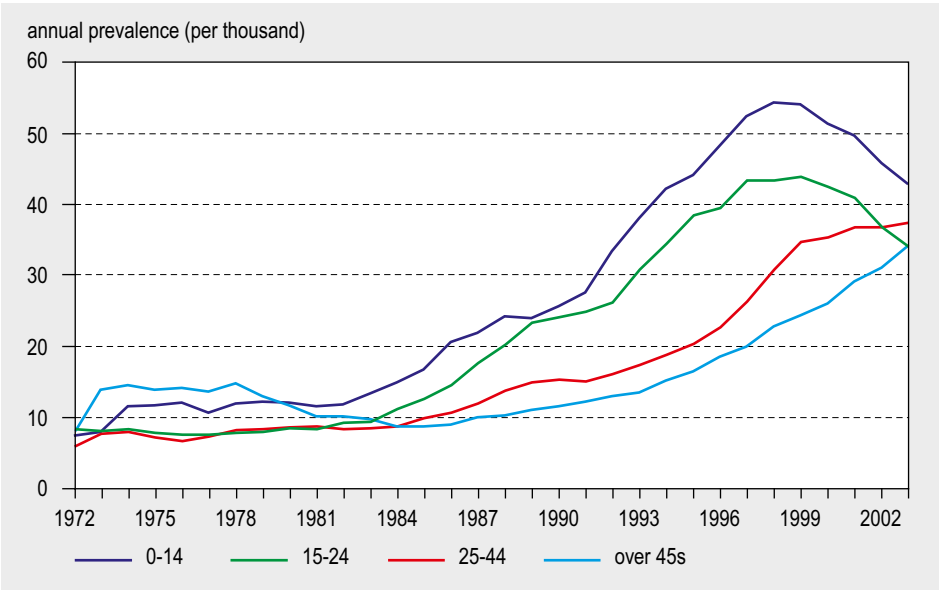


Figure 2.4: Trend in the annual prevalence of asthma by age in the period 1971 to 2004 (progressive 3-years average) standardized after the Dutch population in 1990 (Source: CMR-Nijmegen e.o.).

The cause of the global rise in the prevalence of asthma of the 1990s remains the subject of debate. Part of the explanation is certain to be increased awareness of asthma within the medical community and the general public. However, the rise is in all probability also due partly to lifestyle changes associated with greater prosperity, such as changed dietary patterns, changed domestic environments and exposure to fewer infections (Matricardi, 2001; Nowak et al., 1996; Cook & Strachan, 1997; Health Council of the Netherlands, 2003b). It is assumed that such prosperity-related factors are particularly influential in the perinatal phase of life. This would explain why the rise (and the present decline) mainly involved children. This explanation is sometimes referred to as the hygiene hypothesis (see *box text 2.3*).

Depression and anxiety seen more often in general practice; no evidence that they are more common in the general population

The number of people known by GPs to suffer from depression or anxiety disorders has increased dramatically over the last ten years. Between 1994 and 2004, the number of known depressives more or less doubled, for example. However, it does not necessarily follow that the actual prevalence of these disorders in the population has increased; it may simply be that more cases are identified and recorded by the primary care sector. The findings of two periodic surveys – one regional and the other international – provide tentative support for the latter explanation. The surveys in question both show stabilization in the number of people with anxiety or mood disorders within the population (Kessler et al., 2005; König-Zahn et al., 1999), combined with growth in care consumption. However, it is not possible to judge whether this picture is accurate

Box text 2.3: The hygienic transition.

Author: P. Bol

Present epidemiological data on nomadic groups almost always show that such populations are under considerable infection pressure. This pressure is associated with factors such as physical crowding, which facilitates the exchange of many pathogens. In wigwams, tents or igloos, people live in close proximity, and particularly in colder climes such accommodation would usually be filled with smoke. The combination of cold and smoke implies children with eye infections and runny noses, who coughing and sneezing are spreading plenty of germs to one another. This results inevitably in high levels of infectious diseases, but the survivors have developed a very robust immunity . Exposure to pathogens would come not only through interpersonal contact, but also through direct contact with water, earth, plants and animals. Furthermore, worm infections were until recently part and parcel of life for people all over the world. A single individual can act as host to various types of worm, in the gut, the bladder and elsewhere. In addition, diseases spread by vectors such as mosquitoes (malaria), fleas (plague) and lice (typhus) were once a lifelong hazard for most people.

In developed countries, the burden of infectious diseases has been reduced enormously. Vaccination against diseases such as smallpox, diphtheria, whooping cough, tetanus and poliomyelitis has made a significant contribution in this regard. However, of even greater significance has been hygienic living, which was virtually non-existent a century and a half ago. It was only in about 1850 that John Snow demonstrated the dangers of drinking untreated water and Ignasz Semmelweis first decreed that doctors should wash their hands. At about the same time, measures were taken to create a reliable drinking water supply and sewage systems.

It is undoubtedly the case that a hygienic transition has taken or is taking place from the total exposure situation that once prevailed to a (sometimes obsessively) minimized exposure situation. Homo sapiens has created an artificial world, and the clock cannot be turned back. But are the effects of this hygienic transition limited to reductions in disease burden and mortality? No, it would appear that, like so many other developments, the transition has also had its down side. An article published by Strachan in 1989 triggered the development of the so-called hygiene hypothesis. The crux of this hypothesis is that under-stimulation of the immune system in early childhood results in an imbalance, which is reflected in the increased prevalence of atopies (the family of disorders that includes asthma, hay fever, allergies and certain forms of eczema).

The proponents of this hypothesis point to the sea change in childhood exposure to microbial organisms that has occurred in the last 150 years, and the last 50 in particular. In our part of the world, young children get food that has been pre-processed in all kinds of ways and have a much smaller microbial load than had been the norm throughout human evolution. They grow up in small families, many as an only child. They are vaccinated against numerous infectious diseases (the standard is now eight or nine) and when infections do occur, they are treated with antibiotics. Eating food off the floor is not allowed. In many families, there are no household pets, and very few children grow up in contact with livestock. Even at children's farms – those oases of rural life in the city – soap dispensers, paper towels and advice for parents about washing children's hands are everywhere. The argument goes that, with so little occasion for a child's immune system to lock horns with hostile microbes, there are insufficient stimuli for a balanced immune development.

A detailed exposition of the immunological theory underpinning the hygiene hypothesis is not possible in the present context. However, it may be summarized as follows: operating in the immune system are two lines of T helper cells (immune cells originating in the thymus tissue). If the line that is dominant in an unborn child's body remains dominant after birth, the child will be predisposed to atopic afflictions. To achieve a balance between the two lines, it is necessary (according to the theory) to stimulate the second line by exposure to pathogens and antigens from, for instance, (domestic) animals. And it may be that worm infestation during childhood is essential for the establishment of a proper balance. The rising prevalence of asthma and hay fever in recent years may, therefore, be the result of immune-stimulus deprivation. Improved hygiene, vaccination and urbanization (the latter leading to reduced contact with many pathogens, e.g. from animals) do indeed appear to have led to the creation of an artificial situation. Notably, John Brostock, the researcher who first described hay fever in 1819, asked in an 1828 publication why it should be that the disorder was much more com-

continuation box text

mon among city-dwellers (including himself) than among country folk.

But is there any real evidence to support the hygiene hypothesis? Proponents often point to the findings of research conducted shortly after the German Wende in 1989, which (to many people's surprise) found that atopies were much less prevalent in East Germany than in West Germany. Following reunification, the easterners soon caught up with the western citizens . Globally, atopies are between twenty and sixty times as common in countries such as the UK and Australia as in, for example, Indonesia and Uzbekistan. Furthermore, in developing countries sizeable differences in atopic burden exist between rural and urban areas. And, in central Europe, atopy levels among farmers' children are very low. Adversaries of the hypothesis have strong arguments, however. For example, researchers have found that high levels of exposure to animals are associated with high asthma prevalences. Furthermore, research with twins has found evidence of a strong genetic predisposition to asthma, which would tend to suggest that environmental influences are less significant than some have argued. Also, a Finnish study among half a million children found that young people who had suffered measles were one and a half times more likely to have an atopy.

Many countries are currently going through a hygienic transition and therefore are moving towards the end point situation that we experience here now. They have left the primordial situation, and are possibly encountering the associated disadvantages. However, the great benefits in terms of reduced disease burden and increased life expectancy are for the time being well worth the price.

Source: Bol, 2003; Bol & De Hollander, 2005; Salvi & Holgate, 2001; Diamond, 1997; De Hollander & Bol, 2004; McNeill, 1998; Paunio et al., 2000; Salzman, 1990; Schram-Bijkerk, 2006; Strachan, 1989; Tomes, 1998; Yazdanbakhsh et al., 2002

unless the national surveys of mental disorders carried out in the 1990s are repeated (Schoemaker et al., 2006).

Accidental injuries appear to be less common

The numbers of injuries of all kinds requiring treatment in accident and emergency (A&E) units fell in the period 1993 to 2003. In other words, injuries from non-occupational accidents, sports-related incidents (see *table 2.7*), road traffic accidents (RTAs) and occupational accidents were all down. Within the general picture there are, however, a number of points that warrant attention. Non-occupational accidents actually rose until 1998, before falling. Furthermore, mortality attributable to accidental falls is actually up. Where RTAs are concerned, both the incidence and the mortality rate have fallen; indeed, mortality has continued to decline sharply since 2003. The trends just described have been deduced from A&E records. Theoretically, therefore, the apparent incidence reductions could reflect changes in treatment patterns. However, there is no evidence that the introduction of GP clinics has led to any reduction in reliance on hospital A&E units (Ormel, 2004).

The accident trends described above do not appear to have a single cause, but are the product of numerous factors. The sharp fall in accidental poisonings among children, for example, are likely to be down to improvements in the packaging of poisonous substances (Packaging of Household Chemicals and Medicines (Child Safety) Decree). The decline in sports injuries is simply consistent with the decline in sports participation; injuries are up in those sports whose popularity is increasing (such as mountain biking and skateboarding). The drop in the number of RTA victims is very probably the

result of road safety improvements; however, the sharp downturn seen since 2003 has no obvious explanation (Stipdonk, 2005).

More morbidity, less disability?

The prevalence of many diseases is rising, yet the number of people with disabilities appears to be falling. This would suggest that diseases are less often leading to disability. The extent to which improved treatment, advances in medical technology, growth in the use of medical devices, or improved device quality cannot presently be determined. Nevertheless, each of the latter developments is likely to have played a role. Another factor is probably the early detection of illnesses, before they can lead to disability. Early diagnosis may be expected to lead to higher recorded levels of disease but should not increase the prevalence of disability. However, a fall in disability would result only if early detection led to more effective treatment.

The number of people with disabilities has also fallen in various other western countries (Bogers et al., 2005; Robine & Michel, 2004; Freedman et al., 2002). The trend is most pronounced in the USA, where the number of elderly people with disabilities has been in decline since the early 1990s, despite the fact that a number of important chronic diseases have been increasing in prevalence. US research has shown that the debilitating effect of diseases has declined ('more sick but less disabled people'). Cardiac disease and arthritis in particular caused less disability in the USA during the 1990s than they did in the 1980s (Freedman & Martin, 2000). The researchers suggest that the explanation for this phenomenon is likely to lie in improved treatment of diseases and improved compensation for such disability as nevertheless occurs through the use of medical devices. Support for this theory comes from, for example, a recent US study, which found that during the 1990s far fewer elderly people were dependent on personal supportive care, and that half of the dependency reduction was attributable to the increased use of medical devices (Freedman et al., 2006).

In the Netherlands, too, there are signs that medical technology is increasing self-sufficiency. The large increases in the numbers of people benefiting from hip prostheses and cataract surgery may, for example, go some way to explaining the decline in disability (Van den Berg Jeths et al., 2004). However, no systematic research has been performed into the reasons for the possible decline in disability. This is partly because the exact nature of the trend is a lot less clear in the Netherlands: as indicated earlier, some data suggest that certain disabilities are actually increasing.

A comparison of data from the first and second National Studies has been made in order to establish whether chronic disease became less debilitating in the period 1987 to 2001 (Puts et al., 2006). The prevalence of both impaired mobility and impaired ability to undertake activities of daily living (ADL) was found to have fallen considerably between the two reference years. As expected, cardiac disease and COPD were also associated with less mobility impairment. Nevertheless, there was no clear downward trend in the overall debilitating effect of illness.

Although further research in this field is highly desirable, the findings already available are very interesting. We know that the impact of illness on functional capability and quality of life is central to the nation's health status, but it is sometimes easy to forget that the nature of this impact is liable to change. The consequences of such change are primarily practical. In forecasting and public health modelling, for example, the seriousness of an illness (as expressed in its DALY or QALY weighting) should also be variable. Hence, a model would show health benefit as accruing not only if the number of people with a particular illness fell, but also if the seriousness of the illness declined. Even more important are the implications for care policy. After all, the need for long-term care is determined primarily by the patient's self-sufficiency. If medical technology or the use of devices can prevent or reduce disability among the (chronically) ill, the demand for long-term care (nursing and supportive care) can be reduced.

However, before provision for such care is adjusted, greater insight is required into the trends in disability, into the relationships between particular diseases and disability, and into the underlying causes. Furthermore, it is important to recognize that, while disability is important, it is not the only determinant of quality of life. One must not overlook the ongoing need to tackle pain and other problems, and thus to increase people's ability to participate in society. What is clear is that, along with prevention, improved treatment and disease management can contribute substantially to the improvement of health and quality of life in the Netherlands, and thus to reduction of the demand for long-term care.

2.1.3 International and regional inequalities in health

So far in this chapter, the focus has been on the health situation in the Netherlands. In this subsection, we move on to consider how developments in the Netherlands compare with other European and non-European countries.

The previous PHSF reported that life expectancy was not increasing as quickly in the Netherlands as in neighbouring countries. Is this still the case? Are we gaining or losing ground on those ahead of us in the 'health league'? And how great are health inequalities within the Netherlands? Are such inequalities increasing or decreasing?

Life expectancy in the Netherlands remains fairly average for the EU

Compared with other European countries, the Netherlands has witnessed a modest increase in life expectancy. In the PHSF 2002, it was reported that the life expectancy of the average Dutch woman was fairly typical for the EU as a whole. In the meantime, the EU has been expanded to twenty-five countries, but female life expectancy in the Netherlands remains near the average. The life expectancy of the average Dutch man is significantly greater than the average for the whole of the expanded EU, but about typical for the fifteen 'old' EU member states. Italy and Sweden have the highest life expectancies in the EU. Looking further away, Japan is the clear leader, with the world's highest life expectancy for both men and women (78.4 and 85.3 years, respectively, in

2002; WHO, 2004a). The potential maximum average life expectancy is the subject of great speculation. However, there is still no sign of a deceleration of the steadily increasing life expectancy (see *box text 2.4*).

Although average life expectancy in the Netherlands is not particularly high, mortality among the young and middle-aged (particularly in the fifteen-to-sixty-four age bracket) is lower than in most other EU member states. By contrast, both perinatal mortality and mortality among the over-80s is relatively high in this country. In *subsection 3.1*, a more detailed international comparison of age-related mortality is presented.

Healthy life expectancy: the Netherlands compares quite favourably
If the comparison is broadened to include not only mortality and life expectancy, but also health-adjusted life expectancy (HALE), the Netherlands is found to be average to good (see *figure 2.5*). Healthy life expectancy is relatively high in Sweden, Italy, Spain and France, but relatively low in the former Eastern Bloc countries (WHO, 2005a).

HALE, mortality and life expectancy are all measures of the overall health status of a nation. These indicators effectively aggregate the incidences of and mortality rates for individual illnesses. If one focuses on the specific diseases, one finds that mortality attributable to accidents, stroke and coronary heart disease is relatively low in the Netherlands, while various types of cancer are more significant problems than in many other countries.

Mortality rates for coronary heart disease and stroke are low in the Netherlands
Within the 'old' EU (EU-15), there is something of a north-south gradient in mortality attributable to coronary heart disease: mortality rates are comparatively low in France, Spain, Portugal and Italy, and comparatively high in Finland and the UK. The new EU member states, however, have even higher rates of coronary heart disease mortality than the latter two countries. In the Netherlands, mortality attributable to coronary heart disease is low, at a level comparable with that in Italy (Eurostat, 2006). In the Netherlands and the rest of Western Europe, coronary heart disease mortality has been falling since the mid-1970s (Levi et al., 2002). In Eastern European countries, a similar downturn did not occur until the mid-1990s.

Mortality attributable to stroke is also relatively low in the Netherlands, as it is in most Scandinavian and various Mediterranean countries. Within the EU-15, stroke mortality is particularly high in Portugal and, to a lesser extent, in Greece. In the ten 'new' EU member states, stroke mortality is much higher (WHO-HFA, 2006). Since the late 1960s, mortality attributable to stroke has been falling in Western Europe, as it has in Japan and the USA (Sarti et al., 2000). By contrast, many Eastern European countries witnessed an increase in this period. However, since the mid-1990s the stroke mortality trend has been downward in the former Eastern Bloc as well (WHO-HFA, 2006). It should be borne in mind that apparent international differences in cardiovascular disease may be attributable partly to differences in the way data are recorded.

Box text 2.4: The demographic transition.

Author: P. Bol

In demography, the so-called demographic transition is a recognized phenomenon. It appears that all societies gradually evolve from an initially high-turnover state (characterized by high birth and mortality rates) to a low-turnover state (with lower or much lower birth and mortality rates). This transition has implications for the size of the population. At the start of the Christian era, the world population was about 250 million; by 1500 that had risen to 500 million. In other words, it took a millennium and a half for mankind to double numbers. By 1800, however, the era of Malthus, there were a billion people; the global population had doubled again in three centuries. A hundred years later, the figure was up to 1.6 billion, and by 2000 it had reached roughly six billion. Human numbers had quadrupled in the space of a single century. Had human fertility changed in some way? No, the global fertility level hovered at a very similar level throughout history, right up until the start of the twentieth century, since which time it has been declining. The reason for population growth has been increasing life expectancy. In the modern era (from 1500 to the present day), average life spans first began to rise in Western Europe. Initially, it was only the upper classes that benefited, but since about 1850 life expectancy has risen for all social strata. Globally, a similar sea change occurred around the time of the Second World War.

Delayed mortality therefore explains population growth; but is there a limit to the extension of human life expectancy? Experts have long assumed that, though scope for increasing life expectancy existed in many fields, such scope was inherently finite. A plateau phase would eventually be reached, an asymptote encountered. Recently, however, it has been repeatedly demonstrated that there is no evidence of this happening as yet. In various European countries, including the Netherlands, average life expectancy increased by forty years between about 1840 and 2000. That is an increase of one year every four years, or a quarter of a year per year, over that 160-year period. I In Science, Oeppen and Vaupel have convincingly charted this gradual rise in average life span, showing that the increase has followed a linear path. The question is, how long can this continue? For, in terms of sanitation, safety and all manner of treatments and therapies there is little scope for further progress?

Well, apparently, plenty of scope in fact remains for increasing life expectancy – both by medical means (e.g. vaccination) and by other means (such as improving road safety or the management of natural catastrophies). However, the cost of securing these increases is in some cases very high. In purely financial terms, every extra life-year secured today costs many times more than a century ago, even after correcting for inflation. Nevertheless, there is apparently a general belief that we should continue seeking improvements. The fifty billion euros currently spent directly on public health is matched by a similar amount spent in areas that benefit public health, such as water supply, sewage systems, river and sea dykes, lifeboats and rescue helicopters, safety belts, helmets, airbags, fire services, evacuations and the prevention of terrorism.

Environmental health threats have successfully been minimized. Collective and individual lifestyles are already the focus of attempts to influence behaviour in the interests of health. Just one dominant factor remains: genetic make-up. For the time being there is not much to gain in that field, in terms of life expectancy. Serious common diseases are only partly determined by genetic factors; and if so, mostly, numerous alleles on several chromosomes are involved. It is understandable, therefore, that governments and insurers concentrate on the collective and individual lifestyles that shape the common disease patterns. If they are successful, this will lead to further increases in life expectancy. However, infirmities of old age remain inevitable, and the last years of life bring the largest disease burden.

Source: LeFanu, 1999; Leschot & Mannens, 2000; Mackenbach, 2005; Mackenbach, 2006a; Oeppen & Vaupel, 2002; Timmer et al., 1999

Lung cancer, breast cancer and colorectal cancer all relatively common in the Netherlands

Where lung cancer, breast cancer and colorectal cancer are concerned, the incidence and mortality levels in the Netherlands are relatively high. However, it is worth highlighting certain details within the overall picture. For example, while lung cancer

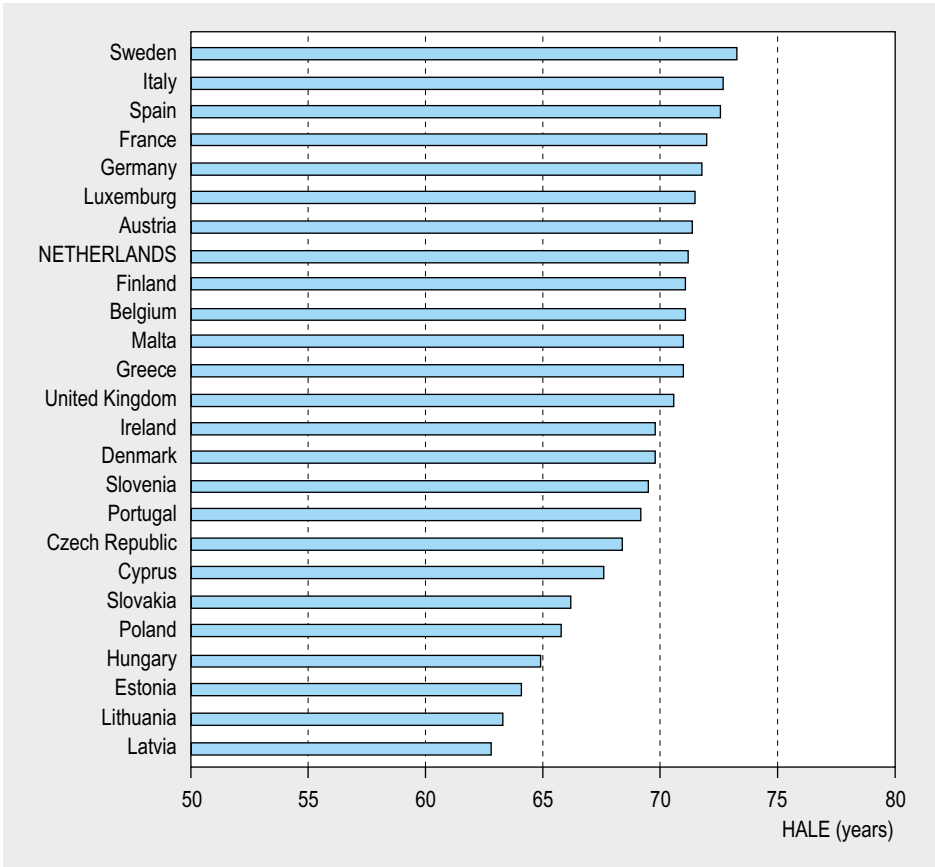


Figure 2.5: HALE in the twenty-five EU countries Union (Source: WHO, 2005a). NB: Due to discrepancies in the calculation methods applied, the WHO's calculated HALE figures differ slightly from the Dutch estimates, as presented in table 2.6. See also box text 2.2 regarding HALE.

is common in the Netherlands, the patients are predominantly older men. Among younger men, the incidence is actually lower than in the other countries. Furthermore, the incidence of lung cancer among Dutch men is no longer the highest in the EU. This is partly because the disease's incidence in the new member states is high, and partly because its incidence among men has been falling more quickly in the Netherlands than elsewhere. The incidence of lung cancer among Dutch women is also above the EU-25 average. In most EU member states, the incidence among women has been rising, albeit not as markedly in most cases as in the Netherlands.

The incidence of breast cancer is also high in the Netherlands compared with the rest of the EU-15. Although the exact cause is not known, it is notable that certain risk factors are relatively prevalent in this country. For example, Dutch mothers typically have their first child quite late in life; the average age was 28.8 years in 2003 (Eurostat, 2006). Within the EU, the corresponding figure is higher only in Spain, where the average is 29.2 years (most recent data relates to 2002). In addition, few Dutch women breastfeed their babies compared to their counterparts in the rest of Europe.

Breastfeeding is more common and continued longer in the Scandinavian countries in particular. In Sweden, around 80% of babies are still exclusively breastfed at the age of three months, compared with just 31% in the Netherlands (Lanting et al., 2003).

Finally, the incidence of colon cancer in the Netherlands is high compared with other European countries, in particular among Dutch women. Danish women are also relatively prone to colon cancer; by contrast, the Greeks (both men as women) contract the disease infrequently. However, there is no clear (north-south or east-west) pattern discernible in the incidence of colon cancer within the EU (Visser et al., 2000).

Health inequalities also exist within the Netherlands

Life expectancy in the healthiest country in the 'old' EU is four years higher than in the least healthy country. However, differences in life expectancy exist not only between the Netherlands and other countries, but also within the Netherlands. People in Amstelland-de Meerlanden live an average of three years longer than people in eastern South Limburg. South Limburg is not alone in having a low average life expectancy: the statistics are similar for Twente, Groningen and the four large cities in the West. High life expectancies are found mainly in the Randstad (the city conglomeration in the West of the country), except the poor city areas (Hoeymans & Zwakhals, 2005). Differences in healthy life expectancy can be as great as twelve years. There has been little or no change in the size of the differences or their geographical distribution since the mid-1990s. Regional inequalities in life expectancy and healthy life expectancy reflect the regional patterns of mortality, morbidity and health (see *box text 2.5*). Regional differences in mortality and health are in turn the product of regional differences in determinant patterns. A detailed description of the regional differences in health, determinants and prevention is presented in *subsection 3.1*.

Box text 2.5: Western Netherlands enjoys the best health (inner cities excepted).

Mortality
Regional inequalities in life expectancy reflect differences in mortality. In the Amstelland - de Meerlanden region, mortality associated with accidents is the lowest in the Netherlands. The region also has one of the country's lowest cardiovascular mortality rates (only South Holland West, South Holland North and Flevoland are better). It is the fifth healthiest region in terms of cancer deaths and the sixth healthiest where pulmonary disease (asthma and COPD) is concerned. At the other end of the spectrum, in the large cities and in South Limburg there is somewhat more variation. Amsterdam, for example, has one of the highest mortality rates in the Netherlands, but the city's mortality attributable to cardiovascular disease is not particularly high. However, with one or two such exceptions, the pattern is fairly consistent. Out of the thirty-nine regions, The Hague is not higher than thirty-fifth in relation to mortality associated with any given cause of death.

Health and morbidity
Regional differences in healthy life expectancy are dependent not only on mortality, but also on health inequalities. The regions with the lowest healthy life expectancy are Amsterdam, Rotterdam and the three most southerly regions. The most favourable statistics are consistently recorded in the west of the country. Although the underlying pattern of diseases and health is more varied, the general picture is persistent. Physical disabilities, for example, are most common in eastern South Limburg and Amsterdam, while the prevalence of mental disorders is highest in Amsterdam, Rotterdam and South Limburg's western mining region. Diabetes rates too are highest in Amsterdam.

2.2 What are the factors that determine our health?

Unhealthy lifestyles closely linked to social and physical environment
The unhealthy lifestyle factors highlighted in the previous PHSF are closely related to social and physical environment at many different levels, including the family, school and neighbourhood levels. Furthermore, exposure to adverse health determinants is higher in some social groups than others, reflecting differences in income, education and origin.

Trends concerning various lifestyle factors favourable, but not among adolescents
Where lifestyle factors and weight are concerned, the adult Dutch population compares reasonably well to other European countries. Obesity is (for the time being, at least) relatively unusual in the Netherlands, although the percentage of Dutch people who are overweight continues to rise. On the other hand, smoking rates, particularly among women, are above the EU average. And adolescents lead significantly less healthy lifestyles. Many of them smoke and levels of alcohol consumption are increasing. Some 14% of boys and 17% of girls are too heavy, while only a quarter of Dutch adolescents get the amount of exercise that is recommended for the age group.

Unhealthy lifestyles cause considerable health impairment in the Netherlands
Tobacco use is the largest single cause of morbidity and mortality, being responsible for 13% of the total disease burden, mainly in the form of lung cancer, chronic pulmonary disease (COPD) and coronary heart disease. Excessive alcohol consumption gives rise to 4.5% of the Netherlands' disease burden, largely by causing alcoholism. The sizeable contribution that overweight makes to the disease burden – nearly 10% – is also striking. In addition, considerable percentages of the cost of illness are attributable to smoking (3.7%), overweight (2.0%) and raised blood pressure (3.3%). Healthier lifestyles have the effect of deferring morbidity and mortality, but not of preventing it; people simply develop other chronic illnesses later in life. Hence, health promotion does not necessarily reduce overall health care expenditure.

Environmental factors and working conditions contribute significantly to disease burden in the Netherlands
Environmental factors, particularly atmospheric pollution and noise-related nuisance, are responsible for between 2 and 5% of all ill health in the Netherlands, although precise estimates are difficult to make. The figures take no account of the effects of any further environmental degradation that may occur in the future. Accurate estimation of the contribution to the disease burden made by working conditions is similarly difficult. However, the WHO believes that at least 1.6% of the total disease burden in the European Union is attributable to working conditions.

From health to the determinants of health
In *subsection 2.1*, we looked at the health of the Dutch population. In this subsection, we consider the determinants of health: the factors upon which our health de-

pends. What factors influence our health? To what extent is that influence shaped by predisposition, lifestyle or environment? How do these factors relate to one another? *Subsection 2.2.1* describes the complex interaction of person-related factors, lifestyle factors and environmental factors in relation to health. *Subsection 2.2.2* sets out the present position and highlights a number of important trends. How many people are overweight, and is the number still rising? Do significant environmental and lifestyle differences exist within the Netherlands or between the Netherlands and neighbouring countries? In *subsection 2.2.3*, consideration is given to the contributions to disease burden made by the various determinants and the associated costs.

In *subsection 3.1*, the various determinants are considered in relation to life pattern and in relation to vulnerable groups within the Dutch population. Very little attention is therefore paid to such matters in the present context.

2.2.1 Complex relationships between illnesses and causes

Person-related factors: the internal environment

Our health is the result of dynamic interaction involving person-related factors (also known as endogenic factors) and environmental and lifestyle factors (exogenic factors; see *figure 2.1*). Person-related factors may be genetic or may be acquired in the course of the individual's life. Each person's unique genetic make-up has a major influence on his or her susceptibility or resistance to illness. In some cases, as with colour-blindness, cystic fibrosis or haemophilia, the hereditary nature of that susceptibility is obvious. Usually, however, the distribution of predisposition to illness within a population is more complex, being the product of numerous influential genes. Furthermore, health-influencing person-related factors often develop as a result of interaction involving genetic, lifestyle and environmental factors, and are therefore partially genetic and partially acquired. This is the case with, for example, physical height, blood pressure, blood lipoprotein profile, allergies and psychological attributes such as self-confidence, inhibition and impulsiveness (Ormel et al., 2000; Van Oers, 2002).

In classic public health literature, the person-related domain is often referred to as the internal environment (milieu intérieur). The organism is constantly seeking to maintain a (dynamic) equilibrium in its internal environment by negating or compensating for disturbances, whether positive or negative. This is known as homeostasis. In this school of thought, illness occurs when the equilibrium of the internal environment is seriously disturbed. The sources of disturbance are often external, but may be internal. After repeated replication or reproduction, important macromolecules, including DNA and certain essential proteins, can ultimately become degraded and consequently dysfunctional. Despite the body's highly efficient repair mechanisms, the integrity of the genetic information stored in the DNA may be corrupted, sometimes with fatal consequences for the cell or the organism, if cells begin to multiply in an uncontrolled manner. Physicists refer to the latter process as 'entropy', the natural inclination towards chaos within systems (Riggs, 1998; Mackenbach, 2006a).

The human body acts against disturbances with a series of mechanisms designed to maintain homeostasis, such as the immunological rejection (inflammation) in response to infection by pathogens, the enzymatic detoxification of chemicals (mainly in the liver), blood coagulation and wound healing following trauma, increased cell division following tissue damage and behavioural changes in response to the detrimental effect of particular activities on health. Over time, these mechanisms can become less effective or malfunction. For example, excessive daily intake of 'unsuitable' (animal) fatty acids can compromise the body's fat metabolism, with various consequences, including an unhealthy rise in blood cholesterol and hardening of the arteries (arteriosclerosis) (Van Kreijl et al., 2004). Cigarette smoking causes damage to the lungs, which the body seeks to repair by increased cell division. This in turn can eventually result in potential cancer cells slipping through the efficient system of detoxification, repair and rejection mechanisms (Health Council of the Netherlands, 1996).

As we get older, we acquire more unhealthy characteristics. We may lose lung function as a result of smoking, acquire respiratory infections or be exposed to hazardous gases at work or in traffic. Our resistance to illness is therefore highly dependent on age.

Lifestyle and environmental factors

In addition to person-related factors, health is influenced by lifestyle. Lifestyle is the complex of healthy and unhealthy habits, such as tobacco use, excessive alcohol consumption or physical inactivity.

Then there is a third set of health determinants: environmental factors. These are outside factors that influence our health. Some derive from the physical environment, including not only familiar physical, chemical and biological agents (noise, radiation, atmospheric pollutants, food additives, contaminated food and allergens), but also the characteristics of our housing and the local spatial environment (architectural aesthetics, the availability of facilities or access to green space). Others derive from the social environment, including the presence of social support, the scope for personal development or casual contact at work, the opportunity to relax on holiday or through recreation, social interaction and the mores of a neighbourhood.

Prevention and care

Finally, alongside person-related, lifestyle and environmental factors, health is directly or indirectly influenced by the system of preventive measures and care that exists within society. Around the start of the twentieth century, enormous advances were made in public health not only as a result of the provision of safe drinking water supplies, good sewers and better housing (physical environment), but also as a result of vaccination programmes (person-related factors). More recently, we have seen the development of programmes designed to prevent two very common mental disorders (mood disorders and anxiety disorders), in the context of which recognition of significance and acceptance play a major part in prevention or aggravation of the problem. Such preventive programmes help people to see their problems in a more realistic and constructive light and to adjust their own behaviour. It was not until the second half of

the twentieth century that medicine began to exert a substantial influence on public health (see *subsection 2.4*).

Interaction between determinants at various levels

The determinants of health discussed above are not always of a similar order: a clear layering can be discerned, beginning with the individual level and going up to the national or European level. On these different levels, there is also interaction between groups of environmental factors.

First, one has the individual, in relation to whom hereditary or acquired person-related factors (such as overweight) apply. That individual is exposed to environmental factors, such as physical and social environmental factors and lifestyle factors. Depending on the individual's life pattern, that exposure takes place in various contexts: in his/her childhood family, in the school where he/she is educated and influenced by his/her peers, in the neighbourhood where he/she makes friends and acquaintances, plays sport and pursues other recreations, in the city where he/she studies or works, and so on (see *subsection 3.1*).

Ultimately, it is political and economic developments in the country where one lives that determine the resources devoted to public hygiene and health care, and to making the latter accessible. Finally globalisation has an influence on health determinants, such as the availability of food and personal and job security (Van Kreijl et al., 2004; Marmot, 2001).

The importance of interaction between determinants on various levels is well illustrated by the persistent health inequalities present in the Netherlands (see *subsection 3.2*), the gradient of health along the social scale. Exposure to adverse health determinants is unevenly distributed across various social groups, reflecting differences in, for example, income, education and origin – and with the seeds of the related health inequalities often sown early in life. Lower-income groups often have less healthy housing, live in less attractive neighbourhoods, do more dangerous jobs, have less access to healthy products (e.g. safer cars and healthy food), and enjoy less opportunity to let off steam. Furthermore, members of such groups frequently live in more difficult circumstances than their wealthier compatriots, with less control over their own lives or careers, more day-to-day troubles, a less agreeable balance between effort and (material) reward, lower perceived social status and more complex personal lives (relationship breakdown, loss of loved-ones). The consequence is often a less healthy lifestyle (tobacco use, addiction, unhealthy diet, etc). Furthermore, it also appears that social inequality may have a direct impact on health (Diez Roux et al., 2001; Marmot, 2001).

The largest health inequalities in the Netherlands are between affluent and deprived neighbourhoods. If one compares neighbourhoods, education and income generally prove to be accurate predictors of environmental quality and lifestyle. There are strong links between housing quality, spatial quality (greenery, facilities, identity), local environmental factors (noise, air pollution, safety) and the socio-economic and cultural

status (mores, cohesion) of neighbourhoods (see *subsection 3.2.2*). The health of the residents typically follows this pattern. Naturally, causality (the direct influence of the neighbourhood) and selection (such as the financial ability to live in an attractive environment) work hand in hand. In the work domain too, there is often a similar link between educational levels, the quality of the working environment (both physical and social), lifestyle and health.

Hence, the ultimate risk of developing an illness is determined by a combination of person-related, lifestyle and environmental factors. So the pursuit of unhealthy lifestyles highlighted in the previous PHSF is not an isolated phenomenon, but one that is closely associated with the social and physical environment, within which various levels may be discerned, including the family, the neighbourhood and the school.

Associations between determinants and illnesses are inconsistent and of variable strength

Information regarding the associations between individual determinants and a number of illnesses is presented in *table 2.8*. The selected illnesses (and the associated determinants) are the twenty that account for the largest DALY losses (see *subsection 2.1*).

The associations identified in *table 2.8* are not all equally strong. A strong link is known to exist, for example, between smoking and lung cancer: women who smoke are roughly twelve times as likely to develop lung cancer as women who have never smoked (Shopland et al., 1991). Among men, smoking increases the risk by twenty-two times. Similarly, bodyweight and diabetes mellitus are closely associated: obese women (those with a BMI of 30 or higher) are eight times more likely to become diabetic than women who are not overweight (BMI of less than 25). Men whose BMI is more than 35 are at fifty times the risk of diabetes (Carey et al., 1997; Chan et al., 1994). Not all of the associations identified in the table are so strong, however. For example, the relationship between the development of mental disorders and social environmental determinants, such as family problems and lack of social support is reasonably consistent, but fairly weak. Furthermore, the direction of influence is not clear in all cases. Social isolation and choosing to live in an urban area may be either the result or a contributory cause of a psychological disorder (Ormel et al., 2001).

The consistency of an association is also significant. Some associations are very consistent and strong (smoking and lung cancer), while others are consistent, but not particularly strong (mental disorders and social support). Finally, there are associations that are suspected, but (as yet) unproven: the consumption of vegetables and high-fibre products in ample quantities is believed to protect against colorectal cancer (WCRF/AICR, 1997), but the association has not been scientifically proven (Steinmetz et al., 1994; Fuchs et al., 1999; Voorrips et al., 2000). Similarly, there may be a causal relationship between alcohol consumption and raised breast cancer risk, but the exact nature of the association remains unclear (Smith-Warner et al., 1998).

Box text 2.6: Diet and working conditions: a closer examination.

Diet: both energy intake and dietary pattern significant
Various aspects of diet are associated with health status in various ways. High levels of energy intake combined with disproportionately low energy consumption can lead to weight problems, which in turn increase the risk of developing various illnesses (see *table 2.8*). The risk of cardiovascular disease is associated mainly with diet that is rich in saturated fatty acids and trans-fatty acids and low in fish, fruit and vegetables. Colorectal cancer is probably associated with a diet rich in meat and low in milk (calcium). The risk of lung cancer, oesophageal cancer, stomach cancer and head and neck cancer is higher among people whose diet includes little fruit and vegetables. However, the most recent studies have been unable to detect any link between breast cancer and low fruit and vegetables intake.

Working conditions can lead to physical and mental conditions
Working conditions influence the development of both physical and mental problems. Physical work-related factors include exposure to noise and substances in the workplace. The risk of various conditions, including 'Painters' disease', asthma, COPD and cancers such as mesothelioma, colorectal and skin cancer is increased if one is regularly exposed to substances at work.

Noise at work is an important determinant of hearing impairment, one of the three occupational disorders most commonly reported to company doctors. The other disorders in the trio are injuries to the upper members (such as arm, neck and shoulder problems and RSI) and stress or burnout.

Working conditions that have an adverse effect on the upper members include physical activities such as lifting, frequent bending and twisting of the trunk and extreme physical stress. However, psychosocial factors, such as dissatisfaction with one's work, stress, pressure of work and anxiety can all influence the development of upper-member problems.

The risk of burnout and stress-related problems increases in line with workload – in particular having to accomplish a lot in a short space of time (work-tempo pressure) and/or having to do work that is (too) difficult or complicated. Another risk factor for stress-related problems is lack of ability to manage one's work, i.e. determine the one's own tempo, sequence, method or location. In practice, such risk factors often occur in combination.

Source: Baars et al., 2005; Van Gils et al., 2005; NCvB, 2005; Ocké & Kromhout, 2004

Finally, several factors play a role in relation to several of the determinants listed in *table 2.8*. Where diet is concerned, for example, both energy intake and the consumption of fats, fish and fruit and vegetables play a role. Other determinants in relation to which several aspects are relevant include personality traits, family problems and working conditions (see *box text 2.6*).

More intense and prolonged exposure often increases risk

Where many determinant-illness associations are concerned, greater exposure increases the strength of the link. The more cigarettes a person does smoke, for example, the greater the risk of lung cancer (Mulder, 2003). Similarly, the more overweight one is, the greater the risk of diabetes (Carey et al., 1997; Chan et al., 1994). One exception to this pattern is the relationship between alcohol and coronary heart disease. Plotted on a graph, the correlation between alcohol consumption and coronary heart disease forms a J-shaped curve: excessive alcohol consumption increases the risk of disease, but people who drink moderately are at less risk than either total abstainers or heavy drinkers (Single et al., 1999).

Table 2.8: Determinants associated with the occurrence of the twenty diseases and afflictions responsible for the greatest DALY losses (for details of the associations, see National Compass on Public Health).

	Circulatory system			Endocrine diseases	Respiratory system	Musculoskeletal			Mental disorders					Neoplasms			Nervous system		Injury	
Determinants	Coronary disease	Stroke	Heart failure	Diabetes mellitus	COPD	Arthrosis	Rheumatoid arthritis	Neck and back problems	Depression	Anxiety disorders	Alcohol dependency	Dementia	Suicide	Breast cancer	Lung cancer	Colon cancer	Hearing impairments	Visual impairments [a]	Non-occupational accidents	Road traffic accidents
Person-related factors																				
Personality traits	■							■	■	■	■		■							
Total cholesterol	■											■						■		
Blood pressure	■	■	■									■						■		
Bodyweight	■	■	■	■		■						■		■		■				
Glucose-intolerance	■	■	■	■																
Lifestyle																				
Smoking	■	■	■	■	■							■			■	■		■		
Diet	■	■		■								■			■	■	■	■		
Breastfeeding				■										■						
Alcohol consumption/dependency	■							■	■	■	■		■	■		■			■	■
Physical activity/fitness	■	■		■				■	■			■		■		■			■	
Contraceptive pill use														■						
Physical environment																				
Noise	■																■			
House design/maintenance					■														■	
Chemical factors															■					
Large scale air pollution	■				■															
Radiation (radon etc)															■			■		
Micro-organisms (including viruses)							■										■			
Social environment																				
Family problems									■	■	■		■							
Social relations	■	■							■	■			■							
Social vulnerability								■	■	■	■		■							
(Early) life-events									■	■	■		■							
Working conditions	■				■	■	■	■	■	■	■				■		■			
SES	■	■		■	■	■		■	■	■	■	■	■		■			■	■	■
Ethnicity	■	■		■		■			■					■	■	■	■			
Household composition		■							■		■			■						
Degree of urbanization									■	■	■		■							■

[a] Macula degeneration, diabetic retinopathy, glaucoma and cataract

The duration of exposure is also relevant. For example, the length of time that a person smokes appears to have a bigger influence on his or her chances of contracting lung cancer than the number of cigarettes he/she smokes (Peto, 1986). Furthermore, risk often begins to decline once exposure to the determinant ceases. Women who use the contraceptive pill, for example, are at 4% more risk of breast cancer than non-users. Women who ceased to use the pill between one and four years ago experience a 6% higher risk, and those whose pill usage ceased between five and nine years earlier remain at a 7% elevated risk. However, after ten years of the pill, the risk returns normal (Collaborative Group on Hormonal Factors in Breast Cancer, 1996).

Health effects often delayed

Some determinants are directly linked to diseases and afflictions over time. For instance, many road accidents are directly related to alcohol consumption of traffic participants. However, most lifestyle factors lead to illness only after some years: the latency period between smoking and lung cancer, for example, averages twenty to thirty years. This also influences the patterns of illness. So the present illness pattern is only a partial reflection of current lifestyles and person-related factors; the determinants in play several years or even decades ago are more significant. The falling rates of mortality attributable to lung cancer that we are currently seeing among men are the result of the downturn in smoking that took place from the 1960s on. Conversely, the impact of many of the risk factors now present will only be felt in the longer term: it will be some years, for example, before obesity among today's adolescents begins to translate into higher levels of diabetes in the adult population (see also *box text 2.7*).

2.2.2 Present position with regard to key health determinants

Adverse developments in person-related factors

Where overweight, cholesterol and raised blood pressure are concerned, the recent trend has been unfavourable (see *table 2.9*). These factors are related mainly to diseases of the cardiovascular system, diabetes and colon cancer (see *table 2.8*). Developments with regard to these three risk factors are described in more detail below.

Percentage of people (including adolescents) who are overweight continues to rise

The percentage people who were overweight rose from 33% in 1980 to 47% in 2004. In 2005, no rise was recorded for the first time (45%). In the period up to 2005, the level of obesity rose from roughly 5% of the population to 11% (see *table 2.9*). Although concerns regarding the trends in overweight and obesity were expressed in the last PHSF (Van Oers, 2002), the levels continued to rise as quickly as ever in the period 2000 to 2004. Levels have been rising in all age groups, with the trend most pronounced in women aged between twenty and forty. Furthermore, weight problems are increasing in all social strata; they are no longer specific to the lower socio-economic groups (see *subsection 3.2*).

Box text 2.7: The dietary transition and diabetes.

Author: P. Bol

Over hundreds of thousands of years, people who were able to store nutrients efficiently at times of plenty and consume these economically at times of shortage enjoyed an evolutionary advantage. Famines and fluctuations in the food supply had the effect of selecting in favour of 'economical bodies'. Humanity existed in more or less this 'basic state' until the end of the Middle Ages. However, after about 1500, increasing global trade led to a more stable food supply and the dispersal of many new crops around the world meant that diets became more varied and healthier. In addition, there was a shift within agriculture, from irrigation based to precipitation based. However, the greatest accelerations in development came in the nineteenth and especially the twentieth centuries. Since the Irish potato famine of 1846 to 1849 (which had its parallel in the Netherlands, triggering political unrest), the Netherlands has not experienced any serious food shortage, except in the winter of 1944-45, when the west of the country was deliberately starved by the German regime.

The increasing and improving food supply was accompanied by a gradual decline in manual labour. Whereas in the early nineteenth century 90% of all energy used in the household and the workplace was provided by human muscle power, in the course of the twentieth century, the figure dropped to 10%. For many people, a large part of all physical effort has now to be found in the context of sport and recreational activities. Until a few centuries ago, the considerable energy expended by humans came from a diet consisting mainly of carbohydrates. Animal and other fats accounted for only a small part of the average person's energy intake and were greatly desired by the labouring classes. Paradoxically, fats were more readily available to the upper classes, which performed much less physical labour. Nowadays, all over the world, there is a trend towards higher daily calorie intakes, particularly by the consumption of more (animal) fats. Many people are satisfying their forebears' desire for meat and fat, despite not having their forebears' needs. This is particularly true of those who get little exercise. This process of 'democratisation' has brought about a global epidemic. Overweight, obesity, diabetes type 2, cardiovascular disease and joint problems are all mainly the result of the lost balance between energy intake and energy use.

More and more scientists are inclined to see the diabetes epidemic as the downside of an evolutionary success formula. The ability to save up energy, such an advantage to our ancestors, is actually a problem in an era of energy surfeit. In 2003, Jarred Diamond described various previously isolated communities, which had been obliged to 'fast forward' through thousands of years of development as the world opened up. The studied communities included Arizona's Pima Indians, the people of rural Papua New Guinea and the inhabitants of the pacific island of Nauru. Among these populations, there had within a few generations been a dramatic rise in food intake, accompanied by an equally dramatic fall in physical activity. Furthermore, the condition of these peoples at the outset of this transition was akin to that of West Europeans several hundred years ago. And, probably because the timescale of the changes gave no opportunity for adaptation, all the communities experienced a diabetes explosion much greater than that seen in the developed world. Prevalences of more than 50% have been recorded among adults in these communities.

The explosion of diabetes mellitus was of course of type 2. It was previously thought that this disease entailed the chronic overdemanding of the pancreas, leading to dysfunction. However, it is now known that insulin resistance in the muscles and liver is more important. Where insulin resistance exists, little or no sugar absorption occurs, even with a normal supply of insulin. The liver responds by producing glucose from other molecules and releasing them into the bloodstream, with the result that the muscles are swamped with glucose that they cannot absorb. Craving for energy, the muscles start to burn proteins and fats: an inefficient and health-threatening solution.

Early and milder forms of diabetes type 2 can be resolved by what must also be the two key elements of prevention policy: diet and exercise. In recent years, experts have begun to see exercise as particularly important. Partly because exercise means energy consumption, but for other reasons as well. Moderate physical effort makes muscle cells much more accessible to insulin, even in people affected by insulin-resistance. Furthermore, exercise 'massages' the pancreas, thus improving its performance.

Considerations about wise energy policy are in sharp contrast with the actual situation in the developed world, particularly among the lower

continuation box text

socio-economic groups. Everywhere, but especially in working class western communities, people are eating too much fat, too much salt, too much sugar and too much overall. This dietary pattern starts in childhood, among a generation of children who spend much of their leisure time engaged in sedentary pursuits, like computer games and watching television. What is more, the 'McDonaldization' of society means that also away from home people are typically confronted with unbalanced, bland, uniform and sub optimal fare in food outlets, school canteens and staff restaurants. Straightforward food that has come more or less directly from field and barn to kitchen and plate has been largely replaced by processed food, rich in additives and transformations.

Source: Brugmans, 1983; Diamond, 2003; Foster, 1998, Ruwaard & Feskens, 1997

Table 2.9: Person-related health determinants in the Netherlands: present situation and trends (period) (for more information about the prevalences of the determinants and the sources used, see National Compass on Public Health, 2006b).

Person-related determinants (20-70-year-olds)	Definition	Year	Prevalence (%) Men	Women	Trend
Moderate overweight	Body Mass Index ≥ 25 kg/m²	2005	50	40	Adverse trend, easing recently (1980-2005)
Obesity	Body Mass Index ≥ 30 kg/m²	2005	10	11	Adverse trend, easing recently (1980-2005)
Abdominal overweight [a]	Abdominal girth > 102cm (men) or 88cm (women)	1998 - 2001	22	33	Adverse trend (1993-2001)
Raised total cholesterol [a]	≥ 6.5 mmol/l and/ or medication	1998 - 2001	17	14	After decrease 1987-1997, unfavourable indication: rise (1998-2002)
Reduced HDL cholesterol [a]	< 0.9 mmol/l	1998 - 2001	21	4	After decrease 1987-1997, unfavourable indication: rise (1998-2002)
Raised blood pressure [a]	≥ 140/90 mmHg and/or medication	1998 - 2001	39	31	Unfavourable indication: rise (1987-2002)

[a] Prevalence, as determined in the context of Regenboog, 1998 t/m 2001 (Rainbow, 1998-2001). Response to the Rainbow Project was lower than expected. Although this was corrected by weighting, the representativeness of the data may have been compromised. Trend: data for the period 1998-2002 from the Doetinchem Study (a smaller-scale continuation of the MORGEN Project, which provides only an indication of the likely trend in this period.

The overweight statistics are based on self-reported data on height and weight, which are known to underestimate the problem, since people are inclined to indicate that they are taller and lighter than they actually are. Very recently, a body of independently measured height and weight data has been made available. Surveys in two municipal health service regions (Nieuwe Waterweg Noord and Zaanstreek Waterland) found that no less than 65% of male and 48% of female subjects were overweight. However, these regional data are not directly comparable with the national estimates referred to above. It is worth noting that these are the first results to come out of the local and

Figure 2.6: Percentages of boys and girls who were overweight and obese in 1997 and in 2002-2004 (Source: Van den Hurk et al., 2006).

national public health monitoring system, which will in due course also yield information on blood pressure and cholesterol levels (see also *subsection 1.5*).

Overweight and obesity are rising not only in adults, but also in children (four to fifteen years old). On average, 14% of the boys and 17% of the girls are overweight or obese. In some age groups, the percentage of children who were overweight or obese in 2002 to 2004 was twice what it had been in 1997 (see *figure 2.6*). An average of 2.9% of boys and 3.3% of girls are obese (Van den Hurk et al., 2006).

Although the percentage of people who are moderately overweight in the Netherlands is high (as indeed it is in most other EU member states), obesity is less common in this country than elsewhere (IOTF Prevalence Data, 2005). The problem of overweight in children is particularly serious in South European countries, where 20 to 35% of children are overweight, compared with 9 to 25% in the Netherlands (depending on sex and age: among boys the percentage varies from 9 to 17%, while among girls the range is 15 to 25%) (IOTF Prevalence Data, 2005; Van den Hurk et al., 2006).

Percentage of people with raised cholesterol and raised blood pressure apparently rising again

The percentage of Dutch people who have a raised total cholesterol level and/or make use of cholesterol-reducing medication halved in the period 1987 to 1997, from 16% to roughly 8% (HVZ Survey Station 1987-1992, MORGEN Project 1993-1997). Since then, however, the indications have been that the percentage is rising again (Doetinchem

Study 1998-2002). Furthermore, the percentage of people with reduced HDL cholesterol appears to be going up again as well, after falling between 1987 and 1997. The same studies suggest that the percentage of people with raised blood pressure rose slightly between 1987 and 1997 and that the rise is apparently continuing (see *table 2.9*).

Various lifestyle factors changing for the better, but not among adolescents
Among adults, the lifestyle trends are fairly encouraging: the number of smokers continues to decline, excessive consumption of saturated fat is falling, and excessive alcohol consumption does not appear to be increasing (see *table 2.10*). Among adolescents, however, the trends are much less positive: many adolescents smoke, alcohol consumption is on the rise, and overweight among adolescents continues to rise (see *table 3.2*). These lifestyle factors have implications for numerous illnesses: diseases of the cardiovascular system, diabetes, asthma and COPD, musculoskeletal problems, mental disorders, infectious diseases and various forms of cancer. Details of the developments in smoking, use of alcohol and drugs, exercise, diet and safe sex are presented below.

Smoking rates have fallen in last few years, but less so among adolescents
After a prolonged decline in the percentage of the population (the male population in particular) that smokes, followed by stabilization in the 1990s, the figure has fallen further in the last few years. In the 1990s, roughly 33% of people smoked, but by 2004 the figure was down to 28%. The biggest drops in smoking rates seen between 1980 and 2004 were among women aged twenty to thirty-five and men of sixty-five and above. No decline occurred, however, among older women (sixty-five and above). Among both older men and older women, roughly 15% now smoke (see *table 2.10*).

Among adolescents, however, smoking rates are not falling. The slight rise seen in smoking rates among young people in the first half of the 1990s did not continue after 1995/1996; in fact there was a small decline in the period 2002 to 2004. The percentage of fifteen to nineteen-year-olds who smoke is relatively high. When asked, 45% of boys and 36% of girls in this age group said they had smoked in the last four weeks (STIVORO, 2004a) (see *table 3.2*).

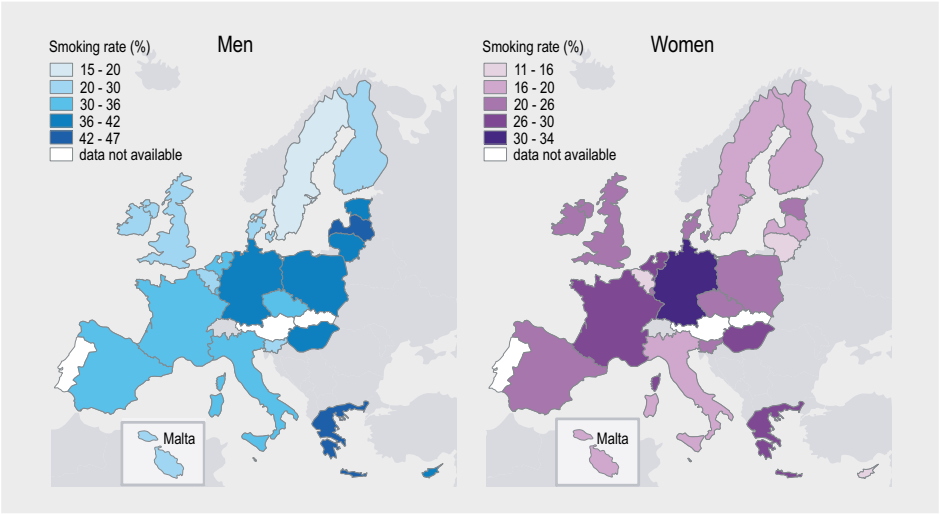
Among people aged thirty-five to sixty from non-western ethnic minority background, the smoking rate is highest among men of Turkish origin (63%), followed by men of Surinamese origin (54%). These figures are significantly higher than the corresponding rates for males in the indigenous population. Some 30% of men of Moroccan origin smoke. Roughly a third of women from Turkish and Surinamese backgrounds are smokers, but smoking is almost unknown among women of Moroccan origin (Nierkens, 2006) (see also *subsection 3.2*).

Smoking rates in the Netherlands are a little above the EU average. Our downward trend in the number of smokers is mirrored in other European countries. However, Dutch women do not compare well with their counterparts in other EU member states (see *figure 2.7*). In 1970, the smoking rate among Dutch men was the highest in Europe, but by 2004 the rate had fallen to near the European average. It is particularly in the

Table 2.10: Lifestyle factors in the Netherlands: present situation and trends (for more information see National Compass on Public Health, 2006a).

Lifestyle (≥ 12 years, unless indicated otherwise)	Definition	Year	Prevalence (%) Men	Women	Trend
Smoking (≥ 15 years)	Existing smokers	2004	31	25	Favourable, decrease among men and women (1990-2004)
Too much alcohol consumption	Men: three units or more a day; women two or more	2003	14	10	Period too short (2001-2003) [a]
Alcohol abuse	Six units or more at least once a week	2005	18	4	Favourable/constant: slight decrease among men, constant among women (1989-2005)
Total abstinence	No alcohol consumption	2005	13	24	Rising among men and women (2000-2005)
Soft drug use	Recent use (in last four weeks)	2001	4	2	Adverse indication: rise (2001 compared with 1997)
Hard drug use	Recent use (in last four weeks) of cocaine, amphetamines, ecstasy, hallucinogens (excluding magic mushrooms) or heroin	2001	0.1-0.4	0.1-0.4	Adverse indication: rise (2001 compared with 1997)
Physical inactivity	Less than five days a week at least half an hour of moderately strenuous activity	2005	44	46	Constant (2001-2004)
Insufficient vegetable intake	< 200 gram/day	1998	78	80	Adverse, slight rise (1987, 1992 and 1998)
Insufficient fruit intake	< 200 gram/day	1998	76	68	Adverse, slight rise (1987, 1992 and 1998)
Excessive saturated fat intake	> 10% of energy intake	1998	92	92	Favourable, slight decrease (1987, 1992 and 1998)
Breastfeeding (birth to six months)	Exclusive breastfeeding				
	At birth	2004		79	Favourable, rising (1997-2004)
	After three months	2004		35	Favourable, rising (1997-2004)
	After six months	2004		25	Favourable, rising (1997-2004)
Sexual behaviour (15 to 35 years)	Failure to always use a condom with casual partners over the previous six months	2004	45	43	After decrease between 1997 and 2000, rising up to 2004

[a] In 2001, the survey question used to gauge excessive alcohol consumption was changed.



Figuur 2.7: Percentage of daily smokers among men and women (fifteen and older) in EU member states between 2000 and 2004 (Source: WHO-HFA, 2006).

new EU member states that male smoking rates are high (see *figure 2.7*) (WHO-HFA, 2005; STIVORO, 2004a). Where smoking rates among school age children are concerned, the Netherlands was again near the EU average in 2003 (Hibell et al., 2004).

Alcohol consumption down slightly overall, but up among adolescents

Alcohol consumption per head of the population in the Netherlands was highest in the second half of the 1970s and in the 1980s. There was then a slight fall, but the trend flattened off from the early 1990s. Since 2001, however, alcohol consumption has been falling again, albeit modestly. Some 10 to 15% of the Dutch population drinks excessively: 14% of men have three or more units per day and 10% of women have two or more units per day (see *table 2.10*).

By contrast, adolescents have been drinking more in recent years (see *box text 2.8*). It is notable that far fewer young people of Moroccan or Turkish origin drink alcohol than their indigenous counterparts: the number of drinkers in the ethnic majority population is three times as high as in Amsterdam's Turkish-Dutch population and six times as high as in Amsterdam's Moroccan-Dutch population. A study conducted in Rotterdam (2004) showed that second-generation Turks and Moroccans aged sixty to thirty were less likely to drink than indigenous people of the same age (Janssen, 2006; Dotinga, 2005) (see *subsection 3.2*).

Ecstasy use high, but problem drug use low by European standards

Cannabis products (hashish, marihuana) are not strongly addictive and are relatively harmless. However, the concentration of the active ingredients in hashish has increased considerably in recent times and the concentration in 'nederwiet' (marihuana grown in the Netherlands) rose from 9 to 18% between 1999 and 2005. The risk of dependency increases with prolonged frequent use. Young people who smoke cannabis

Box text 2.8: Alcohol consumption is rising among adolescents, particularly girls.

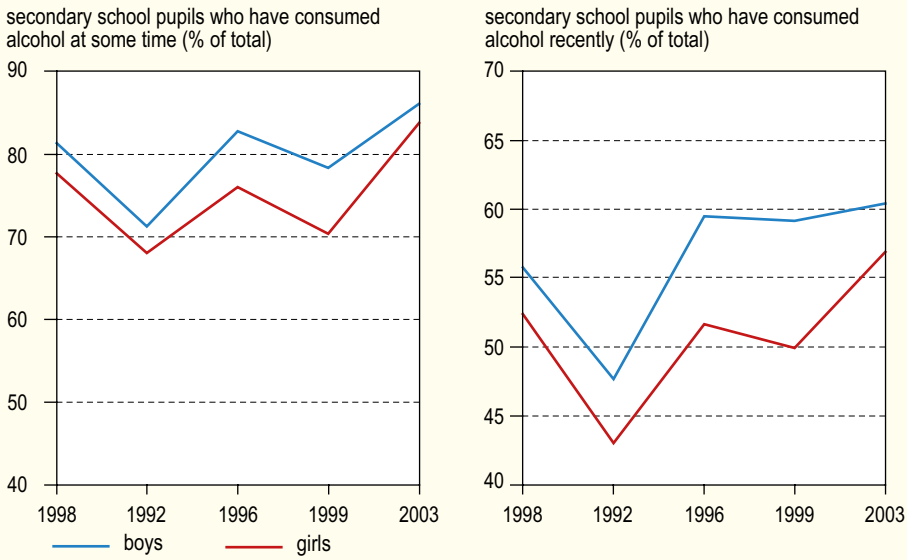


Figure 2.8: Rates of alcohol consumption (ever and recently) among secondary school pupils (Source: Monshouwer et al., 2004).

In 2003, 85% of pupils aged twelve to eighteen at 'ordinary' secondary schools acknowledged having drunk alcohol at some time. In 1999, the figure had been 74%. The percentage has, however, fluctuated persistently over the last fifteen years (see *figure 2.8*). The biggest rises between 1999 and 2003 were in the percentages of girls between the ages of twelve and fourteen who had drunk alcohol ever and who had drunk alcohol in the last month. In 1999, 57% of girls in this age group had drunk alcohol at some time; by 2003, the figure was up to 78%. In 1999, 32% had had a drink in the last month, compared with 44% in 2003. Among secondary school pupils, the favoured alcoholic drinks were beer for boys and alcopops for girls (Van Laar et al., 2004).

Dutch adolescents are more likely to drink alcohol than any of their European peers. Dutch school-age youngsters also rank alongside the Irish and British at the top of Europe's adolescent binge-drinking table; the rates of indulgence in this habit being, respectively, 28, 32 and 27%. In this context, binge drinking is defined as drinking five or more units of alcohol in one 'session' (Hibell et al., 2004).

One worrying development concerning alcohol consumption among adolescents is the rise of so-called 'garden shed drinking'. This is a phenomenon whereby youngsters, typically in the thirteen-to-twenty-three age band, get together in garden sheds, caravans, huts and shelters to socialize and drink alcohol. The number of locations where these get-togethers take place has increased dramatically in the last ten years. It is estimated that there are about fifteen hundred locations around the country, where levels of alcohol (usually beer) consumption are disturbingly high. Youngsters involved in the practice say that they drink an average of half a crate of beer in an evening. Bottled beer bought in crates is considerably cheaper than beer served in licensed premises. The minimum ages for the supply of alcohol are not respected (Mulder, 2005).

display above-average levels of problem behaviour. Furthermore, cannabis users are more likely than non-users to perform badly at school. The association between cannabis use and behavioural problems becomes closer as usage frequency increases. Addiction or dependency is one of the main effects of hard drugs. However, the nature of

such effects differs considerably from one hard drug to another. Heroin, for example, is rapidly addictive both mentally and physically; cocaine, on the other hand, is mentally addictive, but less physically addictive. The addictive effect of Ecstasy is probably slight. In 2001, the percentage of the general population of over-twelves who acknowledged ever having used cannabis or having used it in the last month was higher than in 1997. Usage of several hard drugs (cocaine, Ecstasy, amphetamines) was also higher in 2001 than it had been in the reference year, 1997. Increasing cocaine use appears to be concentrated in the age group 20-24 years (Abraham et al., 2002; see *table 2.10*).

Dutch adolescents are also among Europe's main users of Ecstasy, along with their peers in countries such as the Czech Republic and the UK. Some 5% of Dutch and British fifteen and sixteen-year-olds said they had used Ecstasy at some time; in the Czech Republic the figure was 8% (Hibell et al., 2004). The rate of cannabis use among Dutch youngsters is also relatively high, although young people in a number of other countries (Czech Republic, Ireland, France, UK and Spain) use cannabis significantly more often and use greater quantities than in the Netherlands. In the Netherlands, 28% of fifteen and sixteen-year-olds said they had used cannabis at some time; the corresponding figures for the countries listed above vary from 36% in Spain to 44% in the Czech Republic (Hibell et al., 2004). Cannabis use in the total population is above the European average in the Netherlands, although the number of problem users of hard drugs is low, at three in every thousand fifteen to sixty-four-year old. Problem drug use in Europe varies from 1.9 per thousand in Poland to 9.4 per thousand in the UK (EMCDDA, 2005a) (see *table 3.2*).

Half the Dutch population does not get enough exercise

There was very little change in the nation's exercise habits between 2001 and 2005. About half of Dutch people get at least half an hour's exercise at least five days a week (the Dutch Healthy Exercise Standard; see *table 2.10*). Among adolescents (twelve to eighteen-year-olds), only just over a quarter take the amount of exercise recommended for the age group (at least an hour a day, at least five days a week). In the period 2001 to 2005, the percentage of boys who were active rose from 24 to 33%, but the percentage of girls remained more or less stable, at about 20% (Statistics Netherlands StatLine, 2006) (see *table 3.2*).

Generally speaking, the Dutch rank alongside the Danes, Finns, Swedes, Germans and Luxemburgers as one of the most active nations in the 'old' EU. The Netherlands is the comfortable leader when it comes to moderate physical exercise, such as cycling. The percentage of people who get no exercise at all is lower in the Netherlands than in any of its peer countries. On the other hand, Dutch people walk very little and spend more time than most sitting down (EORG, 2003a). At the age of eleven, Dutch boys and girls are about as physically active as their European peers. The percentage Dutch girls aged 13-15 years who get enough exercise is high in comparison with the European average. Dutch boys of the same age are close to the European average, however (HBSC study: Currie et al., 2004).

Fruit and vegetable consumption falling

No recent data is available regarding dietary patterns in the Dutch population as a whole. The last representative survey was conducted in 1998. Data collected in surveys conducted in 1987, 1992 and 1998 shows that, in the period 1987 to 1998, daily consumption of fruit and vegetables fell by 5 and 8%, respectively, to averages of 120 and 102 grams per person. The figures on the consumption of saturated fats were encouraging, however, although the percentage of Dutch people whose fat intake was below the recommended level was very low (5 to 10%) (see *table 2.10*). Furthermore, the most recent survey suggests that the positive trend may have come to an end: the percentage of men complying with the standard was down in 1998. Like other Northern Europeans, Dutch people eat less vegetables, fruit, legumes and vegetable oil than their South European counterparts (EPIC study; Slimani et al., 2002). The consumption of fish in the Netherlands also remains low in comparison with other European countries (EPIC study; Slimani et al., 2002).

More recent data (2003) are available regarding young adults (nineteen to thirty-year-olds) in the Netherlands. These data show that 8% comply with the advice on saturated fatty acids and only 7 to 8% eat the recommended amount of fruit. None of the people surveyed ate enough vegetables (200 grams a day) and only 2% ate more than 150 grams of vegetables a day (VCP, 2003).

The current food consumption trends in the Netherlands may have both positive and negative consequences in terms of the Dutch population's nutrient supply. Use of a so-called dietary index enables the positive and negative aspects to be weighed up against one another and appropriate policy priorities to be defined.

Breastfeeding rates are rising, but remain low by European standards

In 2005, 79% of infants were exclusively breastfed in the neonatal period. However, the percentage that was still exclusively fed on their mothers' milk (directly or by expression) at the age of three months was much lower, at 35%. An even smaller percentage was being fed in this way at the age of six months. Nevertheless, breastfeeding rates have risen in recent years. For infants aged three months, the rate was roughly 20% in late 1990s, but had risen to 35% by 2005; for those aged six months, the rate rose from roughly 10 to 25% over the same period. Despite these rises, the percentage of infants that are exclusively or partially breastfed remains low in comparison with other European countries (WHO-HFA, 2006).

Safe sex guidance ignored by nearly half of adolescents and young adults in casual relationships

Among adolescents and young adults (fifteen to thirty-five-year-olds) engaging in casual vaginal or anal sex, 45% of males and 43% of females said they did not always use a condom. Furthermore, there are signs that unsafe sexual habits are increasing (Kuyper et al., 2005). Condom use among school-age youngsters is lower in the Netherlands than in other European countries. On the other hand, Dutch adolescents are more likely to use other forms of contraception than their European peers (Currie et al., 2004).

Unhealthy habits often go hand-in-hand

People with unhealthy lifestyles rarely have only one unhealthy habit; hazardous forms of behaviour typically go hand-in-hand. Smoking is particularly likely to be associated with other unhealthy habits, such as for example excessive alcohol consumption. This is particularly the case where young adults are concerned: smokers in the twenty-to-thirty age group are four times as likely to drink too much as non-smokers. Among thirty to sixty-year-olds, excessive alcohol consumption is two to two and a half times as common among smokers as non-smokers. It also appears that compound unhealthy behaviour (such as smoking and alcohol consumption, or lack of physical exercise and low consumption of vegetables or fruit) is more common among less educated people.

Physical environment threatens health in various ways

In the Netherlands, various environmental conditions do not conform to the applicable standards. For example, the concentrations of particulates and ozone in the general atmosphere exceed recommended levels, and the water quality at bathing and other recreational facilities is substandard (see *table 2.11*). The trends relating to these environmental factors are described below.

Particulate concentrations down, but still too high in large parts of the Netherlands.

The maximum daily average concentration of particulates (PM-10) recommended in the context of brief exposure is 50 µg/m^3. This concentration should not be exceeded more than five times a year. In large parts of the Netherlands, however, this standard is not met. The number of days of excess concentration has clearly been falling since 1996, but was still well over the limit in 2003 (see *table 2.11*). The reductions achieved by the Netherlands and other countries were realized by cutting emissions of particulate and substances that can contribute to particulate formation. Year-to-year variations in the number of days that the 50-µg/m^3 level is exceeded are due mainly to meteorological differences (RIVM-MNP et al., 2004a).

Despite the decline in the concentration of airborne particulates, the Netherlands does not compare well with other European countries where particulates are concerned. Particulate limits are exceeded by a greater margin in the Netherlands than in most other urbanized parts of Europe (Buijsman et al., 2005).

No further fall in the ozone concentrations

Ozone concentrations in the Netherlands are close to the public health protection target levels. Data collected in the Netherlands – and elsewhere in Europe – show that, in the first half of the 1990s, there was a clear reduction in the number of days with a maximum eight-hour average ozone concentration of more than 120 µg/m^3. The most likely cause of this downturn was the considerable reduction in the emission of ozone-forming substances across Europe. In the last few years, however, there have been no further falls in ozone concentration in the Netherlands, or in other European countries, despite the continuing emission reductions. In 2004, the 120 µg/m^3 limit was exceeded

Table 2.11: Environmental factors of health in the Netherlands: present situation (reference year) and trends (period) (for more information see National Compass on Public Health, 2006c and the Environmental Data Compendium).

Environmental factors	Scale of problem	Trend
Physical environment		
Particulates	In 2003, the number of days on which the particulate concentration was higher than the day limit (50 µg/m³), was above the permitted maximum (thirty five days per year) in nearly all parts of the Netherlands (except Groningen and Drenthe).	Favourable: both the short-term and long-term exposure to particulates is declining (early 1990s to 2003).
Ozone	In 2004, the day limit for ozone (120 µg/m³) was exceeded in the Netherlands on eighteen days (less than the permitted twenty-five days per year).	Constant: ozone concentrations declined sharply, particularly in the first half of the 1990s. In recent years, however, there have been no further decrease.
UV radiation	Risk groups whose exposure is two to three times higher than the average: patients receiving UV therapy, sunbed users, outdoor workers, sun lovers.	Over the last two decades, UV radiation levels in the Netherlands have been above the 1980 level. In 2002 the annual UV dose was more than 7% higher than in 1980. However, the rate of increase has eased since the mid-1990s.
Radon	Average radon level for the entire national housing stock: 23 Bq/m³.	Adverse: level has risen from 19 Bq/m³ in 1969 to 23 Bq/m³ in 2003.
Serious noise-related nuisance from traffic and industry	Road traffic: 11%	Rise 1993-2003
	Air traffic (passenger and freight):	
	- Total: 4%	Reasonably constant
	- Schiphol: 11%	Declining since 1996
	Rail traffic: 1%	Constant
	Industry: 7%	No clear trend
Pollution in swimming water in recreational areas	Comply with the standards:	The number of swimming areas in the Netherlands that meet the applicable water quality standards fluctuated between 92.4 and 100% in the period 2000 to 2004.
	98.2% of inland swimming areas.	
	97.6% of coastal swmming areas.	

in the Netherlands on a maximum of eighteen days, compared with twenty-six days in 1992. The highest ozone concentrations are found in the southern and southeastern parts of the Netherlands (RIVM-MNP et al., 2004b).

Serious air traffic noise-related nuisance is falling

Long-term exposure to environmental noise can constitute a nuisance. The degree of nuisance is influenced not only by the noise level and variations in that level, but also by personal and contextual factors. The most important of these factors are noise

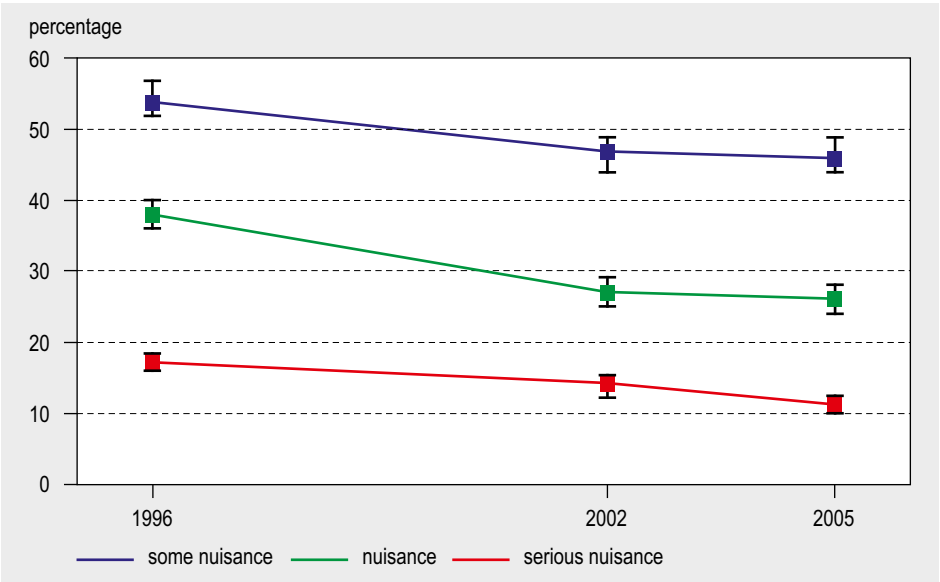


Figure 2.9: Percentage of self-reported nuisance (surveys in 1996, 2002 and 2005) associated with aircraft noise in the adult population (eighteen and older) living near Schiphol Airport, including 95% confidence interval (Source: Houthuijs et al., 2006).

sensitivity, anxiety and worry, trust in the government and the airport authorities and, especially, local expectations regarding future noise levels.

The percentage of people living around Schiphol airport (Amsterdam airport) who experience serious noise-related nuisance from aircraft has declined in the last ten years (see *figure 2.9*). In 1996, 17% experienced serious nuisance, but by 2002 the figure had dropped to 14%. In 2005, just 11% of local residents were still experiencing serious nuisance. In the last ten years, major contributions to the reduction in nuisance have been made by the exclusion of noisier aircraft and changes to runway usage patterns and flight paths (which now pass over less densely populated areas). These policies may therefore be described as successful. The opening of the Polder Runway has had the effect of confining exposure to high noise levels to a smaller area to the north of the airport.

As a result of the decline in serious nuisance from aircraft noise, air traffic is no longer the main source of noise-related nuisance in the region. Noise from road traffic in built-up areas caused serious problems for a comparable portion of the population (10%) in 2005. Extrapolation from RIVM survey data indicates that in the area around Schiphol more than 200,000 adults were experiencing serious aircraft noise-related nuisance in 2005. In a wider region around the airport, as many as 300,000 people were experiencing such nuisance. Nationally, the portion of the population experiencing serious aircraft noise-related nuisance from passenger and freight traffic has fluctuated around the 4% mark since the 1970s. This percentage equates to around half a

million adults in the country as a whole and reflects nuisance associated not only with Schiphol, but also with local and regional airports.

People who experience serious aircraft noise-related nuisance also report lower perceived levels of mental health than others. Because the surveys assessed nuisance and perceived health at the same time, it is not clear whether those experiencing the serious nuisance were in worse perceived mental health because of the exposure to aircraft noise, or whether people in poor perceived mental health are more likely to consider noise to be a serious nuisance. People in poorer perceived health may look to external factors for the causes of their problems. It is also the case that people in poorer perceived health are more tied to the house and therefore less able to find distractions from the aircraft noise. A similar association with road traffic noise has been established in the Netherlands (Jabaaij, 2005). Furthermore, the survey conducted in 2005 found that people who reported experiencing serious aircraft noise-related nuisance were more likely to have (self-reported) high blood pressure; this was not the case in 2002. A German research team found a similar correlation (Maschke et al., 2003). Where road traffic noise is concerned, the relationship is less clear (Babisch, 2006). Nevertheless, it is plausible that nuisance and high blood pressure could be linked, either directly or through stress mechanisms (Health Council of the Netherlands, 1999).

2.2.3 Contribution to disease burden made by the various determinants

Unhealthy lifestyles cause considerable health impairment

On the previous pages, we have presented statistics on the prevalence of various diseases and their determinants within the Dutch population. From this information, it is possible to estimate the disease burden in the Netherlands associated with unhealthy lifestyles and adverse person-related factors. To do so, one first has to calculate what fraction of ill health is attributable to each risk factor (static attribution; see *box text 2.9*). This involves determining what fraction of new cases of all chronic disorders diagnosed a year is due to each risk factor. The resulting figure is referred to as the population-attributive risk (PAR). It is then possible to calculate the associated disease burden. This we perform by estimating the average number of lost disability-adjusted life-years (DALYs; see *subsection 2.1*) associated with the new cases; this is the sum of the lost life-years through premature mortality and the life-years spent in illness, the latter weighted according to the seriousness of the illness (illness-year equivalents, or IYEs). From this figure it is also possible to work out the average cost of illness per year attributable to the risk factor in question. The calculated data are presented in *table 2.12*. The contribution made by each determinant is expressed as a percentage of the calculated total annual disease burden.

Table 2.12: Contribution to ill health by key lifestyle and person-related determinants (expressed as a percentage of the total annual number of lost life-years, illness-year equivalents (IYEs), DALYs and cost) in the adult population (twenty and older).

	Lost life-years [a] (%)	IYEs [b] (%)	DALYs [b] (%)	Cost of illness [c] (%)
Smoking	20.9	7.1	13.0	3.7
Too much saturated fat	0.9	0.6	0.8	0.2
Too little fruit	3.9	1.4	2.4	0.8
Too little vegetables	2.0	0.8	1.4	0.3
Too little fish	3.3	1.7	2.3	0.9
Physical inactivity	4.9	3.5	4.1	1.4
Alcohol consumption [d]	2.7	5.4	4.5	0.4
Overweight	5.8	12.7	9.7	2.0
Raised cholesterol	3.3	2.2	2.7	0.7
Raised blood pressure	10.8	5.6	7.8	3.3

[a] Percentage of total lost life-years.
[b] Percentage of total of 71 diseases of the Chronic Disease Model.
[c] Percentage of the overall cost of illness.
[d] Including alcoholism associated with immoderate alcohol consumption.

These findings are broadly in line with those reported in the PHSF 2002 (Van Oers, 2002). As it was in 2002, tobacco use is the largest single cause of morbidity and mortality, accounting for 20.9% of lost life-years, 7.1% of illness-year equivalents and 13.0% of the disease burden in DALYs. The principal diseases involved are lung cancer (mortality), COPD and coronary heart disease (mortality and morbidity). Compared with the other factors listed, smoking is also responsible for a considerable percentage (3.7%) of the cost of illness calculated by this static method.

Excessive alcohol consumption also makes a significant contribution to the disease burden in the Netherlands (4.5%), mainly because of the sizeable burden associated with alcoholism. Overweight and high blood pressure account for a great deal of ill health, particularly in the form of diabetes mellitus, coronary heart disease and stroke. Hence, overweight causes nearly 10% of the nation's overall disease burden. Overweight and high blood pressure are in turn closely related to physical activity levels and dietary patterns. This is another reason why one cannot simply sum up the percentage contributions made by individual risk factors.

In addition to performing static calculations, we have examined the influence that the various risk factors have on disease burden by means of dynamic modelling. Using the Chronic Disease Model, we made forward projections to the point where the present adult population (twenty and over) has died off, assuming the present distribution of risk factors. The outcome of this simulation was then compared with a similar forward projection, assuming that everyone was in the most favourable risk group in relation to the individual risk factor under examination (see *box text 2.9*). This method does not produce data that are readily comparable with those presented in *table 2.12*. In each case, the basis of assessment is comparison between the numbers of life-years, IYEs and DALYs associated with the favourable scenario and the numbers associated

Box text 2.9: Calculation of the disease burden attributable to certain forms of behaviour.

The impact that lifestyle has on health can be quantified by calculating the associated amount of health impairment. The calculated fraction, known as the population-attributive risk (PAR), is a function of the prevalence of a given unhealthy form of behaviour in a population and the extent to which that behaviour increases the risk of illness (the relative risk). The calculations can be made in two ways: static attribution and dynamic modelling.

Static attribution involves working out the amount by which the present annual incidence of a particular disease would fall if everyone were in the lowest risk group (e.g. 'non-smokers' or 'sufficient fish consumers', or 'sufficiently physically active' or 'normal weight'. Application of this fairly simple method results in an average health impairment figure, calculated from the Dutch health statistics, for each form of illness attributable to the relevant form of behaviour. The latter figure is the sum of an average number of life-years lost through premature mortality attributable to the illness in question and the average number of years spent in illness, weighted according to the seriousness of the illness (illness-year equivalents, or IYEs). This sum gives the number of lost disability-adjusted life-years (DALYs).

In addition, RIVM's Chronic Disease Model (CDM) has been used to predict the effect of unhealthy lifestyle on life pattern. The CDM is a dynamic population model developed in order to estimate the effects of changes in the prevalence of risk factors (such as smoking and overweight) on the prevalence of chronic diseases (including cardiovascular disease, diabetes and various forms of cancer) and the resulting mortality in the Netherlands. This involves using the model to twice look ahead until everyone in the present population aged twenty or more has died: once assuming the present age-specific distribution of risk factors, and once assuming the most favourable age-specific distribution. We then look at the differences in the occurrence of chronic diseases and mortality and finally the number of (healthy) years lived in each simulation run.

Such dynamic modelling gives a more realistic picture, because it takes account of the contribution that unhealthy lifestyle makes to future loss of healthy life-years. The fact that someone avoids developing a cardiovascular disorder by eating sufficient fish does not mean that he or she will spend the rest of his/her life in good health. He or she may subsequently develop some other chronic disease, or even the same cardiovascular disorder that fish eating deferred. The CDM makes explicit allowance for these deferral and substitution effects and calculates the gains and losses that are associated with behaviour, in terms of healthy life-years, years spent in ill health and the sum of the two (DALYs).

Source: Van Kreijl et al., 2004; Van der Maas & Kramers, 1997

with the unfavourable scenario. On this basis, we are able to say, for example, that if no one in the present adult Dutch population smoked, the total number of life-years ultimately accumulated by the people in question would be 4.8% greater than if today's smoking patterns remain unchanged. If the years spent in illness are weighted according to the seriousness of the illness, a similar comparison shows that a non-smoking population would enjoy 7.5% more healthy life-years. The corresponding figures for physical inactivity projections are, respectively 1.2 and 1.6%; for overweight they are 1.2 and 1.7%. If comparison is made on the basis of illness year equivalents (IYEs) only, the benefits of healthy living are appreciably smaller: although 4.7% fewer IYEs would be accumulated by a non-smoking adult population, the reductions associated with sufficient physical activity and the eradication of weight problems are just 0.2 and 0.3%, respectively. The reason being that the model makes explicit allowance for illness deferral and substitution, which is not the case with the static PAR calculations (see *box text 2.9*). In other words, the model recognizes that if at a given point in time someone, on account of being a good weight, avoids developing a particular chronic disease that he or she would have developed if overweight, it does not follow that he or she will

live a long, illness-free life. The risks of succumbing to a weight-related disease may have been reduced, but, because the person's life expectancy is thus increased, it is more likely that he or she will develop some chronic disorder at some point. Ill health is delayed for the individual in question, not prevented altogether. Hence, in a scenario that assumes no one is overweight, one finds that the chronic diseases of old age, such as dementia and stroke are actually more prevalent than in a scenario that assumes a continuation of the present population weight distribution, mainly because people are living longer. Illness-years associated with unhealthy living are substituted by other illness-years later in life; so healthy years are gained, but illness-years are not reduced. Substitution also has implications for the cost of illnesses: a non-smoking adult population ultimately succumbs to substitute illnesses that cost the system 6.6% more than the illnesses that would be suffered by the same population if there were no change in current smoking patterns. Similarly, a population with no weight problems would ultimately run up care costs totalling 1.5% more than an 'unreformed' population, and a physically active population's costs would be 1.7% higher.

Table 2.13: Percentage lifetime gains (increase in life-years, decrease in IYEs, increase in DALYs) and increase in total care costs associated with adoption of the most favourable forms of behaviour by the entire adult population (over twenty), compared with a continuation of present behaviour patterns.

	Increase in life-years [a] (%)	Reduction in IYEs [a] (%)	Increase in DALYs [a] (%)	Increase in cost of illness [b] (%)
Smoking	4.8	4.7	7.5	6.6
Physical inactivity	1.2	0.2	1.6	1.7
Raised blood pressure	1.7	1.2	2.6	2.2
Overweight	1.2	0.3	1.7	1.5

[a] Percentage of total of 71 diseases of the Chronic Disease Model.
[b] Percentage of the cost of all illnesses.

From the foregoing, one may conclude that, by influencing behaviour, it is possible to increase healthy life expectancy considerably, but not to cure all ills. More healthy living results in deferred and substituted chronic illness in old age. It cannot therefore be assumed that health promotion reduces care expenditure. Nevertheless, the point should be made that our calculations have focused on the classic lifestyle diseases, which are for the most part associated with smoking, poor diet and lack of exercise. However, lifestyle and behaviour also influence the occurrence of mental disorders. Although the disease burden associated with these disorders is considerable, it is not possible to quantify the contribution that lifestyle factors make to their prevalence.

Environmental factors apparently responsible for 2 to 5% of ill health in the Netherlands, but estimates uncertain

The RIVM recently made a fresh estimate, suggesting that 2 to 5% of the nation's disease burden (expressed in DALYs) can be attributed to environmental factors, including atmospheric pollution, noise-related nuisance, radon and UV radiation and tobacco smoke or moisture indoors (Knol & Staatsen, 2005). Exposure to atmospheric pollution has gradually been falling; its adverse health effects have in consequence probably

been falling as well, but this cannot be assumed, since a shift in pollutant mix is not necessarily healthier. On the other hand, noise-related nuisance continues to increase, while exposure to radon and UV radiation has remained largely unchanged since 1980 (Buijsman et al., 2005).

Our calculations indicate that atmospheric pollution in the form of ultra-fine particulates is by far the greatest environmental contributor to ill health, followed by noise. Both are to a significant extent caused by traffic. As all premature mortality attributable to atmospheric pollution is taken into consideration, atmospheric pollution's contribution to disease burden in the Netherlands works out at more than 10%. However, the data on the relationship between long-term exposure to atmospheric pollution and mortality derive largely from large-scale US studies, and the validity of using such data in the Dutch context is contentious. That there is a link between atmospheric pollution and health is not disputed. Broad consensus on the precise nature and extent of pollution's influence on health is lacking, however: it is uncertain, for instance, whether pollution causes ill health or merely aggravates existing disorders; nor is it clear what physiological mechanisms are involved. Differences of opinion also exist as to which fractions of the complex mix of atmospheric pollutants are the most significant, and consequently as to whether expensive pollution control measures would in fact be of benefit to public health (Brunekreef & Forsberg, 2005; Buijsman et al., 2005). Some commentators have also questioned whether noise-related nuisance and sleep disturbance may properly be regarded as health effects (De Hollander, 2004).

On the other hand, the estimates take no account of two important public health issues: the possible future health effects and cross-border implications of environmental degradation. In the long term, our open economy and high living standards may contribute to global sustainability problems and hence to health problems in a variety of ways. Potentially significant in this regard are the depletion of resources (fresh water, fossil fuels, fish, agricultural land), the dispersal and accumulation of hazardous substances, soil degradation, loss of biodiversity, or climate change by the emission of greenhouse gases (IPCC, 2001). The associated health problems may occur in the Netherlands or in other parts of the world that are more vulnerable because of their geographical circumstances, their level of economic development or the nature of their health care infrastructure (RIVM-MNP, 2005; Mackenbach, 2006b; Mackenbach, 2006d).

Working conditions are also a major cause of health impairment

Working people generally enjoy better health than people who do not work. This is partly because of the health-promoting properties of work, but is partly a consequence of selection (healthy people are more likely to be able to work, so the working population will contain more healthy people). However, work can also lead to health impairment. Many working people are at risk of accidents or illnesses as a result of exposure to hazards, such as chemicals, noise and stress, while at work.

The WHO estimates that the disease burden attributable to working conditions is at least 1.6% of the total disease burden in the European region (WHO, 2005). The most important work-related risks associated with this disease burden are wounds/injuries (40% of the work-related disease burden), noise (22%), carcinogens (18%), airborne particulates (17%) and ergonomic risks (3%). The disease burden associated with mental problems is not included in these estimates.

Meaningful comparisons between the disease burden in the Netherlands and that in the European region are difficult to make, because of differences in the make-up of the working population and the work situation (Paoli & Merllié, 2001). For example, work tempos and workloads in the Netherlands are among the highest in Europe; computer use in the Dutch economy is also much higher than in many other countries. On the other hand, the percentage of the working population that undertakes physically arduous activities is lower than the EU average, as is exposure to noise and chemicals at work. The portion of disease burden in the Netherlands that may be attributed to all adverse working conditions collectively is also unknown. However, a recent study suggested that exposure to chemicals was on its own responsible for more than 1% of the total disease burden in the Netherlands (Baars et al., 2005). The main health problems associated with such exposure are asbestos-related pulmonary disease, contact eczema and infections of the upper respiratory tract. Other significant work-related contributors to disease burden include workload-induced mental disorders, hearing impairment, back problems and RSI. It has been estimated that 4 to 7% of the Netherlands' working population suffers stress-related problems (Hoeymans et al., 2005a).

Lifestyle-related disease burden in the European context: the Netherlands still compares well

The WHO's European Health Report 2005 included estimates of the contributions to disease burden (in DALYs) made by various known risk factors (WHO, 2005b). These estimates are based on the direct attribution of illness, not on dynamic modelling (see *box text 2.9*). In order of contribution to the disease burden, the most significant risk factors in the European Union are: smoking, high blood pressure, alcohol abuse, overweight, raised cholesterol, lack of exercise, inadequate fruit and vegetable consumption, drug use and unsafe sex. When compared with all twenty-five EU member states, including the predominantly Eastern European new member states (where health standards tend to be low), the Netherlands is above average on nearly all counts. The one exception is smoking-related disease burden, with regard to which the Netherlands is below the EU average and comparable to a number of Eastern European countries (see *figure 2.10*). This risk factor-related pattern of health reflects the lifestyles and person-related factors that predominated roughly ten to twenty years ago. The relatively high DALY count attributable to smoking, for example, is due to the very high smoking rate in the Netherlands in the 1970s.

If one considers the total health impairment attributable to the risk factors identified by the WHO (to which end one cannot simply sum up the DALY counts for the individual risk factors, because they are not mutually independent), the Netherlands is

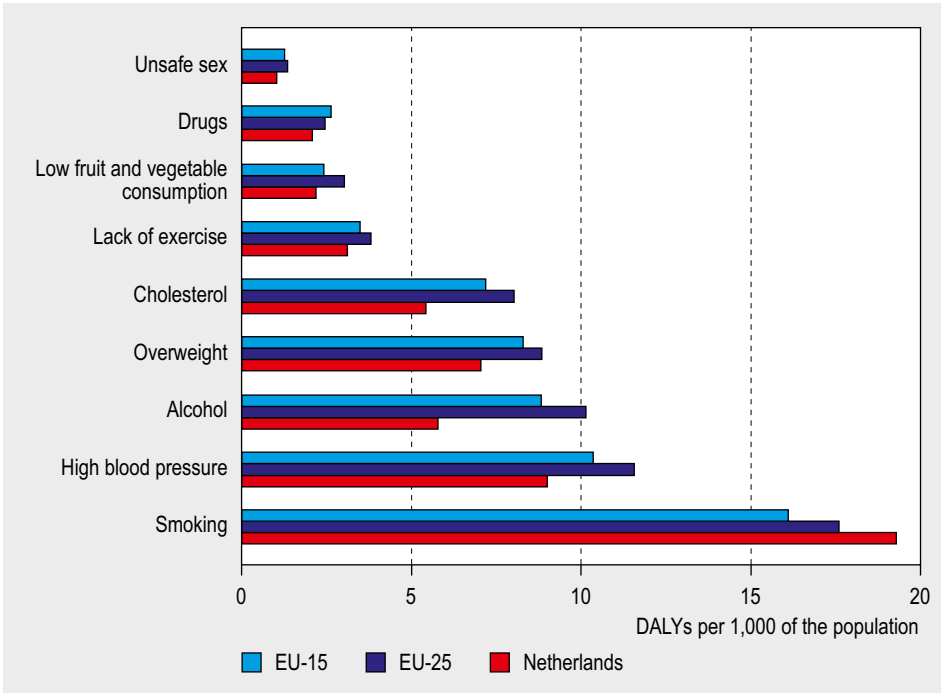


Figure 2.10: Disease burden (in DALYs) attributable to various risk factors: the Netherlands and the European Union (EU-15 and EU-25) (Source: WHO, 2005a).

behind only Cyprus, France and Sweden. The new EU member states in Eastern Europe consistently fare badly when compared on this basis too.

Finally, the point should be made that these DALY statistics are not corrected for age. Hence, the disease burden attributable to the identified risk factors in the Netherlands affects quite a young population compared with some other countries. This may mean that the comparison is tipped slightly in the Netherlands' favour. However, correction for age is not easy to achieve, because the various risk factors are related to age in different ways.

2.3 What impact do preventive interventions have on health?

Integrated approach on smoking has been effective and can serve as a model for tackling overweight problems

Unhealthy lifestyles do not exist in isolation, but are closely related to the social and physical circumstances in which people grow up, go to school, make a home, work and spend their leisure time. As a result, people in many social groups have limited scope for making healthy lifestyle choices. The promotion of healthy behaviour requires an intensive, integrated approach that addresses both the individual and his/her environment using various simultaneous forms of intervention. Where smoking is concerned, such an approach has proved successful. The experience gained tackling smoking can be utilized in connection with overweight and possibly other health-related problems.

Growing insight into the costs and benefits of preventive activities

The Netherlands spends at least 12.5 billion euros on prevention. The bulk of this money (80%) is spent on health protection, after which the next largest slice of the budget goes on disease prevention (17%). Only a small amount (3%) is devoted to health promotion. The health benefits obtained by the Netherlands' preventive programmes are secured at a reasonable cost. However, various cost-saving and cost-effective forms of preventive intervention have yet to be organized and implemented on a systematic basis in the Netherlands.

More information about the effectiveness and implementation of health promotion schemes is urgently needed

Information about the effectiveness of health promotion activities remains scarce. More evaluation research is therefore urgently required. In addition, more needs to be learnt about the factors that influence the success and failure of (general) programme implementation. Particular gaps in knowledge include the long-term effects of health promotion and the impact of intervention aimed at target groups that are difficult to reach, such as young people and people of low socio-economic status. Information about forms of preventive action that are and are not effective could also help local governments to shape local health policy. Such information needs to be more systematically collected, assessed and disseminated; in this context, it is desirable for the government to play a directing role.

More emphasis should be placed on prevention within the care system

The range of systematic preventive activities has become wider over time. This has been achieved mainly by making better use of the existing infrastructure (e.g. by performing additional tests when infants attend clinic for the standard neonatal screening). There remains ample opportunity for further prevention in the primary care sector, in terms of drawing patients' attention to effective preventive public health care initiatives.

Health in all politics aids integrated prevention
Much can be gained by the systematic consideration of the health implications of policy in non-health domains and of the opportunities for exercising a positive influence on health. Considerable further scope exists for the pursuit of integrated health policy at both the central government and municipal levels. However, lack of information, tools and resources often makes it difficult for municipalities to implement integrated health policies. Health-orientation in other policy domains can be increased by, for example, evaluating the health implications of non-health policies using health effect estimation and screening techniques. More research into the quantitative effects of integrated health policy is required, however. There is a need to develop tools for the implementation of multi-sector health policy, and to develop good evaluation methods.

Greater scope for self-testing increases the need for reliable information
Compared with many other countries, the Netherlands is cautious about screening for illnesses and risk factors. However, the public has increasing access to commercial self-administered diagnostic test products. Self-testing can have far-reaching consequences for the individuals concerned, for the care system and for policy. This means that the government and the care sector both need to take a more active approach to the provision of reliable information on the use of self-testing, on the interpretation of self-test results and on appropriate follow-up action.

Recommendations made in the previous PHSF remain valid
In recent years, various parties have sought to promote the embedding of prevention within the care sector and within socio-cultural life, the use of settings and the exchange of knowledge. This has led to the introduction of numerous new preventive activities, but better coordination of these activities is required. There remains scope for improving the systematic establishment, sustainable organization and funding of such initiatives, as well as the systematic evaluation of preventive activities in the Netherlands.

From health and determinants to prevention

We have so far examined the main health problems in the Netherlands (*subsection 2.1*) and the main determinants of these problems (*subsection 2.2*). In this subsection, we consider what can be done to prevent the health problems facing our country.

In the last PHSF, the point was made that, while in theory public health could be improved considerably by addressing unhealthy lifestyles, preventive health care was not organized as well as it might be in the Netherlands. Particular criticisms were a lack of systematic organization and funding, insufficient use of local settings, poor embedding of prevention within the care system and within socio-cultural life, and a lack of evaluation and knowledge transfer. In this subsection, we consider what progress has been made in each of these areas in the last four years.

Subsection 2.3.1 describes the various forms of prevention, while *subsection 2.3.2* looks at the preventive action being taken to address the country's main health problems. Is it effective? What factors contribute to success and failure? What scope is there for increasing the effectiveness of preventive programmes? In *subsection 2.2,* we examined the complex interaction between lifestyle, physical and social environment and the influence of district, school or work in the development of health problems. Following on from the points made there, *subsection 2.3.3* considers the integration of action in the context of various settings, and *subsection 2.3.4* deals with the subject of health policy. Finally, in *subsection 2.3.5*, information is presented on the cost of prevention and on the cost-effectiveness of preventive measures.

2.3.1 The various forms of preventive action

In the conceptual model of public health (see *figure 2.1*), three forms of preventive action are distinguished. First, there is health protection. In the late nineteenth and early twentieth century in particular, the creation of proper sewer systems, safe drinking water supplies and good housing brought considerable health benefits. Nowadays, health protection also involves regulating exposure to hazardous substances at work, in food, in consumer products and in the environment. Flood defences, road and food safety provisions and building regulations are all forms of health protection as well (see *box text 2.10*). Regulating such matters is generally regarded as part of the collective responsibilities of government and to a large extent falls outside the health care domain.

The second form of preventive action is health promotion, which normally involves acting to encourage healthy behaviour. However, the creation of a healthy social and physical environment is also a form of health promotion. Health promotion initiatives may be focused on the general population or on certain population groups. Furthermore, the goals of health promotion activities may be on various levels: intervention goals or process goals ('health promotion outcomes') are concerned with the process, the reach and quality of an intervention (e.g. the number of people taking part in a diet course). Securing a short-term goal of this kind does not necessarily imply an immediate health benefit. There are at present no validated tools for measuring the attainment of such goals. Intermediate health goals or outcomes are often directly related to health and their attainment can be ascertained in the relatively short term (as with, for example, the modification of smoking habits). However, in some cases the relationship between an intermediate goal and health is less clear (e.g. if the goal is the modification of an attitude or intention). The associated tools are more often validated and standardised than those linked to process goals, but measurement errors are nevertheless quite common. Finally, there are health goals, which relate to improved public health status. The attainment of such goals can usually be measured by validated means, although often only in the longer term (see also *box text 2.11*). The Referentiekader Gezondheidsbevordering (Reference Framework for Health Promotion; Saan & De Haes, 2005) distinguishes a number of other types of goal, in particular

Box text 2.10: A closer look at road and food safety.

Food safety standards in the Netherlands are high
The promotion of safe food (food free from micro-organisms, chemicals or other substances in quantities that could be detrimental to health) involves taking action designed to afford a high level of protection to the health of the consumers. The government has put in place an extensive set of measures to ensure that food does not contain harmful substance concentrations. These measures include an assessment-based system for licensing substances such as food additives and pesticides, regulations limiting the concentrations of certain substances in foods, and supervision and enforcement regimes. In addition to these regulatory measures, food safety is promoted through information campaigns concerning matters such as the importance of hygiene. The existing system has ensured that the risk of health being damaged by chemicals in food is very small in the Netherlands. The efforts made by the government and the business community in recent decades mean that our food is now relatively safe and demonstrably safer than it was. Nevertheless, food infections still cause considerable health damage. Consequently, further health benefits can be obtained by the continued promotion of safe food, in particular the prevention of microbiological contamination. The benefits thus attainable are, however, much less significant than those that could be secured by promoting healthy diets (Van Kreijl et al., 2004).

Along with Sweden and the UK, the Netherlands has one of the best road safety records in the world
In the field of road safety, various initiatives have been pursued in the period 2000 to 2003 – some of them new (e.g. new legislation) and some recurrent or ongoing (e.g. infrastructural improvements). Not all these initiatives are primarily aimed at improving road safety, but they may be expected to have a road safety benefit, as with the use of navigation systems or the introduction of the Dutch national eco-driving code, Het Nieuwe Rijden. With a view to further improving road safety standards, a more structural approach to road safety was introduced in the period 1997 to 2002, under the title Duurzaam Veilig (Sustainably Safe). The Sustainably Safe programme consisted mainly of infrastructural measures designed to support the safe movement of traffic. This gave impetus to efforts to create a sustainable and safe traffic network, with 30 kph and 60 kph zones and separate facilities for two-wheelers and pedestrians. The improved infrastructure has led to a decline in the number of people killed or injured in road traffic accidents (RTAs). Roads with 30 kph limits are nearly three times as safe as those where the limit is 50 kph (SWOV, 2004) and driving at 60 kph instead of 80 kph reduces injury accidents by 18% (Beenker et al., 2004). The replacement of ordinary intersections with roundabouts is estimated to cut casualties at such sites by 73% (Province of South Holland, 2004). In addition, as part of the Duurzaam Veilig programme, road safety information has been disseminated and numerous legislative and regulatory changes have been made with a view to promoting safety. However, infrastructural changes have more effect on RTA injury statistics than public information campaigns. Partly because of the design of its infrastructure, the Netherlands – alongside Sweden and the UK – has one of the best road safety records in the world.

process goals concerning the organization of health promotion, such as the extent to which the conditions for health promotion are met, or the availability of information about controlling an intervention.

The third and final form of preventive action is disease prevention: action to prevent the occurrence of specific illnesses (e.g. by vaccination) or to screen for (predisposition towards) an existing illness. Naturally, it is important that screening can be followed up by good life style advice or proper treatment.

With a view to increasing the effectiveness of prevention, an integrated approach is often taken, with environmental measures, legislative and regulatory measures and other measures all taken at the same time. Integrated programmes often focus not on one particular health problem, but on several problems or risk-increasing forms of

Box text 2.11: Increasing the effectiveness of health promotion.

On the basis of experience gained in the Netherlands and from the findings of literature studies undertaken elsewhere (Kumanyika et al., 2002; Bull et al., 2004; Molleman et al., 2003), it is possible to identify a number of factors that can increase the effectiveness of health promotion activities:

- Intervention must be based on a) validated theoretical models, b) problem and situational analysis and c) sound feasibility studies. This allows for the definition of clear goals for intermediate and final outcomes.
- The simultaneous use of several forms of intervention increases the effect. This entails that, apart from general information to the public, there should be personalized reporting, on-line information provision or legislation and regulation.
- The methodology, timing and location of intervention must be appropriate for the target group and be aiming at intermediary results.
- The intervention must be sufficiently intense to bring about an effect.
- An intervention is more effective if it is aimed not only at the individual, but also at his or her social and physical environment. The promotion of healthy eating, for example, will be effective only if appropriate foods are available and affordable.
- Awareness is essential to the process of changing behaviour. Failure to reach the target group is often due to the lack of insight of the intended recipients who do not perceive themselve to be leading an unhealthy lifestyle.
- It is important to have input and support from stakeholders and from the target group. Long-term funding and adequate political support are also required.
- The embedding of a project in the existing structure can cement its continuity. To this end, long-term arrangements need to be made with the relevant partners.

A tool called Preffi 2.0 (Prevention Effect Management) has been developed to help people working in health promotion to ensure that their projects are consistent with the principles outlined above.

behaviour at once. Activities may be undertaken in various settings: the district, the workplace, the school and the care sector. These settings play a vital role in the implementation of an integrated approach to preventive action.

An integrated approach to prevention depends on policy support, not only from within the public health domain, but also from within other domains, such as spatial planning, transport policy, social policy and youth policy. Given that support, health in all politics is possible.

In recent years, there have been a lot of changes in the field of preventive action, including considerable redefinition of responsibilities. With a view to promoting the quality and effectiveness of preventive action, the government sees its role as the national coordination of individual collective prevention activities (see *box text 2.12*).

2.3.2 Reduction of risk factors and prevention of particular diseases

Preventive programmes have been developed for the major health problems, such as cardiovascular disease, diabetes mellitus, several forms of cancer, musculoskeletal disorders and mental disorders (see *subsection 2.1*). The main determinants of ill health (which are linked to the above health problems to some extent) are smoking, excessive alcohol consumption and overweight (see *subsection 2.2*). This subsection begins with

Box text 2.12: Organizational developments in the field of prevention.

The Ministry of VWS and the municipalities have administrative responsibility for preventive activities within the Netherlands' health care system. Numerous different parties are involved in the implementation of such activities, each with their own tasks, powers and responsibilities. Various developments have taken place since the last PHSF, including the following:

- The Public Health (Preventive Measures) Act (WCPV) was amended with effect from 1 January 2003. The amended act sets out the basic tasks for collective prevention sectors, such as youth health care. The municipal health services (MHSs), which undertake collective prevention activities on the municipalities' behalf, are now responsible for all basic tasks within the latter sector (which covers children and young people up to the age of nineteen). Under the amended act, municipalities are required to produce a local public health policy document every four years. Finally, the scope of the Health Care Inspectorate's (IGZ's) supervision has also been extended to include all areas regulated by the act. The report Openbare Gezondheidszorg: hoe houden we het volk gezond? (Public Health Care: how do we keep the public healthy?; IGZ, 2005a) describes the results of a study into the quality and future-readiness of the public health care system.
- The central government now has to produce a public health policy document every four years as well. The first such document published in compliance with the legislation was Langer gezond leven. Ook een kwestie van gezond gedrag (Staying Healthy Longer: also a question of healthy lifestyles). The basic principle of the latter document is that healthy behaviour is primarily the responsibility of the individual, but that various other parties – including care providers, health insurers, schools, employers and the government – all have a role to play in promoting healthy behaviour. These parties' responsibility is to provide a healthy environment, in which healthy behaviour is easy (or, at least, easier); the object is to make the healthy choice the easy choice. A new prevention policy document is expected to appear in the first half of 2007.
- With a view to promoting quality and effectiveness, the government has opted to increase the national coordination of certain collective prevention tasks. In 2005, a start was made with national coordination of infectious disease control, soon followed by national coordination of screening programmes. To this end, the Centre for Infectious Disease Control and the Centre for Screening Programmes have been set up within the RIVM. A Centre for Young Health, which will have various coordinating tasks within youth health care started in January 2006. Plans are also in place to create a Centre for Healthy Life Style in 2007; this centre, which will also be within the RIVM, will have the role of coordinating health promotion at the national level.
- There is consistent cooperation between national and local actors. At the start of 2005, for example, a knowledge network called Prevention was established by a number of institutes involved in health promotion (GBI). The network's aim is the sharing of scientific knowledge, effective intervention methods and evaluation tools relevant to national and local priority themes, with a view to building up a body of resources that can be utilized by those practising in the field. An agreement has also been reached by GGD-NL, NIGZ and VNG, under which the parties concerned will encourage local health promotion activities.

a discussion of the provision and effectiveness of and scope for improving preventive action focused on each of the three aforementioned determinants. Additional activities aimed at the prevention of the relevant diseases and afflictions are then described.

Integrated efforts to deter smoking seem effective

Nationally, a variety of tools have been used to deter smoking, including legislation and regulation (smoking bans) and the associated enforcement measures, higher tobacco duties, public information, self-regulation schemes and treatment for tobacco addiction (Tweede Kamer, 2003; VWS, 2005c). Higher duties, mass-media campaigns and individual support for people who wish to stop smoking have all proved to be ef-

Box text 2.13: International efforts support national policy.

In 2003, the WHO concluded the Framework Convention on Tobacco Control. This convention, which came into force at the start of 2005, is the first international legal instrument designed to limit the number of tobacco-related deaths and the prevalence of smoking-related disease all over the world (WHO, 2003a). A statement of intent was signed by all twenty-five EU states and the agreement was ratified by thirteen countries. Norway (not a EU state) was the first country in the world to ratify the health convention; the Netherlands did so early in 2004. The signatory-countries have committed themselves to pursue various strategies and adopt various protocols with a view to deterring tobacco use; so, for example, advertising, sponsorship and promotion are to be outlawed, packaging, printing and warning notices have to conform to certain protocols, tobacco smuggling is to be tackled and action taken to protect against environmental smoke at work, on public transport systems and in public places (Prins & Willemsen, 2004). The policies and strategies adopted to prevent the harmful effects of passive smoking differ from country to country. Most EU member states have opted for some form of ban on smoking in public places. However, Ireland, Italy, Malta and Sweden are presently the only EU states where smoking is not allowed in any workplace, bar or restaurant (WHO, 2006). Ireland's smoking ban is generally regarded as a success, being respected in more than 94% of cases and backed up by fines for those who ignore it (Howell, 2005). Irish smokers have confirmed that they now also smoke less at home. In February 2006, the UK parliament also voted on a complete ban on smoking in all public places.

ficient forms of prevention (Feenstra et al., 2006a; Van Baal et al., 2005). The effectiveness of these interventions increases when they are used in combination. If the price of tobacco products is high, consumption of cigarettes falls; however, it will fall more if at the same time controls are placed on advertising and sale, smoking bans are imposed, health warnings are put on packs and mass-media campaigns are organized (Zeeman et al., 2004) (see *box text 2.13*). A coherent, integrated approach to smoking deterrence has led to a substantial decline in smoking among adults in recent decades (see *subsection 2.2*). Not smoking has slowly but surely become the social norm.

Social stimuli are also helpful for discouraging smoking, as provided, for example, through the campaign 'Nederland start met stoppen' ('The Netherlands is Starting to Stop'), a mutual-support scheme designed to help people make and act upon a New Year's resolution to stop smoking. Organized at the turn of 2003-2004, this scheme had more than a million participants. After eleven weeks, the success rate was more than 5% (STIVORO, 2004b).

Further public health benefits could be secured by targeting smoking deterrence activities on low-socio-economic-status groups and the ethnic minorities (STIVORO & NIGZ, 2005; Nierkens, 2006). However, little research has so far been conducted into the effectiveness of national intervention programmes aimed at these particular groups (Tweede Kamer, 2003). The community-based approach and workplace schemes look promising, but their effectiveness needs to be investigated further. There is also reason to believe that much could be achieved by the more widespread application of strategies that have proved effective in certain areas. These include the Minimal Intervention Strategy for various care providers (GPs, cardiologists, midwifes), Action Against Poison, Healthy School and Alcohol & Tobacco Products and Personalized Advice (the

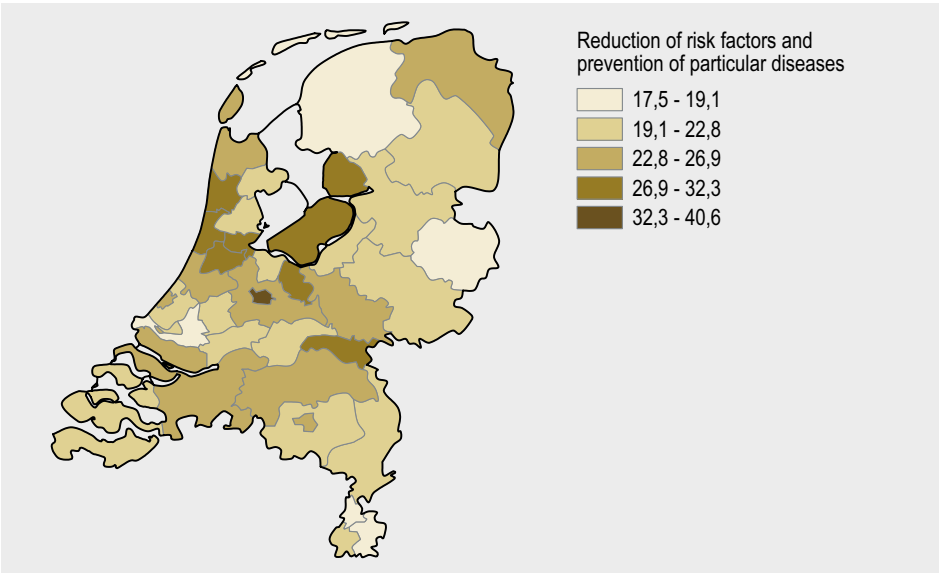


Figure 2.11: Number of smokers aged twelve and above requesting personalized advice in each municipal health service region (Bron: STIVORO, 2005).

latter being an Internet service providing advice tailored to the individual smoker (see *figure 2.11*).

More emphasis could be placed on the deterrence of smoking in local health policy: only 10% of municipal public health documents identify smoking prevention as focus issue (STIVORO, 2006). In 2006, STIVORO produced its Richtlijn tabakspreventie (Guidelines on the Deterrence of Tobacco Use), which can be used by municipalities for the formulation of local smoking policies.

Deterrence of alcohol abuse compromised by mixed message

In many social circles, moderate alcohol consumption is the norm, and does in fact reduce the risk of particular illnesses. However, excessive alcohol consumption and alcohol consumption by road users are hazardous to health and consequently much less socially accepted. This mixed message complicates the task of pursuing a clear alcohol policy. Although various tools are used together to deter excessive alcohol consumption (public information campaigns, legislation and regulation, the application of duties and self-regulation by the bar and catering industry), there is no clear, coherent approach. The main target groups are adolescents (see *box text 2.8*) and problem drinkers (excessive drinkers with alcohol-related physical, social or mental problems).

Where adolescents are concerned, efforts in this field are focused on deterring binge drinking (drinking more than five units of alcohol in one 'session') and encouraging the development of responsible drinking patterns to carry forward into later life. Adolescents are approached through their parents, their schools and the mass media with various preventive messages, but none of the strategies adopted have so far been shown to be effective (Meijer et al., 2006). Some evaluation studies suggest that the

Healthy School and Alcohol & Tobacco Products programme is promising (ResCon, 1999; Vogels et al., 2002). The Internet-based Drink Less self-help programme for adult problem drinkers has succeeded in reducing the number of people who drink alcohol to excess. The self-help course How to Drink Less and the Drink Test also appear to promote reduced alcohol consumption, but have not proved to be successful means of cutting excessive alcohol consumption (Meijer et al., 2006). Recently, the Partnership for the Early Detection of Alcohol Problems has been established, with a view to implementing measures that have proven effective and cost-effective in controlling problem drinking (Smit et al., 2006).

Further health benefits could be obtained by increasing duties, controlling advertising, amending the Alcohol and Catering Act (DHW), a more active local licensing policy and better enforcement of the ban on selling alcohol to under-sixteens. Research has shown that if a person below the legal minimum age attempts to buy alcohol, his or her chances of being served are now more than 90% (Van Laar et al., 2004). Price increases reduce alcohol consumption: when duties in the Netherlands were raised in 2003, alcohol sales fell by nearly 30%. However, even after these increases, alcoholic drinks are barely any more expensive than soft drinks (STAP, 2005a). VWS proposals for further increases in duties were nevertheless rejected by parliament. A policy of self-regulation was chosen in preference to statutory controls on the advertising of alcohol. Furthermore, there is no active supervision of the advertising industry (STAP, 2005a). The Ministry of VWS is currently preparing a draft amendment to the Alcohol and Catering Act (DHW), which proposes to make it illegal for anyone under the age of eighteen to buy alcohol, give municipalities greater supervisory powers in relation to DHW licensing, and provide for stronger action against those who contravene the DHW. However, it remains to be seen whether and to what extent these proposals will be accepted. Finally, it is advisable to place greater emphasis on excessive alcohol consumption among the elderly: alcohol tolerance diminishes with age, but no preventive action is yet targeted at this group.

Action on overweight is too fragmented

The government has identified overweight as one of the primary focuses of prevention policy. Overweight prevention activities are aimed at helping people establish a more healthy balance between energy intake and energy consumption. These activities are closely associated with efforts to promote more active lifestyles and healthier diets, but the analysis presented here is confined to measures designed primarily to prevent excess weight gain. Preventive policy and action in this field are presently very fragmented in the Netherlands, in both the practical and the policy fields. An overall vision and clear objectives are lacking. Numerous actors recognize the need for action and the implementation of programmes, preferably on a large scale. Unfortunately, however, duplication of effort is commonplace and knowledge transfer is inadequate.

Most initiatives are aimed at the youth. Such initiatives are typically local projects in the school and district settings, undertaken by MHSs and welfare and home care organizations. In addition, two national programmes are presently running, which seek

to encourage people to keep their weight in check and/or to lose weight. These are the Maak je niet dik (a play on words, meaning both 'Don't Get Fat' and 'Don't Worry') campaign for adults and the Terug naar de gezonde basis (Back to Healthy Basics) campaign for children.

RIVM has conducted a survey on information on the effectiveness of preventive programmes designed to promote healthy weight management (Bemelmans et al., 2004). The surveyed programmes used the district, school, work and care-sector settings in the Netherlands and elsewhere. This survey revealed that the impact of many of the (possible) measures was unknown, and that the long-term effectiveness of schemes designed to modify behaviour had not been demonstrated.

Various studies have shown that tackling the weight problem requires an integrated approach at both the national and local level. This implies various actors in various policy domains acting in concert to implement a mix of measures aimed at various target groups (Bemelmans et al., 2004; Wendel-Vos et al., 2005; Bull et al., 2004; Nijboer, 2004). Overweight policy should not be exclusive to the public health policy domain, but should extend to other domains within national and municipal government. This can be pursued by tying in with existing policy initiatives, such as the National Sport and Exercise Action Plan and the Covenant on Overweight Problems. There are numerous opportunities for action at the local level: the establishment of a healthy school environment (modifying the selection of foods available at school canteens, making schoolyards exercise-friendly), the creation of attractive walking and cycling facilities and the optimisation of sports facility utilization. Nationally, more emphasis could be placed on encouraging physical education in schools (Storm et al., 2006).

Cardiovascular disease: cardiovascular guidelines form a basis for integrated action

A range of measures is available for the prevention of cardiovascular disease through intervention at various stages of the disease process. The primary prevention of cardiovascular disease involves addressing the key risk factors: overweight, hypertension, elevated cholesterol levels, unhealthy diet, smoking and physical inactivity. Lifestyle advice can have a positive effect on most risk factors. However, the results are not clear-cut, because effectiveness is affected by various factors, such as campaign intensity, degree of tailoring on the individual, the characteristics of the population, the length of the follow-up evaluation and the type of advice (see *box text 2.11*). An example of an effective community based intervention aimed at preventing cardiovascular disease is the Community Project organized by Heartbeat Limburg (see *subsection 2.3.3*). Heartbeat Limburg aims to address cardiovascular disease risk factors and to locally embed newly introduced schemes, activities and collaboration arrangements through a Community Project and a care sector-based programme aimed at high-risk individuals. Evaluation showed that the community approach was effective as a means of influencing various risk factors over a five-years period (Schuit et al., 2006). However, the high-risk group approach had only a short-term effect (Harting et al., 2005).

Although the possibility of preventing cardiovascular diseases by providing lifestyle advice through the primary care sector has been recognized for some years, such advice is not made available on a systematic basis. The reasons include GPs' workloads, the absence of relevant protocols and the reluctance of carers to, for example, advise patients not to smoke. The government, the health insurers and GPs' organizations are all committed to increasing the number of nurse practiotioners (nurses who provide forms of medical care traditionally provided by GPs, in particular to patients with chronic disorders) from 2006. It has since become apparent that nurse practiotioners are increasingly taking on preventive work, particularly in relation to cardiovascular diseases.

Secondary prevention consists mainly of screening. Since 1994, the Netherlands has had a screening programme for the early detection of familial hypercholesterolemia (FH). People with FH nearly always have strongly elevated cholesterol levels, even at a young age. Early detection and adequate treatment of FH patients can reduce their risk of cardiovascular disease. It is estimated that there are 40,000 FH patients in the Netherlands, a third of whom have now been identified. By increasing screening capacity, the target is to identify all FH patients aged six and above by 2010.

Other screening programmes could be organized to identify people who are at high risk of developing cardiovascular disease. It would be possible, for example, to screen for obesity, hypertension and diabetes. The US Preventive Services Task Force has carried out an extensive literature study, on the basis of which it has identified the forms of intervention whose effectiveness has been proven conclusively enough to warrant recommending national implementation (AHRQ, 2005). In the Netherlands, however, there is great reluctance to introduce screening programmes, on the grounds of cost and undesirable medicalisation. Where more and more risk factors and illnesses are concerned, the public nowadays has access to self-testing products (see *box text 2.14*).

Developments are in progress in the field of tertiary prevention. The Guidelines on Cardiovascular Risk Management are to be published in 2006, bringing together the existing guidelines concerning blood pressure, cholesterol and diabetes. In summary, the new guidelines will recommend treating all patients with cardiovascular disease or diabetes, as well as those at increased risk, with cholesterol-reducing and blood pressure-reducing medication.

Prevention of diabetes: collaboration required between prevention, cure and care

In the field of diabetes prevention too, there is a range of measures available, involving intervention at various stages of the disease process. The primary preventive effort focuses on the following risk factors: smoking, overweight, physical inactivity, unhealthy diet and abdominal fat distribution. Forms of intervention aimed at addressing these risk factors by encouraging people at high risk of developing diabetes (disturbed glucose tolerance) to make lifestyle changes are a lot more effective than medication-based forms of intervention: the first type of intervention has been shown to reduce

Box text 2.14: Self-tests.

Increasing number of self-tests on the market
More and more products are available on the market, which enable people to test themselves for (potential) diseases using a sample of their own blood, urine or faeces. Self-tests are available from pharmacists and drug stores, and increasingly via the Internet. Such tests may be designed to show whether someone is at elevated risk (e.g. from a raised cholesterol level) or to show whether someone already has a medical condition (such as HIV infection). In addition, on-line questionnaires and checklists are widely available, intended to help people decide whether they should consult a doctor about problems they have been experiencing or about their lifestyles.

Although the early detection of risk and illness is generally a good thing in terms of facilitating treatment and improving a patient's prognosis, a critical look needs to be considered at the increasing availability and use of self-tests. The reliability of a test depends on it being performed correctly, at the right time and directed to someone from the right target group. The prostate cancer self-test available via Internet (which enables men to check their PSA levels by testing a blood sample obtained by pricking the end of a finger) is suitable for use mainly by men between the ages of forty-five and sixty, while prostate cancer predominantly affects men over the age of sixty. The HIV self-test (which enables the user to test for the presence of antibodies against the virus, again by testing a finger-prick blood sample) is unreliable until three months after unsafe sex, since it takes some time for the body to produce sufficient antibodies to be detected. An HIV test carried out sooner is liable to give a false negative outcome. Furthermore, self-tests are not backed up by professional support for those who test positive, which is potentially problematic, particularly where life-threatening illnesses such as cancer and HIV-AIDS are concerned. It is open to question whether people whose test results are positive do always seek the help of a doctor, as the product manufacturers advise.

In 2000, the Minister of VWS responded to a parliamentary question regarding the prostate cancer self-test by saying that the free availability of self-tests is undesirable and that the marketing of such products would have to be regulated in due course (Tweede Kamer, 2000). However, at the start of 2006, self-tests were still readily obtainable via the internet. The government cannot prevent Internet trading, but could ensure, for example, that (potential) self-test users had access to a site providing reliable information about the 'ins' and 'outs' of self-testing.

Insurers offer health checks
Encouraged by changes to the health care system, insurers are launching all sorts of initiatives to win new clients and to manage their costs. Two large insurers, Ohra and Delta Lloyd, intend the provision of annual health checks for their clients. These checks involve a questionnaire, a physical examination and lab testing of blood, urine and faeces samples. On the basis of the findings, the insured person may be advised to take preventive action, or may be referred for further testing or treatment. The intention is to promote the early detection of common illnesses, such as cancer, diabetes and cardiovascular disease. This is expected to improve the scope for treatment and result in reduced care consumption and therefore lower costs for the insurers. The companies are initially providing checks for their own personnel; if these trials prove successful, checks will be made available to people insured through their employers' company schemes or under private policies. Where testing is made available for commercial reasons, it is important to look critically at the implications for insured individuals: is early detection actually in the interest of the client and is his or her privacy adequately protected? The Minister of VWS has expressed criticism of this initiative and has pointed out that any programme that involves systematic screening for cancer has to be licensed under the Population Screening Act.

the incidence of diabetes by 50 to 60% after two years, while the second led to a drop of only 24 to 30% (Mensink et al., 2003).

The goal of the secondary prevention effort is the early identification of undiagnosed diabetes patients. The Health Council of the Netherlands considers the establishment of a national diabetes mellitus screening programme unjustified, since there is insuf-

ficient evidence to suggest it would be effective (Health Council of the Netherlands, 2004).

Tertiary prevention is concerned with optimising the treatment of known diabetes patients in order to prevent or delay complications. Numerous tertiary schemes are in place, including transmural care projects (involving the coordinated provision of various forms of primary and secondary care), walk-in outpatient clinics, retinopathy (eye abnormality) screening programmes and initiatives involving the provision of information by care consultants to diabetics from ethnic minorities. The effectiveness of tertiary prevention programmes has been studied in a handful of cases only, and the results do not present a clear picture.

The diagnosis and prompt treatment of diabetes can prevent considerable problems further down the line. In April 2006, therefore, a national campaign entitled Kijk op Diabetes (Looking at Diabetes) was launched, covering primary, secondary and tertiary preventive action. The campaign focuses mainly on high-risk groups, such as people who are overweight and people from ethnic minorities. The intention is to educate people about diabetes and to increase people's awareness of their own risk status. Diabetes programmes are now commonplace in Europe, but most are too new for their effect to be determined. Nevertheless, the RIVM has looked into the extent to which existing cooperative initiatives involving GPs, internists, nurses and dieticians can improve the care given to people with diabetes (Struijs et al., 2004). It was found that transmural care did result in lower blood-sugar levels and lower cholesterol levels. The effect on the development of complications could not be determined, however, mainly because of methodological shortcomings of the study.

Prevention of cancer: combination of lifestyle change and screening

Like the development of cardiovascular disease, the development of cancer is affected by various factors, including genetic, hormonal, dietary and other lifestyle factors. Primary prevention of cancer is concerned with lifestyle factors, such as smoking and excessive exposure to the sun. The gradual decline in smoking over recent decades has, for example, made a major contribution to reducing the incidence of lung cancer among men (see *subsection 2.2*).

For some forms of cancer early detection of precancerous cells or first stages of the disease is possible (secondary prevention), facilitating timely treatment. The Netherlands exist screening programmes for the early detection and treatment of breast cancer and cervical cancer (see *box text 2.15*), and screening is being piloted for prostate and colorectal cancer. The effectiveness of these programmes can be increased by emphasizing the importance of screening to population groups that have traditionally been reluctant to participate and by encouraging follow-up and repeat testing.

Box text 2.15: Screening for cervical cancer and breast cancer.

Participation in cervical cancer screening is low among women in risk groups
Once every five years, women in the thirty-to-sixty age group are invited to attend their GP's surgery for a cervical cancer smear test. In 2003, 66% of invited women attended for testing. Once pregnant women and those who have already undergone hysterectomy are excluded from the statistics, the participation rate is roughly 75%. In 2001, an estimated 7% of women whose test results were seriously abnormal did not attend for a retest within five months. Among women whose results were slightly abnormal, the corresponding figure was 16%. It is not known why so many women do not appear for retests and referral consultations. The screening programme has been criticized for, amongst other things, the relatively small number of women with cancer that are identified and the suboptimal participation rates. Participation is particularly poor among women in the very groups that are most at risk (women of low socio-economic status, older women, unmarried women).

Participation in breast cancer screening is high
Every two years, women between the ages of fifty and seventy-five are invited to a specialist test centre to be checked for signs of breast cancer. This involves making a mammogram of the breasts. Of the ten thousand women who are diagnosed with breast cancer each year, three thousand are identified through the screening programme. The scheme is estimated to save about eight hundred lives a year. Participation rates are fairly high: roughly 80% of women invited for a mammogram attend. The value of this screening programme was called into question not long ago by the findings of a Danish study. This study suggested that screening did not reduce mortality, but led to an increase in the use of aggressive treatment methods and mastectomy. The Health Council of the Netherlands did not regard these conclusions as justifying any immediate change to screening policy, but recommended a fresh, systematic and impartial appraisal of the Dutch breast cancer screening-programme.

Musculoskeletal problems and disorders: information about the reach and effectiveness of prevention is lacking

There exist many different musculoskeletal problems and disorders. In public health terms, the most significant disorders are arthritis, osteoporosis and various forms of joint inflammation. Also of significance are pain in the lower back, neck and upper and lower extremities, as well as generalized pain. The preventive measures in place differ from one problem or disorder to the next. So, for example, all neonates are screened for congenital hip dysplasia because it can be completely corrected by prompt treatment, thus reducing the risk of (hip) arthrosis later in life. In addition, guidelines and protocols have been developed for the prevention and treatment of various other musculoskeletal problems and disorders. However, a comprehensive statistical overview of the use and effectiveness of the present interventions is not available. Nevertheless, it can be said that overweight places excessive load on the joints, so the prevention of weight problems can contribute to the prevention of musculoskeletal problems and disorders.

The promotion of expertise among care providers working in the curative and occupational sectors could enhance preventive efforts in this field. The workplace is one setting where legislation, regulation and information can be used more effectively to prevent musculoskeletal problems and disorders, such as RSI ('mouse arm'). Within the care sector, specific attention could also be given to patients at elevated risk of osteoporosis, in the form of fall prevention measures and schemes for the early detection of osteoporosis. The establishment of good systems of preventive action in this field depends on obtaining a better understanding of the effects of various forms of

intervention. Improved cooperation between care providers and greater emphasis on this topic are also needed.

Prevention of depression: internet-based intervention methods are promising
Measures aimed at preventing depression are concerned mainly with identifying and treating mild depressive disorders, in order to stop them becoming chronic or escalating into depressive disorders. People with mild depressive disorders and children whose parents are depressive are more likely than others to develop a serious depressive disorder. Numerous prevention programmes are therefore organized for these groups. Not all the forms of intervention currently in use have been studied to determine their effectiveness, but almost all are derived from forms of therapy (particularly cognitive behavioural therapy) whose efficacy has been proven in the curative mental health care sector. Forms of intervention that have been shown to be effective (Cuijpers et al., 2005) include the courses Grip op je dip (Get a Grip on Your Blues; Voordouw et al., 2002) and In de put, uit de put (Feeling Down, Feeling Up; Allart-van Dam, 2003; Haringsma et al., 2004). No precise data are available on the reach of preventive action against depression, but it is expected that only two to five thousand adults a year take advantage of schemes designed to prevent this disorder (VWS, 2002a).

One way of increasing the reach of schemes is to offer assistance via the Internet. This is a growth area and a very promising prevention method for use with adolescents and adults. Examples include: 'www.kleurjeleven.nl' and 'e-mailservicedepressie'. Internet-based interventions and other self-help courses for depression are cheaper and no less effective than professionally supervised group therapy courses.

Early diagnosis and treatment of depression is largely the responsibility of the primary sector, with the GP as the central figure. However, GPs find it difficult to recognize depressive disorders, particularly among the elderly; only 20% of elderly people with depression are identified by their GPs. The use of questionnaires might help, but GPs do not have the time to make use of such resources in daily practice. Lack of time is also a problem for GPs treating mildly depressive patients to prevent the development of serious depression. Hence, most treatment provided in such cases involves medication, although preventive interventions in the form of courses, self-help books or on-line resources are often more appropriate. The addition of social psychiatric nurses to general practice teams appears to have been helpful in terms of the early detection and treatment of depressive disorders in the primary sector (ZonMw, 2006b). Furthermore, an integrated approach of the prevention of depression is facilitated by lowering the threshold of preventive assistance, particularly for the elderly. In this field, integration should involve primary health care, mental health care, the municipality, the welfare services and the home care services (Bohlmeijer et al., 2005).

Box text 2.16: Innovative efforts to reach particular target groups.

Adolescents and people of low social economic status are particularly hard to communicate with using the available prevention methods. E-Health and Entertainment Education are promising initiatives aimed at reaching these groups.

E-health adheres to the target groups' digital lifestyle
E-health involves the digital provision of health (care) information and other forms of intervention, such as general advice, personalized advice, contact groups, courses and self-tests. Internet-based support seeks to tie in with the digital lifestyle of a growing group of people, including adolescents. E-health can be particularly useful in the context of 'taboo' subjects, such as sex, drugs, alcohol and mental health, especially if face-to-face contact with a care provider is regarded as too difficult. As well as increasing the reach of preventive programmes, e-health can reduce their cost. However, e-health also raises a number of practical and ethical issues: how will services be funded and their quality ensured? What services can and cannot be provided in digital form and are the available services necessarily in the recipient's interest? ZonMw's Gezond Leven (Healthy Living) programme includes a project entitled New Media and Health Promotion, which aims to provide information about the opportunities and hazards of using the Internet in this way.

Workplace-based prevention aimed at promoting and protecting health
As its name suggests, Entertainment Education (E&E) brings together entertainment and education. The E&E strategy derives from the belief that public information activities need to tie in with the lifestyle, culture and information and communication patterns of the target group. Within E&E, the basic principle is that the choices people make (and therefore the way they behave) are based not only on rational considerations, but also on habit and emotional motives. ZonMw's Gezond Leven (Healthy Living) programme includes a project entitled Entertainment Education. The project involves the development and production of a soap opera for and by adolescents, which deals with sex, drugs and alcohol, and seeks to monitor any changes in the viewers' behaviour. The intention is that knowledge and experience gained through the E&E project will be utilized in other forms of (health) communication and education using modern media.

2.3.3 The setting-based approach

This subsection describes how preventive activities are organized in settings, the established settings being the neighbourhood, work, school and the care sector. *Box text 2.16* additionally describes two promising initiatives that are being organized in the new setting 'media'.

Evidence for the effectiveness of the neighbourhood-based approach is limited
The neighbourhood serves as a useful setting for health promotion for two reasons. First, living in a deprived neighbourhood leads to health problems associated with the less favourable social and physical environment. Second, a deprived neighbourhood is a 'pool' of people of low socio-economic status and health deprivation. A neighbourhood-based approach always involves a combination of different activities and is usually accompanied by initiatives organized through organizations such as schools and businesses (intervention mix). The object of a neighbourhood-based intervention programme is the long-term improvement of health; the measures are therefore designed to bring about sustainable change. Only one project in the Netherlands has been scientifically shown to significantly improve local public health: the previously mentioned Heartbeat Limburg community project (Schuit et al., 2006). Most neighbourhood-based interventions in the Netherlands have not been evaluated to determine their direct health impact (see *box text 2.11*). However, many have been evaluated on the basis of

Box text 2.17: Opportunities for neighbourhood-based preventive action.

The neighbourhood-based intervention programmes Gelijke Gezondheid, Gelijke Kansen (Equal Health, Equal Opportunities) in Tilburg, Gezond Molenberg ('Healthy Molenberg') in Heerlen and Wijkgezondheidswerk (Neighbourhood Health Work) in Eindhoven have had a favourable effect on intervention indicators (participation) and on intermediate health indicators (own effectiveness). However, the reach of the programmes was modest. The Tilburg programme reached 4.5% of the target group in 2002 and 11.9% in 2003 (Kok, 2005), while the Eindhoven programme secured the participation of 12.5% of local residents in at least one activity over the course of a year. Evaluation of the effects of the Neighbourhood Health Work programme indicated that the range of activities needed to be reinforced in order to secure measurable effects. The initiative was associated with a small increase in fruit consumption (Kloek, 2004). The Heartbeat Limburg community project had various positive effects, including reductions in abdominal fat and blood pressure. Unlike the other programmes, Heartbeat Limburg was evaluated over an extended period (five years), which may be why it resulted in measurable health benefits while the others did not (Schuit et al., 2006). The lesson from these programmes is that neighbourhood-based projects require the investment of a great deal of time, in order to win the support of the target group, establish inter-sectoral cooperation at the municipal level, to get the private sector and other institutions involved, and so on.

intermediate health indicators and process indicators. Taking everything into account, it has to be concluded that, although neighbourhood-based interventions have been shown to be effective elsewhere, there is limited evidence for their effectiviness in the Netherlands (see *box text 2.17*).

The neighbourhood is the setting not only for health promotion, but also for health protection. The improvement of safety at the neighbourhood level is identified as an objective of the Major Cities Policy. In the latter context, the focus areas are the promotion of physical safety, the control and prevention of violence and the reduction of nuisance.

Workplace-based prevention aimed at promoting and protecting health

The workplace is an excellent setting for health promotion of the Netherlands's working population of seven to eight million people. For example, 5% of the working population drinks too much, 32% do smoke and 49% do not get enough exercise. The workplace is a key setting for reaching the people concerned. Unhealthy lifestyles lead to lost productivity and work absenteeism (Chapman, 2003; Kreis & Bödeker, 2004; De Greef & Van de Broek, 2004). Health promotion at work is concerned both with the working environment and with the lifestyles of working people. In 2004, a survey found that more than 75% of large businesses had initiated measures to encourage personnel to make healthy lifestyle choices. Some 55% had a policy on smoking, 33% on alcohol, 30% on work absenteeism and 28% on exercise (Van Pelgrim, 2004). Workplace-based health-promotion programmes include Alcohol en werk (Alcohol and Work), Fietsen naar je werk (Cycling to Work), Gezond groen op het werk (Healthy Greenery at Work), Gezonde voeding op het werk (Healthy Eating at Work), Lunchwandelen (Lunch-time Walking), the Stress Management Course and Gezonde lucht werkt beter (Healthy Air Works Better). Research into the effectiveness of such programmes has highlighted the importance of combining various prevention methods, adopting a systematic ap-

proach, securing management support and ensuring that both employers and employees are involved (Visser & Witte, 2005).

The main risks of people working in certain industries are exposure to hazardous substances, working at heights, exposure to high noise levels and physical strain. Businesses are accordingly obliged to identify such risks within the organization in a Risk Inventory and Evaluation (RI&E) report and then to take action to exclude or minimize the identified health risks. Roughly three quarters of businesses required to produce RI&E reports have taken action to improve working conditions within their organizations. Many of the preventive interventions and measures concerned are related to RSI (37%) or lifting, carrying, pushing and dragging (30%). As well as RI&E reporting, employers are obliged to implement measures such as Periodic Occupational Health Studies, formulation and application of an absenteeism policy, appointment of company support officers and appointment of a preventive activities officer. At the national level, the Ministry of Social Affairs and Employment has established three programmes to promote and support safety at work: Versterking Arbeidsveiligheid (Reinforcing Occupational Safety), Versterking Arbeidsomstandighedenbeleid Stoffen (Reinforcement of Health & Safety Policies on Substances) and the Farbo scheme, which seeks to promote the use of innovative equipment and resources that enhance occupational health and safety. The effects of these programmes are not yet measurable.

Prevention at school requires a coordinated approach

Adolescents are an important target group, because by educating today's youngsters, one can reduce tomorrow's health problems. Preventive initiatives aimed at young people can be organized through the school and youth health care setting (see *box text 2.18*). In recent years, national and regional institutions have developed an enormous number of prevention programmes and projects and made them available for use in schools. These programmes and projects have included initiatives designed both to protect and to promote the health of pupils and/or staff. Health promotion projects have included the courses Stemmingmakerij (Mood Factory), designed to help people deal with negative emotions, Levensvaardigheden (Life Skills), Schoolgruiten (School Grub, concerned with diet) and Rookvrije school (Smoke-Free School). Data were collected on the percentage of pupils in each municipal health service region reached by the Smoke-Free School course (see *figure 2.12)*.

Because of the large number of initiatives and the lack of cohesion between them, schools have tended to feel over-stretched and to find it difficult to satisfy the implementation requirements of the different programmes. The need for a more coordinated approach led to establishment of the national Healthy School Programme by the Ministry of VWS and nine national health-promoting bodies in 2004. The aim of the Healthy School Programme is to provide for more coherent, more accessible and better quality preventive initiatives. There are also plans to introduce customised preventive programmes. However, not many schools yet employ such an approach, so there is considerable room for improvement in this regard. Along with more than forty other countries, the Netherlands is also a member of the European Network for Health Pro-

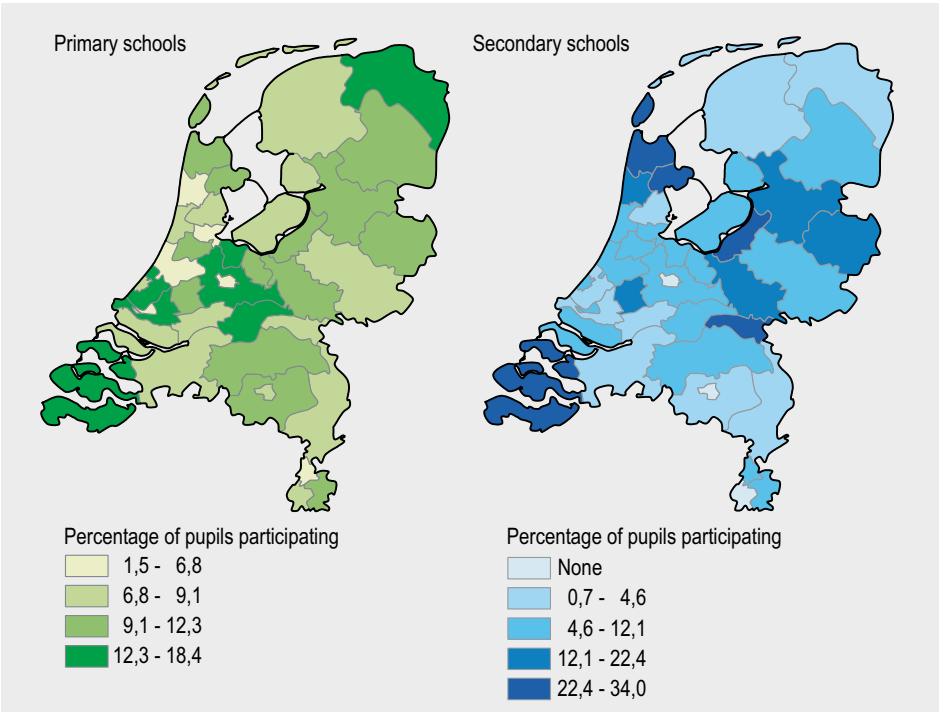


Figure 2.12: Percentages of primary and secondary school pupils participating in the Smoke-Free School Project (Source: STIVORO, CFI).

moting Schools, which seeks to promote cooperation and the exchange of knowledge concerning preventive activities in the school setting (Burgher et al., 1999).

There have been relatively few well-designed and well-implemented evaluation studies of preventive programmes for schools. A number of widely deployed programmes, such as School and Alcohol & Tobacco Products, Life Skills, Schoolslag (a scheme designed to help professionals organize preventive action in the school setting; its title is a play on words that is lost in translation) and Antipestbeleid (Anti-Bullying Policy) are known to have been effective, but there are many others whose impact remains uncertain. School and Alcohol & Tobacco Products has had the effect of reducing the use of tobacco, alcohol and marihuana. The programme has also had a positive effect on what pupils know about such substances and the risks associated with their use. It also teaches young people where they can go if they have problems (ResCon, 1999; Vogels et al., 2002). The Anti-Bullying Policy programme reduced the number of children who were verbally abused once a week or more (from 10 to 7%), who were kicked or hit (from 3 to 1%) or who were made fun of (from 6 to 1%) (Fekkes et al., 2004).

Schools have a responsibility to protect the health and safety of pupils, staff and visitors. A school's health protection duties include providing a healthy indoor environment and good hygiene, and working to ensure schoolyard safety and a safe traffic situation in the immediate vicinity. The main causes of accidents in and around school are unsafe behaviour by pupils and the physical insecurity of school buildings. The

campaign Veiligheid op de basisschool (Safety at Primary School) has been used to encourage schools to introduce and implement their own physical safety policy. No well-designed evaluation studies into the effects of health protection initiatives in school have been undertaken.

Plenty of opportunity for prevention in the care setting

All professionals working in curative health care (somatic and mental, primary and secondary) are involved with preventive intervention in some form or other. However, their preventive activities are generally confined to early identification of diseases and health risks (secondary prevention) and giving preventive advice and guidance to patients with a view to preventing their health problems becoming worse (tertiary prevention) (Jong et al., 2005). Within the care sector, primary prevention is found mainly in midwife practices and hospitals where pregnancy guidance is provided, in nursing and supportive care homes, where action is taken to prevent falls (see *figure 2.13*) and bed sores (pressure ulcers), and in general practices and hospitals, where lifestyle advice is given. In many cases, prevention is part of the treatment, care and guidance given to the client. This is the case in the mental health care sector with, for example, courses such as Feeling Down, Feeling Up and 'Get a Grip on Your Blues' that are offered by municipal mental health care centres (see also Van Wezel & Boot, 2006). There are ample opportunities for prevention in the care setting, but there remains a need for clear direction, a proper funding structure and practical assistance for health workers in the form of guidelines, chain care and collaboration structures.

Prevention is not structurally integrated into the health care system, with the exception of certain systematic activities such as influenza vaccination and screening for cervical cancer. The preventive health management approach is not well developed. There are one or two positive exceptions, however, such as integrated care programmes for diabetes. At the regional and institutional level, there have also been a number of successful initiatives, such as the drafting of a 'regional prevention vision', in which various local and regional bodies (municipalities, GPs, MHSs, youth care services, hospitals, home care services) describe the way in which they wish to see preventive care develop and identify a number of concrete measures that are required. Except where the systematic activities referred to above are concerned, little is known about the reach or effectiveness of prevention in the care sector.

There are many ways in which the preventive intervention portfolio could be improved. GPs are generally advocates of prevention, but they also tend to be wary of new initiatives in this field. This is partly because preventive interventions are time-consuming and intensive (Cardol et al., 2005) and partly because the methodologies are often inadequate and the scientific evidence to justify intervention is often lacking. Nevertheless, the primary care sector is in principle a good setting for preventive intervention: it offers contact with individual members of the public, and it is readily accessible, non-specialized and ambulant. Furthermore, the primary care sector takes a broad view of health, in which prevention and care are available side by side, and the early identification and immediate referral of appropriate cases are possible. Nev-

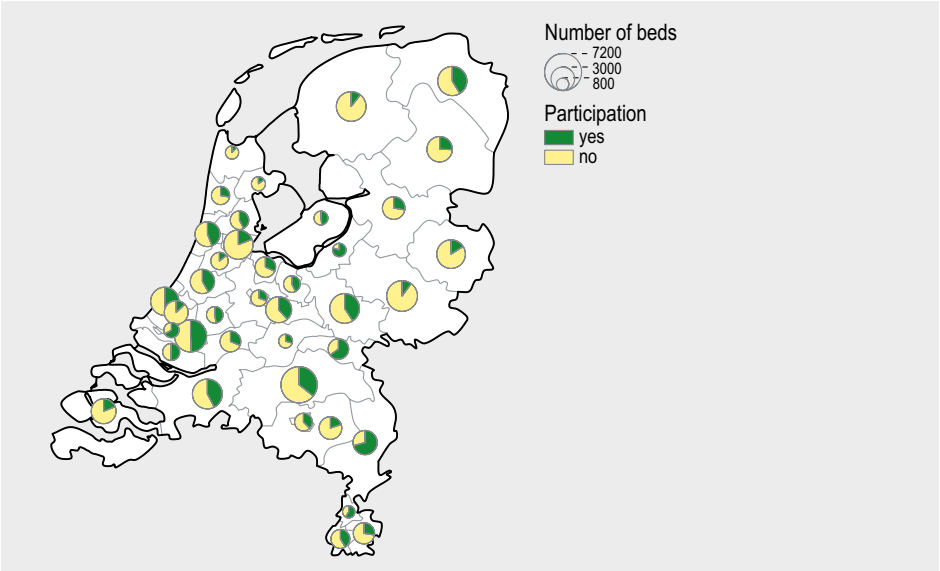


Figure 2.13: Number of supportive care homes participating in the Blijf staan (Stay on Your Feet) project (Source: Consument en Veiligheid).

ertheless, good coordination, follow-up arrangements and the delegation of duties are all necessary if GPs are to successfully take on a more comprehensive preventive role. Within general practices, nurse practitioners or health promotion workers could take on certain responsibilities, provided they are suitably trained. Where preventive work led to the detection of (potential) problems, referral could be made to hospitals, where follow-up diagnosis and treatment would be undertaken, but also to primary non-ordinal sector providers where appropriate intervention can be made. The latter option is under-utilized at the moment, possibly due to a lack of collaboration, a chain care, (interdisciplinary) guidelines and structural funding arrangements.

2.3.4 Integrated health policy

Social and physical circumstances influence health, both directly and by shaping people's lifestyles (see *box text 2.18* and *subsection 2.2.1*). However, many of these health-determining circumstances are not open to influence by the policies pursued within the health sector. The scope that children have for outdoor play, for example, depends on spatial planning policy or transport policy. And duties on tobacco and alcohol are determined by the Ministry of Economic Affairs. In other words, policy domains other than public health domain have a significant bearing on public health. Policy developed and pursued in various collaborating domains with a view to protecting, promoting or improving public health is referred to as health in all politics. This is not strictly part of the public health realm, but its object is nevertheless to promote health and/or to prevent health impairment.

Box text 2.18: Making the healthy choice the easy choice.

In recent years, there has been increasing interest in the role of the environment as a determinant of unhealthy lifestyles. In the field of health promotion, therefore, more emphasis has been placed on changes to the physical and social environment. This is particularly the case where the prevention of overweight is concerned, with considerable influence being attributed to the 'obesogenic' environment (Health Council of the Netherlands, 2003a). The presence or absence of fast food outlets, play and sports facilities and advertising policy are all of significance in this regard. A survey report (Brug & Van Lenthe, 2005), looked explicitly at the effect of changes in the environment on smoking, diet and exercise. Scientific evidence for the influence of numerous individual environmental factors (particularly on diet and exercise) was not found to be very strong. However, there was good evidence of certain environmental factors influencing smoking. Where exercise was concerned, social support (for young people and adults alike) and opportunities to exercise were found to be significant. In addition, the availability and accessibility of healthy and unhealthy foods were found to influence the dietary choices made by young people and adults. Finally, adolescents proved particularly susceptible to influence by their peers, by the price of cigarettes and by marketing.

Still no structural integration at the municipal level

Under the amended Public Health (Preventive Measures) Act (WCPV, 2002), municipalities are obliged to consider the health implications of administrative decisions; in effect, they are required to pursue health in all politics. The Health Care Inspectorate has looked at a randomly selected group of municipalities to establish how they are fulfilling this requirement (IGZ, 2005a). The Inspectorate's findings suggest that the number of municipalities that do consider the health implications of decisions taken in certain other domains has risen in recent years. The portion examining the impact of environmental policy, for example, rose from 76% in 1995 to 92% in 2004; where economic/industrial policy was concerned, the figure went up from 42% in 1995 to 61% in 2004 and where social policy was concerned from 63% to 88%. However, none of the municipalities were pursuing a policy where health was considered as a matter of course within all other domains. Furthermore, municipalities are presently making insufficient use of the opportunity for health-related initiatives in other policy domains, although such an approach is highly desirable where certain health problems are concerned (IGZ, 2005a). Nevertheless, some promising schemes have been introduced. In Breda, for example, deprivation policy and youth health care go hand in hand. In cases where it is concluded that the health or welfare of a child is threatened by poverty, the Municipal/ Regional Health Service (MHS) is able to rule that financial support for the family is medically indicated. In Rotterdam, the MHS, the City Education Service and the Sport and Recreation Department are together running a Diet and Exercise Action Programme to tackle weight problems among the young.

At national level, integrated policies on road safety, smoking and alcohol have been successful

At the national level, there are more successes to report. In the field of road safety, for example, the compulsory wearing of seatbelts in cars is proven to be effective. Since the Ministry of Transport and Water Management made seatbelts compulsory for all vehicle occupants in 1997, the percentage of people using restraints rose to roughly

90%. For front-seat occupants, seatbelts reduce the risk of fatal injury in the event of an accident by 40% and the risk of serious injury by 25% (SWOV, 2005a).

Various government departments have acted to discourage tobacco use by health protection initiatives, such as creating smoke-free public places, smoke-free workplaces, banning tobacco advertising and imposing duties; these initiatives have been combined with health promotion measures, including campaigns and courses on giving up smoking. In the field of alcohol abuse prevention, no fewer than twelve central government departments have been working together, under the coordination of the Ministry of VWS. As well as public information campaigns, additional statutory controls have been placed on the sale of alcohol, the number of outlets has been reduced and food shops are obliged to clearly separate alcoholic and non-alcoholic drinks. In addition, rules have been introduced on the advertising of alcoholic drinks and on matters such as closing times and safety at licensed premises (VWS, 2000a).

'Health in all politics' at the EU-level

Various European countries, including Ireland and Finland pursue 'health in all politics'. The Finnish 'Government Resolution' is a good example: the ministries of sport, health, social affairs and education, plus various influential non-governmental bodies, are working in concert to encourage the public to exercise more (Wendel-Vos et al., 2005). Integrated health policy is also in operation at the supranational level, where the operative phrase is 'health in all policies' (HIAP). Article 152 of the Treaty of Amsterdam is of particular significance in this regard, stipulating that all EU policy must be consistent with a high level of health (EU, 1997).

Effects of integrated health policy remain difficult to measure

It seems reasonable to assume that an integrated approach to health problems will have an effect, since various studies have demonstrated a relationship between aspects of the social and physical environment and the health and lifestyle of the public (Brug & Van Lenthe, 2005). Furthermore, lifestyle interventions are known to be more successful when supported by complementary policy measures and legislation. However, the extent of the effects of integrated health policy has not been determined. To date, few effect evaluations have been undertaken. This is partly because no one has yet devised a good method for quantifying the effects of policy on health. Price elasticity indicators can, for example, be used to estimate the extent to which reductions in the price of healthy products are likely to lead to increased consumption, but it is harder to calculate how the introduction of a play area standard will impact upon the number of hours children spend playing outside. Nevertheless, it is possible to identify factors that have a bearing upon the success or failure of integrated health policies:

- The likelihood of health-influencing action being instigated from other policy domains is greater where there are shared interests and no conflicts of interest (Ruland et al., 2006).
- The presence of 'entrepreneurs' – key individuals who are able to link problems, solutions and policy trains when the opportunities arise – is vital (Kingdon, 1995).
- Health in all politics is complex because of the interconnections between different policy fields; this accentuates the need for clarity (Ruland et al., 2006).
- Continuity is important. If integrated policy is merely linked to particular projects, rather than built into the fabric of government, the likelihood of good results in the long term is reduced (Ruland et al., 2006).

Health in all politics is increasingly orchestrated policy

In recent years, various new ways of realizing integrated health policy have been developed. Whereas in the past the health sector has typically had to cajole other sectors into supporting policy integration, it is now increasingly common to see joint policy development. In the context of the Major Urban Areas (MUA) policy, for example, ten central government departments are working together and a number of policy objectives have been agreed with the relevant city authorities. The MUA policy provides opportunities for influencing health because it is a vehicle for tackling inner city problems on a concerted basis. One of the first steps towards the integration of health into the MUA policy was the conclusion of a National Public Health Care Contract in 2001, ensuring that the MUA policy addressed the question of health inequalities. Since then, health has been made an element of the MUA policy's social segment and the reduction of health inequalities has been identified as an objective concerning which performance targets are defined. Thus, the MUA policy has evolved from a policy with health spin-offs to an integrated health policy. However, more could still be done. Health could, for example, also be made an element of the MUA policy's physical pillar, alongside safety and environmental quality, and an element of the economic pillar, along with improved supply-and-demand balancing in the labour market. Furthermore, the health projects and activities included in the MUA policy have been initiated mainly by the public health and welfare sector; they are not inter-sectoral activities.

Another example of joint policy development is Operation Youth, in which a number of ministries are working together to create a coherent and result-oriented youth policy. The ministries in question are Home Affairs; Health, Welfare and Sport; Education, Culture and Science; Social Affairs and Employment; Justice; Housing, Spatial Planning and the Environment; Finance and General Affairs. Although the central aims initially related to safety, employment and education, health has since become an important focus in the context of themes such as youth and physical space. The latter theme covers, for example, outdoor play areas for children and healthy school buildings (Ministry of Home Affairs).

Concluded in 2005 by ten public and private bodies led by the Ministry of Health, Welfare and Sport (VWS), the Covenant on Overweight Problems is a joint plan to restore the balance between eating and exercise (Tweede Kamer, 2006a). By work-

Box text 2.19: Integrated health policy in the field of weight management.

Key partners at the national level: the education sector and the food industry
At the national level, both the education sector and the food industry have important roles to play in promoting weight management. The education sector can contribute to exercise promotion by supporting physical education (PE), for instance by requiring schools to devote more hours to PE and by funding the employment of more specialist PE teachers. Where energy intake is concerned, the food industry can play a part by providing honest and clear information on food products, and by making more low-calorie products available from vending machines.

Opportunities abound for tackling the weight issue at the local level
At the local level, initiatives from within the education, finance, spatial planning and sport sectors look particularly promising, along with action on canteens. Canteens can play an important role by offering healthy food at schools, workplaces and recreational facilities. At the same time, the education sector can promote a healthy school environment by, for example, running after-school sports clubs and providing sufficient cycle parking. The finance sector's role should cover the subsidization of cycle commuting, while the sport sector can promote optimized utilization of sports facilities. Naturally, the spatial planning sector can do a lot to make the environment exercise-friendly by, for example, creating attractive walking and cycle routes and school grounds that provide opportunities for energetic play.

ing together, the covenant signatories are seeking to encourage the eating of smaller portions, regulate the advertising of unhealthy foods, make the composition of food products healthier, improve labelling, offer healthier food in canteens and promote exercise. A study on weight-management measures that had been initiated in non-health policy domains or by parties outside the public health sector has identified a number of promising initiatives (see *box text 2.19*; Storm et al., 2006).

2.3.5 The costs and benefits of preventive intervention

In the last PHSF, expenditure on preventive interventions was estimated at 1.4 billion euros (1999 prices), equating to 4% of the nation's overall care budget (Van Oers, 2002). However, many important preventive measures were not included in this estimate. So, for the present PHSF, a study has been undertaken to establish the cost of prevention in the Netherlands in 2003 (De Bekker-Grob et al., 2006). This study looked not only at initiatives within the health care sector, but also at initiatives in other fields that have the explicit aim of protecting or promoting health. Some of the initiatives concerned, particularly those originating outside the health care sector, are not exclusively concerned with public health, but are also intended to promote a clean, peaceful, safe and sociable environment for people to live in. The findings of the study are summarized below.

Lifestyle is a topical issue, but expenditure on health promotion is modest
In 2003, the government, the business community and consumers together spent at least 12.5 billion euros on preventing health impairment. This figure is regarded as a minimum, since the estimates of expenditure on food safety, consumer spending

and expenditure on preventive action within the curative care sector are known to be conservative. The bulk of the expenditure – 80%, or 10.0 billion euros – goes on health protection (see *table 2.14*). Some 17% is spent on disease prevention and 3% on health promotion.

Health protection initiatives involve action to limit exposure to environmental health hazards through legislation, regulation and enforcement, and through measures designed to influence the physical nature of the environment. The main cost items are the collection and processing of domestic refuse, hazardous substance dispersal prevention, road safety measures, air quality improvement and the preparation of drinking water.

Disease prevention consists of preventive activities such as vaccination, screening and the provision of preventive medication. Among the biggest individual items are the prescription of anti-hypertensive drugs, preventive dental checks and the prescription of cholesterol-reducing medication.

The heading 'health promotion' covers public information campaigns and consumer expenditure on, for example, giving up smoking, physical activity, safe sex, healthy eating and other forms of safe behaviour. In the health promotion field, relatively large amounts are spent on working conditions and mental disorders.

The amount spent on prevention within the health care sector was 2.5 billion euros (4.3% of the official care budget), while some 10.0 billion euros was spent outside the health care sector. Nearly all of this 'external' spending went on health protection. Out of the prevention expenditure within the sector, 16% was on health promotion (e.g. through the funding of health promoting institutes), 1% on health protection measures (e.g. technical hygiene care provided by the MHSs) and 83% on disease prevention. The main cost items under the latter heading involved the prevention of infectious diseases (34%), accidents (29%), respiratory diseases (13%), cardiovascular disease (8%) and mental disorders (5%).

Nearly all health protection measures are aimed at the whole population. By contrast, health promotion measures are predominantly aimed at adults. This is because much of the expenditure is in the occupational sector, and therefore concerned with the working population. In spite of the many preventive activities undertaken in the youth health care sector and the existence of the national vaccination programme, less per head is spent on people aged up to nineteen with a view to preventing disease than on any other age group. Expenditure on the over-45s is considerably higher (see *figure 2.14*). This is mainly due to the breast cancer screening programme and the prescription of anti-hypertensive drugs and cholesterol-reducing medication.

The expenditure figures quoted above are much higher than generally assumed, despite themselves being minimum estimates. A number of health protection measures are associated with particularly high levels of expenditure. The measures in question

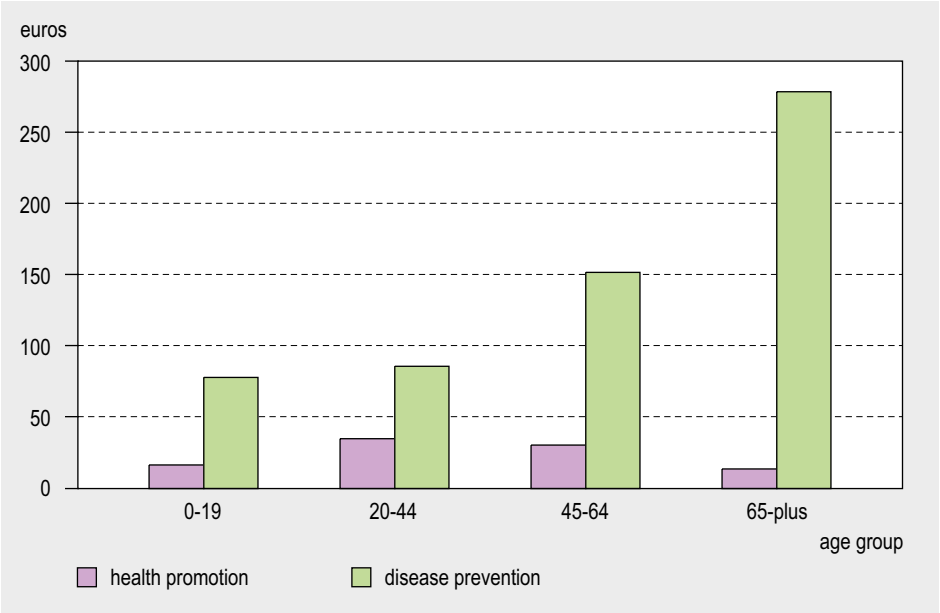


Figure 2.14: Average per capita expenditure on prevention, according to age and expenditure type, in the Netherlands in 2003 (Source: De Bekker-Grob et al., 2006).

do, however, also have very considerable health benefits, such as those that accrue from clean drinking water supplies and efficient sewers. Health protection measures generally form the basis of public health and are essential to preservation of the nation's health status. Furthermore, many such measures – such as safe drinking water and flood defences – not only bring health benefits, but also provide a sense of safety. One's sense of safety, or risk perception, is also influenced by criteria such as the extent to which exposure is voluntary, manageability, fairness and trust in the government.

Cost-effectiveness is an increasingly important policy consideration

All kinds of preventive intervention take place on a day-to-day basis at local and national level in the Netherlands, with a view to preventing illness, promoting health and protecting against health risks. The costs and benefits of some of these interventions are known, but to a large extent such information is lacking. With the cost of health care provision rising steeply, it is increasingly important to know what the costs and benefits of health care interventions are in order to account for current policy and guide the development of new policy. Information regarding the efficiency or cost-effectiveness (ratio between the cost and benefits) of care and preventive interventions is therefore very useful.

There are many (cost) effective or cost-saving preventive measures that have yet to be systematically implemented in the Netherlands (see *table 2.15*). Implementation of these measures would enable health benefits to be obtained at justifiable cost.

Table 2.14: Breakdown of prevention-related expenditure in 2003 by risk factor and affliction addressed (figures in millions of euros) (Source: De Bekker-Grob et al., 2006).

Intervention	HPromo	HProtec	DP	Total
Smoking [a]	16.1	1.7	3.7	21.5
Alcohol abuse	8.1	1.7		9.8
Drug abuse	5.1	1.7		6.8
Compulsive gambling	1.8			1.8
Healthy foods and weight problems	12.2			12.2
Physical activity and sport	24.2			24.2
Screening in the youth health care sector			166.9	166.9
Dental care and dental checks	0.2		488.5	488.7
Sexual health, contraception <21years	19.2		11.8	31.0
Road safety	3.0	1,614.2		1,617.2
Fire prevention	3.0	57.0		60.0
Prevention of sports injuries	6.7			6.7
Prevention of non-occupational accidents [b]	5.8	7.3		13.1
Working conditions and occupational safety [c]	217.0	25.7		242.7
Violence		20.8		20.8
Noise-related nuisance		558.3		558.3
Quality of drinking water and swimming water		1483.7		1483.7
Waste disposal		1604		1604
Sewering		797.1		797.1
Food safety		155.9		155.9
Air quality, housing quality, environmental safety [d]		3,626.5		3,626.5
Mental disorders	60.4			60.4
Cancer prevention [e]	15.4		69.0	84.4
Diabetes prevention	0.8			0.8
Cardiovascular disease: cholesterol-reducing medication and anti-hypertensive drugs			902.0	902.0
Congenital anomalies, perinatal disorders and pregnancy complications			115.3	115.3
Osteoporosis			67.9	67.9
Infectious diseases: vaccinations and screening			145.1	145.1
General health (not specified)	35.4		93.6	129.0
Total (in millions of euros)	434.4	9,955.6	2,063.8	7,210.1

DP = disease prevention, HPromo = Health promotion and HProtec = health protection.
[a] Public information, tobacco controls, assistance giving up smoking.
[b] Public information, school swimming, product inspection.
[c] All preventive intervention by occupational health and safety services is treated as health promotion because it is not known what the split is between disease prevention (e.g. check-ups) and health protection (e.g. risk evaluations).
[d] Reduction in waste discharges and acidifying emissions, VROM Inspectorate, radon, hazardous substances, GGD technical hygiene care.
[e] Public information, screening for breast and cervical cancer.

'Cost-effectiveness' is a normative concept, which suggests that there is clear dividing line between forms of intervention whose benefits justify their cost and forms of intervention whose benefits do not justify their cost. However, in the academic literature there is no consensus as to what constitutes cost-effectiveness. Nevertheless, 20,000 euros per healthy life-year gained (QALY) is generally seen as the maximum for

a measure to be called cost-effective. This ceiling derives from the guidelines on the primary prevention of cardiovascular disease by the use of cholesterol-reducing statins (Casparie et al., 1999; see also *subsection 3.6*).

In Canada, a study was undertaken in 2004 to identify forms of preventive intervention that were not then in systematic use, but had the potential to bring cost-effective benefits for Canadian public health (Goldsmith et al., 2004). The associated report identified five interventions for which there was ample evidence of cost-effectiveness. These included two forms of disease prevention: chickenpox vaccination and screening for colon cancer. The US Preventive Services Task Force also identified a number of forms of preventive intervention whose effectiveness has been well demonstrated, and advised their national introduction (AHRQ, 2005). Several of these interventions may also be considered cost-effective. The forms of intervention recommended by the Task Force are mainly screening programmes, including screening for colon cancer, chlamydia, hypertension (in people eighteen and over), depression, obesity, aneurysms and retinopathy (in diabetes patients).

At the request of the Ministry of VWS, the RIVM and ZonMw have performed a concerted literature study to identify forms of preventive intervention that are likely to be cost-effective in the short term (within five years) but are not yet implemented nationally. The study indicates that it is mainly interventions involving high-risk groups and patients (secondary and tertiary prevention) that would be cost-effective in short term. Those forms of intervention whose cost-effectiveness has been consistently demonstrated (i.e. demonstrated by several studies) and whose systematic implementation is considered feasible in the Netherlands are listed in *table 2.15*. Where most interventions are concerned, cost-effectiveness depends on the setting, target group, reach or participation level and organizational arrangements. The cost-effectiveness of screening for retinopathy, for example, depends on the interval between tests, while the prevention of head injuries among children is cost-effective mainly where younger children are concerned. The RIVM is currently calculating the health benefits, cost and effects associated with a number of the identified interventions. A report on this subject is expected towards the end of 2006.

The RIVM has previously evaluated the cost-effectiveness of tobacco use discouragement policy in the Netherlands (Feenstra et al., 2006a). This study showed that mass-media campaigns, higher tobacco duties and individualized support for people who want to stop smoking would all cost less than 10,000 euros per healthy life-year gained (QALY). If the cost of caring for people during the life-years gained is excluded from the calculation, these interventions actually save money.

Information on the cost-effectiveness of new forms of intervention is often obtained from studies carried out in other countries. Such information is not directly applicable in the Dutch situation. Most of the data available relate to the cost-effectiveness of disease prevention; much less is known about health protection measures, and relatively

little is known about the cost-effectiveness of health promotion, certainly in the longer term.

Table 2.15: Preventive interventions whose systematic implementation in the Netherlands would be cost-effective in the short term, according to estimates (Source: Vijgen et al., 2005; Dirkmaat et al., 2003).

Preventive intervention
Prevention of sudden cardiac death by the use automatic external defibrillators (DP) [a]
Prevention of hip fracture by the use of external hip protectors (DP)
Prevention of head injuries among children by the use bicycle helmets (HProtec) [b]
Prevention recurrent depression by treatment (DP) [c]
Chlamydia screening (DP) [d]
Screening for abdominal aortic aneurysms (DP) [e]
Prevention of blindness by retinopathy screening of DM type 2 patients (DP) [f]
Prevention of cervical cancer by screening for HPV in combination with Pap (DP) [f]
Prevention of chronic disease by treatment of obesity (medication and lifestyle) (HPromo, DP) [c]
Prevention of repeat myocardial infarction by heart convalescence (DP)
Intensive blood pressure monitoring of diabetes patients (DP)
Intensive blood-glucose monitoring of diabetes patients (DP)
Influenza vaccination (working population) (DP)
Fluoridation of drinking water (HProtec)
Vaccination against hepatitis A (people in certain professions) (DP)
Folic acid supplementation to prevent neural tube defects (DP)
Chickenpox vaccination (DP)
Prevention of accidental falls among the elderly (HPromo)
GP assistance for people who wish to stop smoking (HPromo)
Pneumococcal vaccination of the elderly (DP)

A more recent version of this table is available in the National Compass on Public Health (www.nationaalkompas.nl).
DP = disease prevention, HPromo = health promotion and HProtec = health protection.
[a] Cost-effectiveness depends on the setting and the user group.
[b] Cost-effectiveness greatest where young children are concerned.
[c] The studies relate to various treatments.
[d] Opportunistic screening only.
[e] Cost-effectiveness depends on participation rate.
[f] Cost-effectiveness depends on screening interval.

2.4 What impact does health care have on our health?

Health care makes a substantial contribution to public health

Health care contributes considerably to public health in the Netherlands. Mortality attributable to infectious diseases and cardiovascular disease in particular has dropped significantly over the last few decades by medical care and collective prevention. Where cancer is concerned, the effect of care has been smaller. Research carried out in other countries suggests that mental health care has brought down the disease burden associated with mental disorders by 10 to 15%. This figure could be increased to 20% by a strict application of 'evidence-based' principles. The overall effect of health care has been an estimated increase in life expectancy of three to four years, plus benefits in terms of quality of life. Although the figures quoted are tentative, it is reasonable to conclude that, certainly in recent times, health care has made a substantial contribution to the health of people in the Netherlands.

Performance indicators under development

Performance in the health care sector can be gauged in many different ways. In this context, interest in the use of performance indicators has been growing. Performance indicators are statistics that shed light on the quality of care and other aspects of performance within the health care system, such as accessibility and affordability. Health care performance monitoring is a very dynamic field, and much is being expected of the developments in progress. However, many obstacles associated with the development and application of performance indicators remain to be overcome; for example, much of the data on which assessment might be based are neither sufficiently comparable nor of suitable quality, and the financial and administrative implications are considerable. Furthermore, the various stakeholders tend to have radically different perspectives on performance and performance information and in some cases the expertise necessary to develop indicators is not available. Much remains to be done before indicators may be regarded as sophisticated and sensitive tools for the assessment of performance within the Netherlands' complex health care system. Nevertheless, it is certainly no longer acceptable not to measure performance.

Health Care Performance report 2004 as baseline for comparison

The HCPR describes the performance of the Dutch health care system in 2004. At the time of the survey, the Netherlands had an accessible health care system, providing services whose quality was above average in many respects. Nevertheless, there is scope for considerable improvement in terms of the effectiveness of prevention and care, patient safety and chain care. The HCPR may be seen as a 'baseline reading', from which the effects of future changes to the system may be measured.

Every year, a very large amount of money is spent on health care in the Netherlands. It is therefore reasonable to ask, for example: what are we getting for our money? What impact does health care have on public health in the Netherlands? How well is the care sector performing? Such questions are not easy to answer, however. Consequently,

various lines of research have been started in recent years, with a view to obtaining data that would shed light on performance within the Netherlands' health care sector. This subsection summarizes three of these lines of research.

First, in *subsection 2.4.1*, we look at a background study set up to support this Public Health Status and Forecasts Report by estimating the contribution that health care has made to public health over the last few decades (Meerding et al., 2006). The study looked at the effect of health care on life expectancy and quality of life within the Dutch population.

Performance indicators are increasingly important

Effect on life expectancy and quality of life are by no means the only measures of performance within the health care sector, either where outcomes or where process quality are concerned. Considerations such as the way people are treated, patient safety and the accessibility of care are equally valid. In recent years, there has been increasing interest in measuring performance within the care sector. Against this background, we have seen the development of performance indicators: individual statistics designed to reflect particular aspects of performance in care, primarily quality and effectiveness. The Netherlands Health Care Inspectorate and the Dutch Order of Medical Specialists are among the bodies that have been developing indicator sets consistent with their own outlooks and objectives. In addition, various organizations have been looking to implement US Consumer Assessment of Health Plan Survey (CAHPS) resources in the Dutch context. The questionnaires developed for the CAHPS are designed to assess performance from the patient's perspective, with patient empowerment and the facilitation of demand-driven care as key objectives. It will be apparent from the examples given above that the nature of a performance indicator depends largely on the purpose and audience for which it is developed. The whole field of care sector performance monitoring is highly dynamic, from the micro-level (individual care providers and treatments), to the meso-level (professions and illness chains) and the macro-level (the health care system in all its complexity).

Performance indicators for specific diseases and for the health care system as a whole

In the context of this PHSF, the theme of performance indicators is examined on a disease-specific level. This approach is consistent with what has become known in international literature as 'clinical logic'. Despite what the name might suggest, this discipline is not concerned with clinical indicators, but with the performance of entire care chains. *Subsection 2.4.2* presents an initial exploration of the use of performance indicators in relation to diabetes care (Van den Berg Jeths & Baan, 2006). That is the second line of research summarized here. The third relates to the HCPR: the first step towards the development of a set of performance indicators for the health care system as a whole (Westert & Verkleij, 2006). Particular focuses for the Balance Sheet are the quality, accessibility and cost of the Dutch health care system. The first edition of the HCPR provides a sort of baseline dataset on performance within the sector prior to the system changes. By periodically obtaining new values for the same indicators in

the future, it may be possible to assess what effect the system changes have had on performance.

2.4.1 How much health does the health care system produce?

The ultimate goal of health care is improved population health. It is therefore relevant to ask what contribution health care is making to public health. Yet the answer is inherently contentious. The reason being that it is very difficult to demonstrate a causal relationship between health care and public health at the population level – much more difficult than demonstrating effects on an individual level in, say, a randomised clinical trial. At the population level, other factors are always at work and liable to autonomous variation in the same time frame as the developments in health care whose effects one would like to measure. These factors include economic growth and education, and improved diet. A great deal of empirical research has been done in this field, which can be divided into types on the basis of the approach used. First, there have been studies that used medical knowledge and data on the recorded fall in mortality attributable to a particular cause to calculate the contribution to that fall made by medical intervention. Second, there have been studies that took a more ecological approach, based on international-level empirical links between the provision of health care and mortality, taking the effects of other determinants into account. The reported findings from research of both types are briefly summarized below.

McKeown argued that health care has not brought about any large declines in mortality

Estimates vary considerably as to the extent to which health care (including both curative interventions and collective prevention) has contributed to mortality reduction and thus to increased life expectancy (*table 2.16*). This is partly due to differences in the time period examined. McKeown, for example, made a series of thorough analyses of mortality development in England and Wales, which showed that medical care had made no substantial contribution to the rise in life expectancy between the middle of the nineteenth century and 1971 (McKeown, 1976). Although 74% of the increase was apparently attributable to lower mortality rates for infectious diseases, including tuberculosis and pneumonia, most of the gains were secured before the introduction of effective medical treatment, such as sulphonamides and antibiotics in the 1930s and 1940s. McKeown used similar statistics for other illnesses to argue that health care had made a negligible contribution to the declines in mortality during the study period, despite the advances in fields such as surgery and midwifery. His analysis suggested that by far the most significant factors were improved hygiene (clean drinking water, sewerage), living conditions and diet. However, there is also evidence that would tend to contradict McKeown's conclusions, as will be apparent from the analyses of mortality development in the Netherlands.

Table 2.16: Summary of studies into the contributions that prevention and medical care have made to reduced mortality and increased life expectancy (Source: Meerding et al., 2006).

	Country	Period	Health care contribution
Total mortality			
McKeown (1976)	England and Wales	1848/1854 - 1971	Roughly 20% of the decrease in infectious disease mortality [a] (74% of total decline in mortality), less than half the decrease in non-infectious disease mortality (26% of total decline in mortality)
Mackenbach (1996)	Netherlands	1875/1879 - 1970	4.7-18.5%
Mackenbach et al. (1988)	Netherlands	1950/1954 - 1980/1984	Three-year increase in life expectancy for men and four-year increase for women [b]
Mackenbach (1992)	Netherlands	1970 - 1989	15-29% (collective prevention) [c]
			22-35% (medical care) [d]
Bunker et al. (1992)	USA	1950 - 1989	Increased life expectancy: 1.5 years (collective prevention) and 4.5 years (medical care)
Mortality attributable to coronary heart disease [e]			
Goldman et al. (1984)	USA	1968 - 1976	40% (medical care), 60% (primary prevention)
Capewell et al. (1999)	Scotland	1975 - 1994	40% (medical care), 51% (primary prevention)
Bots et al. (1996)	Netherlands	1978 - 1985	75% (medical care), 25% (primary prevention)
Unal et al. (2005)	England and Wales	1981 - 2000	25% (medical care), 75% (primary prevention)
Hunink et al. (1997)	USA	1980 - 1990	71% (medical care), 5% (primary prevention)

[a] Percentage of the decline in mortality that occurred after the introduction of effective medical treatments.
[b] A maximum estimate, since data relate to total benefit in terms of prevention by medical treatment of death from avoidable causes, in the context of which medical intervention is not the only factor at work.
[c] Sum of the effect on the decline in mortality attributable to cardiovascular disease and accidents.
[d] Sum of the effect on the decline in mortality attributable to cardiovascular disease, stroke, accident, infectious disease, disease of the digestive organs, and perinatal disorders.
[e] Distinction is made between the contribution made by primary prevention, in particular the reduction of the prevalence of risk factors (partly by collective prevention), and that made by medical care through the treatment of risk factors and coronary heart disease.

Mortality in the Netherlands has been reduced by medical care and population wide prevention

Until 1970, cause-specific mortality trends in the Netherlands were similar to those seen in England and Wales. The proportion of the total decline in mortality accounted for by the fall in deaths from (certain) infectious diseases was roughly 47% for men and 45% for women (Mackenbach, 1993a). Mackenbach demonstrated that the introduction of antibiotics after the Second World War did accelerate the decline in mortality, at least where certain infectious diseases were concerned (Mackenbach & Looman, 1988). The diseases in question included major causes of death, such as tuberculosis and pneumonia, and less significant causes of death, such as syphilis, otitis media, rheumatic fever and puerperal fever. If one additionally takes account of the fact that part of the decline in mortality from digestive and perinatal disorders is attributable to

medical advances, such as improved surgery, the contribution made by medical care to the decline in mortality in the Netherlands prior to 1970 works out at between 4.7 and 8.5% (Mackenbach, 1996). It may also be assumed that various aspects of prevention, such as public information and emphasis on personal hygiene, have played a significant role in the fall in mortality attributable to diarrhoea, pneumonia, acute bronchitis and influenza, tuberculosis and a number of childhood diseases. The contribution of collective prevention to the decline in overall mortality prior to 1970 is estimated at 20% (Mackenbach, 1992).

It is also worth noting that the role of diet in the decline in infectious disease-related mortality has been questioned (Mackenbach, 1996). Cultural factors such as economic change and better and more widespread education may also have served as important underlying causes.

Health care has increased life expectancy in the Netherlands by three to four years

Since 1970, the end-point of the period covered by McKeown's analysis, the advancement of medical science has gathered pace, particularly in the field of cardiovascular disease. Hence, it is probable that the effect of health care has increased in this period. Mackenbach has estimated that collective prevention's contribution to the decline in mortality between 1970 and 1989 was roughly 20%, while the influence of medical care was about 25% (Mackenbach, 1992).

In this field, the concept of 'avoidable mortality' is of particular importance. Avoidable mortality is mortality attributable to diseases and afflictions that can be influenced or prevented by health care (Charlton et al., 1983; Mackenbach & Looman, 1988; Nolte & McKee, 2003; Nolte & McKee, 2004). The general availability of mortality statistics in western countries means that the concept of 'avoidable mortality' can be relatively easily operationalized. This opens the way both for international quality comparisons, and for trend analyses. Using this approach, Mackenbach demonstrated that, comparing the 1980-84 period against the 1950-54 period, health care had increased life expectancy at birth in the Netherlands by three years for men and four years for women (Mackenbach et al., 1988). These figures were considerably less than the six years (1.5 years through screening and vaccinations and 4.5 years through curative care) that Bunker calculated for the USA (Bunker et al., 1994). However, the US study method was very different, so the findings are not directly comparable.

Ecological studies also indicate that health care benefits public health

In 2003, the World Health Organization (WHO) caused something of a stir by publishing a report on health systems performance assessment (Murray & Evans, 2003). This study used a very different, more ecological approach. Utilizing international datasets, the researchers sought to clarify the relationship between the provision of health care and public health status, taking account of the influence of other health determinants, such as education, lifestyle and prosperity. This approach has since been adopted for other studies, the majority of which have concluded that health care has a significant positive effect on health (Nixon & Ulmann, 2006). The size of the calculated effect

differs greatly, however, partly as a result of methodological discrepancies between the studies. One problem with this type of study is that many lifestyle factors, such as smoking and alcohol consumption, have a delayed impact on public health, which cannot generally be compensated for using the available data.

Preston performed an ecological analysis of the increase in life expectancy in a large number of countries in the period 1930 to 1960. His findings indicated that economic growth was responsible for only 10 to 25% of the twelve-year average increase in life expectancy. The role of literacy and improved diet also appeared to be limited. The bulk of the worldwide rise in life expectancy during the study period must therefore have been attributable to the introduction of medical technologies such as vaccination, antibiotics and sulphonamides, coupled with pest control measures and improved (personal) hygiene (Preston, 1975).

Medical care has brought about a considerable decline in cardiovascular disease mortality

It is possible to calculate the influence of health care not only in relation to overall public health, but also in relation to specific illnesses – through, for example, reduction of the associated rates of mortality. The results of such calculations for cardiovascular disease are summarized in *table 2.16*. As with the relationship between health care and overall mortality, opinion varies concerning the relationship between health care and mortality attributable to coronary heart disease since late 1960s. This partly reflects differences in the time periods examined by various authors, since it seems that the contribution made by health care has increased over time. Three of the five studies suggest that health care is responsible for less than half of the mortality decline, the rest being due to the mitigation of risk factors (less smoking, lower serum cholesterol and less hypertension, due to better diet and more physical activity), partly through the use of prevention measures at community level. In the Netherlands, however, the contribution made by medical care has been estimated to be 75% (in the period 1978 to 1985). Due to a lack of data, the latter figure does not take account of the contribution made by secular trends in high blood pressure (Bots & Grobbee, 1996).

Relative reduction in mortality achieved by cancer treatment and probably by early detection, particularly where cervical and breast cancer are concerned

In the Netherlands, overall mortality attributable to cancer has fallen slightly among women and remained stable among men in recent decades, having previously risen due to the smoking habits of previous decades. By contrast, the number of new cancer cases in the same period rose considerably (stomach and cervical cancer, amongst other forms, excepted). Rising incidence coupled with falling mortality clearly indicates improved rates of survival due to better treatment and, with some forms of cancer, earlier detection. This picture is confirmed by survival data from the Cancer Registry. Since 1970, the improved treatment has led to higher survival rates for lymph, breast, ovarian, thyroid, colorectal, renal, cervical, testicular and small-cell lung cancer (Janssen-Heijnen et al., 2003). Unfortunately, little is known about the associated health

benefits, in terms of extra life-years and improved quality of life at the population level.

Early detection may involve greater alertness (e.g. where melanomas are concerned), the use of improved diagnostic techniques (e.g. where prostate cancer is concerned) or organized screening (e.g. where breast and cervical cancer are concerned). It should be noted that early detection can distort the survival rate: if a condition is detected earlier, the patient will, statistically speaking, appear to survive longer, even if nothing else changes. This is what is known as 'lead-time bias'. Doubts exist concerning the effect of early detection, partly because the improvements in the detection methods and systems were accompanied by advances in cancer treatment (Quinn & Allen, 1995). Nevertheless, there is now reasonably good evidence that screening programmes for breast cancer are effective (see *box text 2.15*). To begin with, the evidence came from experimental research, but the quality of the trials in question and the validity of extrapolating the findings to national screening programmes have been fiercely debated (Olsen & Gotzsche, 2001; Humphrey et al., 2002). More recently, thorough evaluation of screening programmes and mathematical modelling have contributed considerably to what is known about the effectiveness of breast cancer screening at the population level. Model simulations indicate that 28 to 65% of the fall in breast cancer mortality in the USA between 1975 and 2000 was attributable to screening, and the rest to use of adjuvant therapy (Berry et al., 2005). The benefits of cervical cancer screening have not been demonstrated experimentally, but have been confirmed in ecological studies (Laara et al., 1987; Comber & Gavin, 2004) and by mathematical modelling with screening data. Thus, it has been estimated that screening prevents five hundred cases of cervical cancer a year in the Netherlands. Since the early 1990s, with the introduction of the PSA test, the early detection of prostate cancer has become a lot more common. However, uncertainty still surrounds the effectiveness of the procedure and therefore the desirability of prostate cancer screening, which are therefore the subjects of ongoing experimental research. Although screening makes it possible to detect prostate cancer sooner, because prostate cancer is predominantly a disease of old age, screening leads to considerable over-detection of cancers that would otherwise never have been diagnosed.

Mental health care improves quality of life

Research conducted elsewhere suggests that mental health care has reduced the disease burden associated with mental disorders by 10 to 15%. This figure could be increased to 20% by working strictly to 'evidence-based' principles (see *box text 2.20*).

Health effects of health care in the Netherlands

In a background study undertaken to support this PHSF, the contribution that health care has made to increased life expectancy and improved quality of life in the Netherlands over the last fifty to sixty years has been estimated. Provisional results for infectious diseases and cancer are discussed in the *box texts 2.21* and *2.22*. A report describing the methods and findings in more detail is due to appear in the first half of 2007 (Meerding et al., 2006).

Box text 2.20: In Australia, mental health care reduces disease burden associated with mental disorders by 13%.

Table 2.17: Effect of mental health care in Australia on quality of life (from Andrews et al., 2004, Table 2, p. 529).

	Disease burden in the population		Disease burden reduced by mental health care			
	Annual prevalence (n)	DALYs	Reach (%)	Effective reach (%)	Reduction DALYs	(%)
Mood disorders	797,892	194,162	59.8	33.7	30,078	15
Depressive disorders	648,375	143,018	60.2	31.7	22,559	16
Dysthymia	78,209	37,781	50.9	33.3	4,982	13
Bipolar disorders	71,308	13,363	66.1	46.2	2,536	19
Anxiety disorders		201,547	35.2	19.7	26,059	13
Panic attacks/agoraphobia	175,994	25,338	39.1	23.8	2,375	9
Social phobias	206,976	30,058	20.8	6.7	2,530	8
Generalized anxiety disorder	376,290	85,341	37.6	20.5	14,469	17
Post-traumatic stress disorder	327,071	60,810	39.5	25.1	6,687	11
Alcohol-related disorders	479,342	48,744	10.7	5.6	745	2
Alcohol abuse	251,911	5,304	8.1	3.6	95	2
Alcohol dependency	227,431	43,439	13.6	7.8	650	2
Schizophrenia	39,048	28,671	100.0	100.0	3,774	13
Mental disorders only		473,123	39.5	22.8	60,655	13

Andrews et al. calculated the quality-of-life benefits for the Australian population of mental health care in connection with ten common mental disorders in 1997 (Andrews et al., 2004). To do so, they combined data from epidemiological research, from research into quality of life and from treatment-effect research. The results (see *table 2.17*) are broadly valid for the Dutch situation (Beekman, 2006). For methodological details, see Andrews et al., 2003.

Table 2.17 should be read as follows. In Australia in 1997, a total of 648,375 suffered from depression. Taking account of the durations of the depressive episodes in that year and the weighting given to depression in the Australian burden of disease study, one arrives at a figure of 143,018 lost DALYs (on the basis of years lived with disability; YLDs). Of all Australians suffering from depression, a little more than half (60.2%) was treated for depression in 1997. Of those who were treated, half (31.7% of all depression patients) received an evidence-based form of treatment. On the basis of effect research, it was estimated that these evidence-based treatments led to a reduction in the disease burden of 22,559 DALYs in the year in question. That equates to 16% of the total number of lost DALYs attributable to depression. Conclusion: mental health care in Australia reduced 16% of the disease burden attributable to depression.

Taking the ten listed mental disorders together, mental health care in Australia reduced the total number of lost DALYs by 13%. However, the impact of care varied considerably from one disorder to another, the range being 2 to 19%. This largely reflects differences in the reach of mental health care: treatment was given to most people with mood disorders, for example, but only to about a third of people with anxiety disorders, and a tenth of people with alcohol-related disorders. The researchers estimated the treatment reach for schizophrenia to be 100%, but that may be somewhat optimistic (Beekman, 2006).

In a number of scenario studies, Andrews and his team went on to calculate the effect of improvements in the provision and use of care (Andrews et al., 2004). First, they looked at what would happen if only evidence-based treatments had been provided. Their findings suggested that such a shift in provision would increase the effect of care from a 13% reduction in lost DALYs to a to 20% reduction. If this were coupled with an increase in the reach of mental health care, to the point where on aver-

continuation box text

age two thirds of all people with the listed mental disorders received a treatment, the effect would be a 28% reduction in burden. In an unrealistic scenario characterized by 100% treatment reach and 100% evidence-based provision, it was calculated that mental health care could reduce lost DALYs by 40%.

The results presented in *box texts 2.21* and *2.22* are intended to illustrate the considerable effect that improvements in health care have had on public health. Where infectious disease is concerned, the introduction of antibiotics and vaccination have increased life expectancy at birth by roughly 1.8 years and reduced the number of illness-year equivalents (IYE) by 0.2 years. Improvements in the treatment and early detection of cancer have raised average life expectancy at birth by roughly 0.8 years for women and 0.3 years for men, albeit while pushing up the number of illness-year equivalents by 0.04 years for men.

Of course, there is a degree of uncertainty associated with all these estimates. This is particularly the case in relation to the effects of health care on quality of life, because the available empirical data on this subject do not date back very far in time. Information is also lacking regarding the effects of health care on certain illnesses, including a number of sexually transmissible diseases (STDs) and forms of cancer in children and young adults. To obtain an estimate of the overall health impact of the Dutch health care system, one must also take account of the effect on other diseases, such as cardiovascular disease, digestive disorders and many other fatal and non-fatal diseases. Subject to the above qualifications, it appears that the contribution made by health care to public health in the Netherlands is considerable. It is not easy, however, to precisely quantify that contribution, either in absolute terms or in terms of influence on other determinants. Further research is therefore essential for a proper assessment of the effects of health care.

2.4.2 Performance indicators for the health care sector

From performance monitoring to performance indicators

The improvement of population health may be the health care system's most important goal, but it is certainly not the only one. Various other goals are pursued, particularly in the 'supportive care sectors' that in the Netherlands fall within the scope of the Exceptional Medical Expenses Act (AWBZ). Furthermore, there are many measures of performance other than the increase or decrease in life expectancy that it is valid to apply at the individual treatment level, at the care chain or profession level, or at the macro (health care system) level. In this context, quality of care is of particular importance, along with accessibility and affordability.

Over the past ten years, there has been growing interest in performance monitoring within the health care sector. Focussing on quality and political and societal pressure

Box text 2.21: Effects of health care in relation to infectious diseases.

An estimate has been made of the effect that improvements in health care since the Second World War have had on life expectancy and quality of life, as associated with infectious disease. In making this estimate, we sought to use medical knowledge to isolate the contribution made by improved health care from the contributions made by other influential factors, such as increased prosperity, better diet, better housing and improved hygiene (clean drinking water, sewers, etc). It was also necessary to take account of factors that have had a negative effect, such as the increase in salmonella infections associated with the development of the bio-industry.

Health effects have been quantified by comparing the present public health situation with a notional baseline situation, which differs from the situation that actually exists only insofar as it supposes that none of the health care improvements made since the war have taken place. The state of medical technology in the immediate postwar period therefore forms the basis of this baseline situation. That is the period prior to the introduction of antibiotics and vaccination, two important medical innovations in the fight against infectious disease. It is worth pointing out that our baseline situation should not be seen as the situation that would exist without any medical care at all, since many important advances in the control of infectious disease were made before the war, including the development of surgical techniques (e.g. for the treatment of appendicitis), the isolation of patients (tuberculosis) and the use of sulphonamides (from 1935), antitoxin (diphtheria) and salvarsan (syphilis).

The effect of antibiotics use has been determined as the one-off decline in mortality and/or acceleration of this decline following the introduction of antibiotics in 1947, as associated with those infectious diseases where antibiotics use may reasonably be assumed to have positively influenced case fatality (mortality risk among patients). The basic data were corrected for the pre-war mortality trend, because mortality associated with a number of infectious diseases was already declining in the 1920s and 1930s under the influence of the factors mentioned above. The results of this exercise are presented in table *2.18*. It will be apparent that, where numerous infectious diseases are concerned, there was a one-off decline and/or an acceleration of an established decline in mortality, coinciding with the introduction of antibiotics. The health effect of antibiotics use was then quantified as the difference between observed mortality in the late 1960s and notional mortality in the late 1960s, as calculated on the assumption that the pre-war trend had continued (column 1 in table *2.18*).

The effect of the introduction of antibiotics has been estimated on the basis of an analysis of the trend in mortality associated with infectious disease. This involved a Poisson regression analysis, similar to that described by Mackenbach (Mackenbach et al., 1988), of mortality data for the years 1921 to 1968, using the calendar year as the explanatory variable, with correction for age and sex. The war years were excluded, since there was a temporarily general deterioration in public health in this period.

In addition, an estimate has been made of the decline in mortality attributable to vaccination, in particular against diphtheria, whooping cough, poliomyelitis, measles and meningitis. The effects of influenza vaccination have not yet been quantified. Again, correction was made for any other factors that might have contributed to a fall in mortality, by correcting for any mortality trend in existence prior to the introduction of vaccination (DTP-polio in 1952-1957, measles in 1971-1976, Haemophilus influenzae type b (Hib) in 1993, meningococcus serogroup C in 2002). However, it transpired that only in relation to whooping cough was there already a downward trend in mortality before vaccination; accordingly, where the other infectious diseases were concerned, the entire difference between the mortality rates before and after the introduction of vaccination was attributed to vaccination.

Because the falls in mortality were calculated on an age-specific basis, the results could be transferred to two survival tables for a standard population. The differences in life expectancy between corresponding pairs of figures in the tables are taken to be the survival benefits attributable to improved medical care.

Antibiotics and vaccinations have also affected levels of morbidity associated with infectious diseases. Vaccination prevents new cases of disease, while antibiotics can reduce illness duration and (by obstructing transmission) prevent incident cases. However, where antibiotics are concerned, the reduced case fatality can also result in extended illness duration, particularly if there is permanent health damage, as sometimes happens with meningitis.

continuation box text

Table 2.18: Decrease in standardized mortality attributable to infectious diseases prior to (1921-1939) and following (1947-1968) the introduction of antibiotics (in fractions) [a] (Source: Meerding et al., 2006).

	Decrease in annual mortality	One-off decline	Decline in standardized annual mortality
	1921-1939	Circa 1947	1947-1968
Typhoid	-0.11	0.68	0.08
Scarlet fever	-0.03	-0.74	-0.10
Measles	-0.08	-0.38	-0.01
Syphilis	-0.02	-0.19	-0.07
Encephalitis, meningitis [b]	-0.06	0.41	0.02
Convulsions [c]	-0.11	0.83	-0.71
Otitis media (inflammation of the middle ear)	0.05	-1.25	-0.12
Acute bronchitis, influenza	-0.01	-0.39	-0.05
Pneumonia	-0.04	-0.39	-0.01
Rheumatic fever	0.00	-0.04	-0.18
Diarrhoea, dysentery, enteritis [d]	-0.09	0.79	0.06
Peritonitis	-0.09	0.24	0.04
Gonorrhoea, other STDs	0.05	-1.28	-0.12
Acute nephritis	-0.05	0.12	-0.03
Puerperal fever	-0.01	-1.42	-0.15
Erysipelas	-0.02	-0.97	-0.10
Septicaemia	-0.06	-0.16	-0.01
Tuberculosis	-0.06	0.23	-0.12
Other infectious diseases	0.00	-0.21	-0.04
All infectious diseases	-0.05	-0.08	-0.02

[a] Based on an analysis of the kind described by Mackenbach et al. (1988).
[b] Where meningococcal meningitis is concerned, there was an acceleration in the decline in case fatality rate after WW II.
[c] Much of the mortality attributable to convulsions involved children with fever.
[d] Where bacillary dysentery is concerned, there was an acceleration in the decline in mortality after WW II.

The effect on the morbidity was quantified as follows. The reference-situation incidence of tuberculosis, diphtheria, whooping cough, poliomyelitis and syphilis was extrapolated from the reference-situation mortality (see above) and case fatality level prior to the introduction of antibiotics (on the basis of empirical data or literature). Where meningitis and measles were concerned, data on the average incidence in the years prior to the introduction of vaccination were used. The present-day incidence figures used for the various illnesses were based on national records in all cases. The incidence data were then entered into an Incidence-Prevalence-Mortality model, in combination with data on the likelihood of complications or lasting consequences and their duration (as derived from literature), and the mortality data. The model was run twice for each illness, once for the baseline situation and once for the present situation The number of years spent in each stage of illness were weighted according to seriousness using the existing disability standards, resulting in an illness-year equivalents figure (Stouthard et al., 1997a). The difference between the number of illness-year equivalents in the present situation and that in the baseline situation is considered to be the benefit attributable to improved health care.

The results are presented in *table 2.19*. The total increase in life expectancy attributable to improved infectious disease care is estimated at 1.8 years. The main gains come from the treatment of tuberculosis (0.7 years), acute bronchitis/influenza (0.3 years) and pneumonia (0.2 years). The additional estimated quality-of-life benefit is put at a reduction of 0.24 illness-year equivalents. Here, the effect is greatest where measles is concerned, because this illness was very frequent before the advent of vac-

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Table 2.19: Estimate of the health benefits attributable to improved health care (antibiotics and vaccination) in relation to infectious diseases, between roughly 1947 and 2003 [a] (Source: Meerding et al., 2006).

	Lifetime illness-year equivalents	Life expectancy (years)
Infectious diseases with predominantly intervention by the use of antibiotics		
Gastrointestinal infections	≈0	+0.130 [d]
Tuberculosis [e]	-0.023	+0.670
Syphilis	-0.01	+0.068
Otitis media	≈0	+0.124
Acute bronchitis, influenza [f]	n.k.	+0.332
Pneumonia	n.k.	+0.216
Rheumatic fever	n.k. [b]	+0.046
Acute nephritis	n.k. [b]	+0.009
Puerperal fever	n.k.	+0.079
Erysipelas	n.k.	+0.027
Septicaemia	n.k.	+0.004
Infectious diseases predominantly tackled by vaccination		
Meningitis		
Haemophilus influenzae type b (Hib)	-0.006	+0.009
Meningococcal infection	-0.003	+0.008
Diphtheria [g]	-0.004	+0.064
Whooping cough	-0.008	+0.021
Poliomyelitis	-0.036	+0.011
Measles	-0.148	+0.004
Subtotal (specified infectious diseases only)	-0.238	+1.820 [c]

Illness-year equivalents: the number of years spent with illness, weighted according to the seriousness of the disease. N.k. = not known.

[a] Estimates apply to a standard population with mortality risk pattern as in 2003.

[b] The effect of antibiotics on the incidence of chronic cardiac valve defects / chronic nephritis has not yet been quantified.

[c] Sum of the disease-specific life expectancy gains. No account has been taken of interaction between the life expectancy gains associated with individual infectious diseases. This is likely to have led to a slight overestimation of the subtotal.

[d] Baseline situation mortality is as in 1958-1962. From the 1950s, the incidence of and mortality attributable to salmonella were both rising; from roughly 1960, mortality began to fall, although there was no apparent fall in the incidence. The improvement in case fatality is attributed to improved medical treatment.

[e] The calculation takes account of increases in incidence and mortality associated with migration after the 1980s.

[f] Excluding the effect of the introduction of influenza vaccination.

[g] Mortality fell between 1921-1939, but subject to strong epidemic influence; mortality was higher in postwar years than in the late 1930s, probably due to the aftermath of the Second World War. Baseline situation incidence and mortality are as reported or recorded for the period 1931-1939.

cination (the lifetime risk was probably approaching 100%). It should be noted that the quality-of-life effects of improved health care have not yet been calculated in relation to a number of infectious diseases. Insufficient data were available, for example, to enable calculation of the effect of antibiotics on the duration and seriousness of a number of infections, or the effect on chronic complications.

In the analyses, the rise in the incidence of (and mortality associated with) septicaemia, pneumonia and a number of other infectious diseases (e.g. erysipelas, MRSA) from the 1960s is treated as an autonomous trend. This rise may be ascribed to a combination of factors, such as the increase of invasive interventions, the use of immunosuppressive treatments, increased vulnerability among the elderly, antibiotic resistance and higher rates of reporting due to greater recognition of infectious disease as a cause of morbidity and mortality. The increase in mortality associated with these infectious diseases must therefore be viewed in

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conjunction with the beneficial effects of improved health care in relation to other diseases.

Box text 2.22: Health effects of screening for and better treatment of cancer.

An estimate has been made of the health effects of the improved treatment and early detection of various forms of cancer. The cancers in question are all relatively common and are forms for which the relative survival chances have improved in recent times: colorectal, breast, prostate and lung cancer and non-Hodgkin's lymphoma. Except where prostate cancer is concerned, the observed improvements in the relative chances of surviving these cancers is attributable to better treatment, or better treatment in combination with early detection (Janssen-Heijnen et al., 2003). This does not exclude the possibility that other factors, such as reduced malignity or the better general health status of the patient population may also have played a role in improving survival rates. However, where the cancers listed above are concerned, there is no evidence to suggest that such factors have had a major influence. It is worth making the point that by limiting our attention to the specified cancers, we are excluding from our calculations the declines in mortality associated with a number of less common cancers, which tend to affect mainly children and adolescents (Hodgkin's lymphoma, testicular cancer).

The contribution that improved treatment and screening have made to increased life expectancy and enhanced quality of life for cancer patients since 1955 has been calculated by determining the difference between the actual present situation and a notional baseline situation, which supposes that none of the relevant improvements have taken place. Both situations have been simulated using a survival data table, in which the age-specific incidence of cancer is combined with the duration-specific and age-specific relative survival rate (Kruijshaar et al., 2003b). The survival data table takes account of mortality attributable to other causes of death, on the basis of 2003 mortality rates. The difference between the rate of mortality in the actual situation and that in the notional situation is deemed attributable to improvements in medical care and early detection since 1955.

It is assumed that the actual present situation is characterized by the incidence levels recorded for the period 1999 to 2003 (NKR) and the most recent relative survival data available (IKZ). Where the incidences of lung cancer, colorectal cancer and non-Hodgkin's lymphoma are concerned, the incidence in the baseline situation is also taken to be that recorded for the period 1999 to 2003, since it is reasonable to assume that the incidences of these cancers would have increased even without the medical improvements that have taken place. However, early detection has had a major influence on the incidences of breast cancer and prostate cancer since the early 1990s. The incidences of these cancers in the baseline situation therefore exclude the effects of screening on the actual present incidences. In the case of breast cancer, correction has been made using the MISCAN model; for prostate cancer, the incidence in the period 1989 to 1991 (i.e. immediately prior to the introduction of PSA screening) has been adopted. The baseline situation also assumes the relative survival rates seen in the earliest period for which Dutch survival data are available: 1970 to 1977 for prostate cancer and 1955 to 1969 for all other cancers. All the data on relative survival come from the IKZ (Coebergh et al., 2001, Rutqvist, 1985). Because the incidence statistics relate to numbers of tumours, and one person can have several tumours, the incidence and hence the mortality is overestimated somewhat in all cases.

The effects on quality of life have been calculated using established disease models (Melse & Kramers, 1998). For each cancer, a number of stages are defined (including diagnosis and treatment, post-treatment, disease-free, metastasis, terminal). The incidences of these stages are linked to the incidence of the disease and the mortality attributable to it. The duration of each stage has been defined on the basis of expert estimates and empirical data (TRM, 1999). A standard system of illness seriousness weightings for the various stages has been applied (Stouthard et al., 1997a). The same survival table used to calculate the mortality effects has then been used to multiply the incidence per stage by the stage duration and the seriousness weighting to give the number of illness-year equivalents in the standard population (number of years spent with illness, weighted according to seriousness).

The same stage definitions, stage durations and seriousness weightings have been used for both

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Table 2.20: Estimate of the health benefit provided by improvements made between 1955-1969 and 2003 in treatment of and screening for various types of cancer [a] (Source: Meerding et al., 2006).

	Baseline		Age 0-80
	Lifetime illness-year equivalents	Life expectancy (years)	Life expectancy (years)
Lung cancer			
Men	0.008	0.06	0.06
Women	0.003	0.04	0.04
Colorectal cancer			
Men	≈0	0.1	0.09
Women	≈0	0.1	0.09
Breast cancer			
Women	≈0	0.63	0.58
Prostate cancer			
Men	0.028	+0.06-0.07	+0.02-0.05
Non-Hodgkin's lymphoma			
Men	0.001	0.05	0.05
Women	0.001	0.04	0.04
Subtotal (specified cancers only)			
Men	0.037	+0.27 [b]	+0.22 [b]
Women	0.004	+0.81 [b]	+0.75 [b]

Illness-year equivalents: the number of life-years spent with illness, weighted according to the seriousness of the disease.

[a] Estimates apply to a standard population with a mortality risk pattern as in 2003.

the present situation and the baseline situation. Hence, any calculated effect on quality of life cannot merely be a consequence of a shift in stage incidences (reflecting changes in cancer incidence and mortality). No account has been taken of the possibility of less and shorter-duration treatment being provided in the baseline situation, or of more inconvenient or unpleasant treatment being provided in the baseline situation (complications), or of any improvements that may have been made to the care provided in the stages prior to death. These variables have provisionally been excluded because empirical data on quality of life (duration and seriousness of each disease stage) are not available for the period 1950 to 1960.

The results are presented in *table 2.20*. The overall increase in life expectancy obtained through detection and treatment of the cancers considered works out at less than 0.3 years for men and roughly 0.8 years for women. By far the biggest increase in life expectancy is associated with breast cancer. Because of the unreliability of cause-of-death statistics concerning the elderly, a sensitivity analysis of the mortality data for people of up to eighty has been performed. The net effect on quality of life proves to be negative: detection and treatment appear to have increased the number of years that the average person spends living with disability. Where most cancers are concerned, the effect is modest, since while improved survival leads to an increase in the time people spend living with illness (temporarily in most cases), it also means a decrease in the time spent living with the most onerous metastasis and terminal phases of the disease. Only where prostate cancer is concerned is quality of life significantly lower in the actual present situation than in the baseline situation.

has been among the drivers of this trend. Professionals, health care organizations, professional associations, insurers and government bodies are investing considerable

money and energy in the development of indicators and systems for the collection, analysis and reporting of performance-related data (see *box text 2.23*).

Since the Care Institutions (Quality) Act came into force in 1996, every Dutch health care institution has been expected to operate a quality management system, under which the quality of care is monitored, controlled and improved. An important component of any such system is the systematic collection of data on the quality of the care provided to patients (i.e. performance). Such data are needed to determine whether care provision is of an appropriate standard. In this context, insight into structures (essential and supporting organizational units or services), processes (the manner in which care processes are made available to the patient) and outcomes (in terms of effectiveness, safety and efficiency) is important, and indicators play a key role in the provision of such insight.

The government also has increasing need of performance indicators that enable it to build up a reliable and comprehensive picture of performance within the Dutch health care system. The need for such indicators is closely linked to the shift in responsibilities, making the government primarely responsibly for the system, rather than for the results. Performance information can be used by the government to support strategic decision-making at system level, to measure the effects of health care policy (e.g. the modernization of curative care, supportive care and system reform), to account to parliament for its policies and to tie in with international developments in this field within the OECD and the WHO.

Much is being expected of performance indicators. However, various researchers have highlighted problems associated with their development and application, which are yet to be overcome; the availability and quality of the data remain issues, for example, and the financial and administrative implications are considerable. Furthermore, the various stakeholders tend to have radically different perspectives on performance and performance information and in some cases the expertise necessary to develop indicators is not available. A situation in which each stakeholder has to develop a customized indicator set to serve its own purposes and using its own methods is undesirable. Indicator development requires a coherent approach consistent with generally applicable scientific standards. Much remains to be done before indicators may be regarded as sophisticated and sensitive tools for the assessment of performance within the Netherlands' complex health care system. Nevertheless, it is certainly no longer acceptable not to measure performance.

Clinical logic: a tool measuring performance in an entire disease or care chain

When the performance indicators for a number of individual illnesses are aggregated, it is possible to make use of 'clinical logic'. Despite what the name might suggest, clinical logic is not about clinical indicators, but addresses the performance of entire chains of care associated with particular type of illness. The object of clinical logic is to define, and if possible quantify, the associations between disease histories and care processes. Based on information about possible correlations between health and the performance

Box text 2.23: Quality, performance and indicators in the health care sector.

Within the health care sector, interpretations differ of the terms 'quality', 'performance' and '(performance) indicator'. Clear definition is desirable in order to avoid argument as to what is meant.

One widely used definition of the quality of care is that proposed by Donabedian, namely 'the degree of correlation between the criteria for good care (desirable care) and care as actually provided in practice'. The influential US Institute of Medicine (IOM) states: 'Quality health care means doing the right thing, at the right time, in the right way, for the right person – and having the best possible results.' (IOM, 2001) The thus identifies four aspects of quality: effectiveness, safety, promptness and demand conformance. These are generally referred to as the core aspects of quality in the international literature (Veillard et al., 2005).

Performance may be defined as follows: 'performance refers to how and to what extent persons, institutions, or systems carry out their defined functions, meet core objectives, and achieve set-out targets in a balanced way and within a stated time-frame'. From this definition, it will be apparent that performance is not simply a matter of satisfactory or acceptable functionality, but covers a series of functional and outcome possibilities. However, some commentators use the terms 'performance' and 'quality' synonymously (Groenewoud & Huijsman, 2003).

Performance indicators in health care
For the term 'indicator', the Advisory Council on Health Research (RGO) applies a definition that has held sway for some years: 'an indicator is a measurable aspect of care provision that may be indicative of the quality of care'. It is usually a quantitative variable that reflects an underlying phenomenon. Insofar as such phenomena relate to the quality of care, within the Dutch health care system we are concerned with variables that are indicative of, for example, the safety, efficiency, accessibility or client-orientation of care.

Indicators can be used for various purposes. Distinction is often made between those for use in the context of internal quality improvement and those for use in the context of external accountability. Indicators of the first type are designed primarily to facilitate the management and improvement of the internal care process and are used mainly by professional practitioners themselves. However, care institutions and professional practitioners are increasingly expected to provide information regarding their performance to, for example, insurers, patients' and clients' organizations, policy makers and government bodies, the Health Care Inspectorate (IGZ) and their own institutional governors. Hence there is a need for indicators of the second type mentioned above. This entails information on the performances to be used for external accountability and transparency, on behalf of others than the care providers themselves. Each actor's information requirements differ. Insurers, for instance, require information about quality, cost-effectiveness and any unnecessary use of health care facilities, while patients' and clients' organizations are more interested in the availability of care, the technical quality of the available care and the approach of care professionals; for their part, policy makers tend to seek information concerning the quality and accessibility of care and the contributions made by health care facilities to overall public health. Performance indicators play an increasingly important role in policy formulation and evaluation, operational supervision, management and communication with third parties, including politicians and other stakeholders (RVZ, 2004).

As performance indicators become more widely used for external accounting and the creation of transparency, it is increasingly important that they are designed to high quality standards. They need to give a reliable picture of the quality of care and provide a basis for the fair and proper comparison of care providers. A systematic and structured approach to their development is therefore vital, in order to ensure that the end product, the indicator, is of the requisite standard (De Koning et al., 2006).

of the health care system, one can measure the performance of the health care system by reference to a number of health outcomes. By the application of clinical logic, it is possible to, for example, provide insight into the distribution of an initially healthy population across various stages of illness and into the influence of prevention and care on the illness outcomes (see *figure 2.15*).

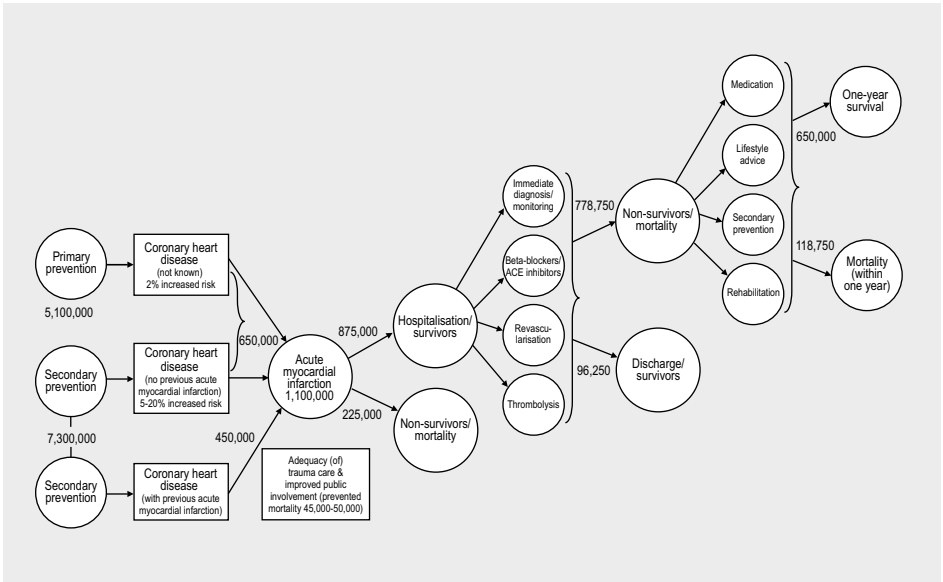

Figure 2.15: Application of clinical logic to acute myocardial infarction (Source: McGlynn, 2003).

Clinical logic is a valuable approach, since it allows outcome and process indicators to be included in a dynamic model. This is important because reliable and valid information on the outcomes of care is scarce, and outcome variations normally depend partly on factors outside the care sector. Outcome indicators therefore often serve only to highlight that something may be the case. Process indicators have the advantage that they are less sensitive to distorting variables and better able to reveal changes that are taking place at an early stage. Clinical logics utilize both types of indicators and makes associations between the two types of information. For this PHSF, the approach has been applied in relation to diabetes and breast cancer (Van den Berg Jeths & Baan, 2006; Hoekstra & De Koning, 2006). The report on the use of clinical logic in relation to breast cancer should be complete towards the end of 2007.

Diabetes

The diabetes case study was undertaken as an initial examination of the feasibility of applying clinical logics and the suitability of the approach for use within the Dutch health care setting. In this study, clinical logics were employed primarily with a view to selecting a core set of performance indicators for preventive and general care activities. The following selection criteria were applied: the indicators had to relate to variables that reflected impact on health, were influenceable by the health care system and, of course, were measurable. In addition, the selected performance indicators collectively had to be capable of providing a complete picture of the entire chain, from prevention to mortality.

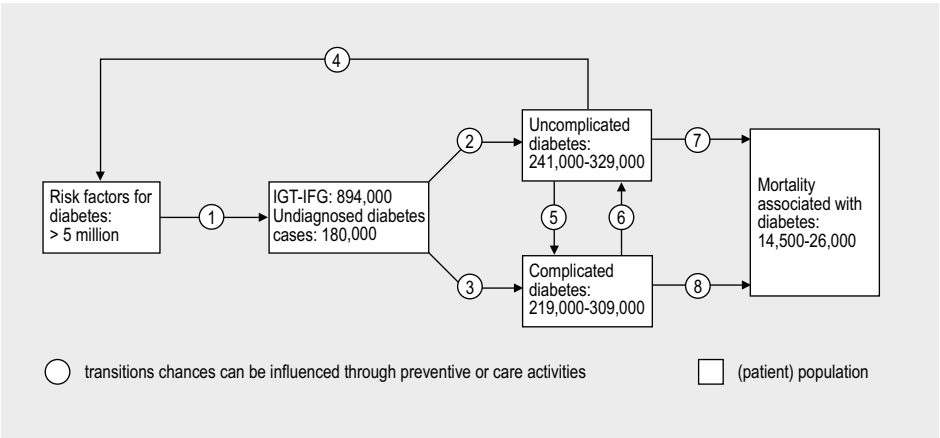

Figure 2.16: Application of clinical logic to diabetes (Source: Van den Berg Jeths & Baan, 2006).

At least five million people in the Netherlands are at risk of developing diabetes. In 2003, some 548,000 people aged twenty-five or above had been diagnosed with type 2 diabetes.

The available data indicate that 44 to 60% of diabetes patients have no complications, but this is probably an overestimate. The other patients have one or more micro- or macro-vascular complications, such as myocardial infarction, heart failure, stroke or disorders affecting the eyes, kidneys, nerves or feet. Among people aged sixty or more, approximately 30% (894,000 individuals) have impaired glucose tolerance (IGT), a known precursor of diabetes. Furthermore, it is estimated that 180,000 people suffer from diabetes without being aware of it. The disease leads to the death of an estimated total of fourteen to twenty-six thousand people a year. *Figure 2.16* summarizes these data in a flow chart.

It quickly became apparent that the application of clinical logic to diabetes would be complex, due to the large number of risk factors influencing the development of the disease and the associated complications. Quantification and the linkage of performance information to population data proved particularly problematic. Taking account of, for example, all the care interventions with the potential to influence the transition from complicated diabetes to uncomplicated diabetes would be extremely difficult, because so many illnesses are potentially relevant. Furthermore, the data necessary to properly define all the relationships – particularly those on the diabetic population – proved not to be available. Nor was it possible to accurately determine the effect of preventive and general care on illness outcomes. Nevertheless, the research team was able to define a core set of nine performance indicators (see *table 2.21*).

The Health Care Performance Report: performance indicators for the Dutch health care system

The HCPR is an example of a very different approach to the use of performance indicators within the health care sector. The HCPR is primarily concerned with indicators that

Table 2.21: Core set of nine performance indicators relating to diabetes (Source: Van den Berg Jeths & Baan, 2006).

Policy objective	Performance indicator
Risk factors influencing the development of diabetes	
Stop the rise in the number of people who are overweight or obese	1. Percentage of the general population who are overweight or obese
Reduce the number of children who are overweight or obese	
Epidemiology of (precursors of) diabetes	
Increase early detection of people at high risk of developing diabetes	2. Prevalence of IGT/incidence of diabetes not diagnosed by GPs
Reduce the number of people below the age of 55 with late-onset diabetes	3. Annual incidence and prevalence of diabetes type 2
Risk factors influencing the development of macro-vascular complications	
Extend the healthy life of people with diabetes by preventing complications and counteracting aggravation of the symptoms.	4. Percentage of patients who are overweight or obese
Encourage patients to adopt healthy lifestyles and follow medical advice	5. Percentage of patients that smoke
Increase patients' involvement with and acceptance of responsibility for their disease	6. Percentage of patients with high blood pressure
	7. Percentage of patients with abnormal lipid profiles
Epidemiology of macro-vascular complications among diabetes patients	
Extend the healthy life of people with diabetes by preventing complications and counteracting aggravation of the symptoms	8. Percentage of patients with macro-vascular complications
	9. Mortality attributable to macro-vascular diseases as a fraction of overall mortality among diabetes patients

together provide an overall picture of the performance of the health care system. To this end, the indicators are grouped in accordance with the three primary public goals: quality, accessibility and cost. For the first edition of the Care Balance Sheet, approximately 125 indicators were selected and quantified for 2004 (Westert & Verkleij, 2006). Thus, HCPR provides not only information about the performance of the health care system in that year, but also a baseline dataset, which can be used to assess the effects of future system changes. Presented below are summaries of two of the central topics covered by the HCPR: quality and accessibility. The cost and affordability of health care are considered in more detail in *subsection 2.5* and *subsection 3.6*.

Quality of care

Quality is a broad concept (see *box text 2.23*), embracing aspects such as the effectiveness, safety and client-orientation of care. In the HCPR, the quality of curative care in the Netherlands is measured using twenty indicators. Generally speaking, it appears that GPs provide good-quality care, usually in keeping with the relevant professional guidelines; nevertheless, considerable variations exist among individual GPs and practices. GPs act as 'gatekeepers', regulating access to almost the whole health care system

and referring only a small number of the people that come to see them. The outcomes of hospital care are measured using fifteen indicators. Indicators such as mortality within thirty days of a myocardial infarction suggest that, in general, care is effective. In certain fields, however, the effectiveness is low by comparison with other countries. The figures on five-year survival of breast and colorectal cancer patients are relatively bad, for example. Another indicator relates to citizens' satisfaction, which is high concerning the care provided by GPs and medical specialists.

The quality of long-term care has been rising in recent years. Nevertheless, the Netherlands Health Care Inspectorate highlighted numerous shortcomings in the nursing home care in 2004. Furthermore, in some respects there is considerable variety in the standard of care provided by supportive and nursing careorganizations. The percentage of nursing home residents referred to hospitals varies considerably from home to home, for example.

The mental health care sector operates effective preventive programmes for depression and anxiety disorders, but the programmes' reach and the utilization levels are modest. Only a third of people with mental problems seek help from the mental health care sector. The development of quality indicators for this sector remains in its infancy.

Considerable improvements in patient safety have also been secured over the last few years. Unfortunately, however, it is not possible to obtain an overview of avoidable harm associated with health care. Patients in the Netherlands are generally positive about the standard of care they receive, and more than 40% of Dutch people are satisfied with the health care system. The latter figure is fairly typical in the wider European context. Many people are not confident about the future, however.

Accessibility

The Netherlands is looking for new ways to balance accessibility and freedom of choice within the care sector. One of the key principles underpinning the Dutch health care system, and most other European systems, is that there should be uniform access for all to health care facilities. Accessible care is care that can be obtained by those who need it, when they need it, without having to negotiate any significant thresholds. The accessibility of care may be limited by all sorts of factors, such as waiting lists, lack of facilities, staff shortages, geographical separation, and financial, social or cultural barriers. Care can be expensive (see *subsection 2.5*), so legally guaranteed and practical access to health insurance is a prerequisite for adequately accessible care.

The HCPR assesses the accessibility of health care in the Netherlands by reference to twenty-five indicators. Particular emphasis is placed on waiting times for acute and non-acute care, financial and geographical accessibility, and the actual degree of accessibility for people from disadvantaged groups and ethnic minorities.

Internationally, the Netherlands compares well in terms of the overall accessibility of care. Waiting lists and waiting times have fallen markedly in recent years. Consequent-

ly, waiting is not problematic in the majority of cases. Where planned hospital care is concerned, roughly 80% of waiting-list cases are non-problematic. Care consumption levels are indicative of actual accessibility, and the differences across the Netherlands are small. Nearly everyone in the Netherlands is insured. In addition, by OECD standards, personal contributions to the cost of care are low in relation to overall care expenditure. Most health care facilities are geographically well distributed around the country.

This does not mean that the accessibility of the system could not be improved in certain respects. For example, ambulance response times exceed the fifteen-minute standard in approximately 8% of emergency cases. Also, approximately 40,000 people were living more than half an hour's drive from a GP's surgery in 2004. In addition to which, 11% of emergency callers contacting GPs' surgeries in 2004 did not receive expert assistance within a minute. The number of people waiting for mental health care grew by 6% in 2004. Another problem is that, in some cases, there is insufficient utilization of care. Less well-educated people make relatively less use of dental and psychosocial care, and less likely to participate in cervical cancer screening; the ethnic minorities generally make less use of physical therapy, home care or medication.

The financial accessibility of care for the chronically ill is an ongoing policy concern in the Netherlands. In the period 1997 to 2003, the chronically ill had an average of 500 euros extra expenditures a year, due to their illness. People with several somatic and functional disabilities are vulnerable because, apart of extra expense, they typically tend to have lower incomes. On the other hand, only 56% of eligible chronically ill people took advantage of the tax reduction available in respect of special expenditure. It is worth making the point, however, that the accessibility of care for people who are chronically ill, are living in deprived areas or belong to a marginal group has always been problematic. The situation described above emphasizes the need for constant vigilance and monitoring, particularly in view of all the changes currently being made to the Dutch health care system.

The first edition of the HCPR may be seen as providing baseline information. By updating the same indicators for future editions, it will be possible to build up a good picture of developments in the performance of the Dutch health care sector, under the influence of, for example, new insurance schemes and other organizational changes to the system.

2.5 How much care is used, why, and by whom?

Total value of care provided in 2003 was between 43.7 and 57.5 billion euros

According to the Health and Social Care Accounts of Statistics Netherlands the total amount spent on care in 2003 was 57.5 billion euros. However, Statistics Netherlands applies a broad definition of 'care', which includes, for example, playgroups. The Ministry of VWS has also estimated expenditure on care for its Health Care Budget of the Ministry. Focusing primarily on care provided under the Health Insurance Act and AWBZ, the ministry arrives at a figure of 43.7 billion euros for 2003. Statistics Netherlands Health and Social Care Accounts indicate that, between 1999 and 2003, the cost of care increased by a total of more than 45%, or 9.7% per year. More than half of this annual growth was attributable to inflation (5.4% per year), with approximately 4% resulting from volume growth. A small part of the volume growth (1% per year) was a consequence of demographic developments, leaving 'real' volume growth in this period at 3% per year.

Most care is provided by hospitals and long term care

Hospitals accounted for the largest portion of the cost of care (26.9%) in 2003; next came nursing homes, supportive care and home care (21.3%). Medication and medical devices formed the third largest cost item (13% of the overall cost). GP care absorbed only a modest slice of the spending (3.7%), but this is obviously not a reflection of the field's significance and role. A relatively small part of the money spent went on preventive care (1.3%), but it should be noted that a lot of prevention takes place outside the formal health sector (see also box text 2.4).

Mental health care most expensive

When the cost of care is broken down by disease, mental disorders prove to be the most 'expensive' category, accounting for 22% of the care budget. The leading 'psychiatric disorders' include mental disabilities (8.0%) and dementia (5.4%). Substantial resources also go on cardiovascular disease (9.2%) and digestive disorders (7.9%). Notably, cancer (neoplasms) accounted for a fairly modest 4.1% of the total care budget in 2003, despite being very common and a major cause of death. In other words, it is mainly chronic diseases that lead to intensive care consumption and high costs.

More spent on women's health than on men's

Annual care consumption per head increases sharply with age. It costs more than 40,000 euros a year to care for the average man of ninety-five or above, and nearly 50,000 euros to care for the average woman in that age group (and the women outnumber the men by far in that age group). Women consume more care than men. For many years, the cost ratio between the sexes has been approximately 60:40. The difference is, of course, partly due to the need for care in connection with pregnancy, childbirth and maternity care but it is also a consequence of the fact that women do live longer. Moreover two other facts are relevant here: women spend more years in ill health at the end of life than men do, and since men die earlier on average, women are

more likely to live alone. Together, these factors mean that women make more use of health care than men, and that the average cost of caring for a woman is higher.

Care costs in the Netherlands rising faster than elsewhere in Europe
Throughout the EU, the health expenditure has increased relative to the GDP since 1999, partly as a result of the slow rate of economic growth. However, the speed of the growth seen in the Netherlands has been exceptional. This has resulted from a more generous approach to funding and what is known as the 'immediate payment' policy. Introduced by Minister of Health, Borst, this policy brought an end to years of working to fixed budgets. Under the policy, all care of approved types that had actually been provided qualified for funding. By entering into covenants with the relevant 'umbrella organizations' and pursuing targeted policies, the government has nevertheless recently been seeking to contain the cost increase. The most recent statistics indicate that it has been successful in doing do.

The relationship between population health and care is complex. Illness and disability influence the consumption of care, but the provision of care also influences levels of illness and disability. The extent of the latter influence was discussed in *subsection 2.4*. In the present context, we are concerned primarily with the consumption of care. Of particular interest in this regard are questions such as: how much care is consumed and what is the breakdown of care consumption across different diseases and afflictions? Which diseases account for the largest parts of the care budget, what is the individual case cost and what is the relationship between care and age? What trends have been evident in recent years and how does the Netherlands compare with other countries?

Health care comprises a large variety of facilities and activities, ranging from medication to complicated surgery, and from prevention programs to long term care in nursing homes. To compare all those different aspects, here we express health care consumption in terms of expenditures. High expenditures point to an extensive use of health care, while low expenditures denote a limited consumption. We will focus on formal heath care, delivered within the context of the Dutch health care system. Informal or lay care will be discussed in *chapter 3.1*. Although 'health expenditures' has a more neutral connotation, here we will use the economic term 'costs' of health care.

This subsection contains mainly key statistics accompanied by brief commentaries. More comprehensive information is available at www.costofillness.nl.

2.5.1 How much does the Netherlands spend on care?

Total value of care provided in 2003 was 57.5 billion euros
No one knows exactly how much care is consumed in the Netherlands. The reason being that health care can be defined in various ways, which differ mainly in the extent to which they cover social care, residential care and supportive care (*box text 2.24*).

It its Health and Social Care Accounts, Statistics Netherlands estimated that the total amount spent on care in 2003 was 57.5 billion euros (*figure 2.17*) (Smit et al., 2006). However, the Statistics Netherlands (CBS) applies a broad definition of 'care', which includes, for example, playgroups. The Ministry of VWS has also estimated expenditure on care for its Health Care Budget of the Ministry (BKZ). Focusing primarily on care provided under the Health Insurance Act and AWBZ, the ministry arrives at a significantly lower figure of 43.7 billion euros for 2003 (VWS, 2005a). Because the BKZ definition of care is liable to change from year to year – if, for example, the package of services covered by health insurance changes – the BKZ data for the years covered by *figure 2.17* are not entirely comparable and the BKZ series presents a distorted picture of the actual pattern of cost development.

To enable international comparison, the OECD developed the System of Health Accounts (SHA; OECD, 2000a). Although this system yields a similar expenditure figure to that given in the BKZ, the included and excluded provisions differ significantly from the BKZ (*table 2.22*). Most preventive care, for example, is outside the scope of the BKZ, but included in the SHA. Conversely, many AWBZ provisions, such as supportive residential care, home care and care for people with disabilities, do not fall within in the international definition of health care.

Care costs are determined by socio-cultural factors

It will be clear that the differences in the calculated costs cannot be attributed entirely to the complexities of the definition question. The point should also be made that there are no right or wrong definitions; it is simply that each definition has its specific use and users. The information needed to account to parliament for government spending is not necessarily the same information as needed to obtain a comprehensive overview of health care costs, or to facilitate international comparison. However, more fundamental questions about the significance of care within our society and the relationship between the individual and the community are also relevant in this context. How is care viewed and experienced, and how, for example, do we regard our children and older members of society? If we delegate the care for our children to others, do we regard that as a form of health care? And is the cost of accommodating and looking after elderly people in supportive care homes a form health care expenditure? Then what about the money that employers spend on ensuring that working conditions are healthy? All these questions tie in with socio-cultural issues concerning the place of the individual in the community. What are the individual's rights and obligations? Which forms of care should society provide on a collective basis, and which are the individual's personal responsibility? From the care perspective, is there a distinction between formal care and lay care? Views on these socio-cultural issues are shifting all the time, as was emphasized by the public debates concerning the new health care system and the Social Support Act (WMO). One important lesson to come out of those debates is that health care cannot properly be viewed from any single point of view. It is not merely desirable, but in fact essential to illuminate the subject from different sides.

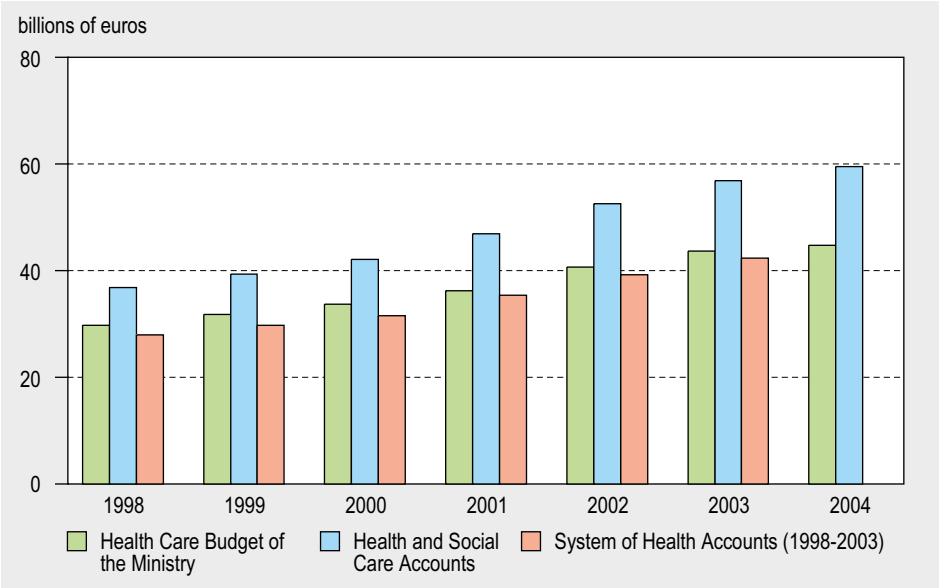

Figure 2.17: Development of health care costs, as reported in the Health Care Budget of the Ministry / (BKZ), the Health and Social Care Accounts (ZR) published by Statistics Netherlands and the System of Health Accounts (SHA) published by the OECD, 1998-2004 (figures in billions of euros).

With these considerations in mind, this PHSF seeks to examine public health and health care in the round. Accordingly, we view care costs in the manner adopted for the Health and Social Care Accounts, but consider BKZ expenditure where policy formulation and accountability considerations make this appropriate. Naturally, the international comparison at the end of this chapter is based upon the OECD definition structure.

Hospital care and care for the elderly are the largest expenditure items

Hospital care was the largest single cost item in 2003, accounting for 26.9% of health care spending; the next largest item was nursing, supportive and home care (21.3%). The PHSF theme report Ouderen nu en in de toekomst (The Elderly Now and in the Future; Van den Berg Jeths et al., 2004) contains an in-depth examination of this sector in relation to the health of older people in the Netherlands. The third-biggest cost item is medication and medical devices, absorbing 13% of expenditure, with medication as the predominant part. Primary care (which accounts for 10.2% of expenditure) includes not only GP care, dental care and paramedical care, but also midwifery services, social work and psychological care. GP care takes up a modest 3.7% of spending, but this is obviously not a reflection of the field's significance and role. The PHSF theme report Op één lijn (Public health forecast for primary care; De Bakker et al., 2005) made it clear that the primary sector was strong, partly because of the central role played by GPs. Primary care is followed in the list of major cost items by care for people with disabilities and by mental health care (8.3 and 6.8% of spending, as defined in the Health and Social Care Accounting system). Just as *table 2.22* shows, in international definitions for

Box text 2.24: Three assessments of health care expenditure.

Everyone would agree that GP care, medication, hospital care and many other forms of medical provision are types of health care. However, there are many forms of support that some observers regard as healthcare, while others do not. Examples include childcare, alternative therapies, occupational health care and supportive residential care. A situation where such a provision is regarded as health care by the compilers of one set of statistics, but not by the compilers of another set, is referred to by Statistics Netherlands as a field discrepancy. Two other types of discrepancy are relevant in this context: definition discrepancies and allocation discrepancies. A definition discrepancy exists where there is agreement that a type of provision should be included, but different definitions are applied in its valuation, leading to divergent results. Statistics Netherlands, for example, considers all spending on a given form of care, while the Ministry concerns itself only with spending from the communal purse. An allocation discrepancy involves two parties each including a given cost item, but under different headings. So the cost of medication dispensed by GP-pharmacists may be treated as pharmaceutical assistance (VWS), or as GP care (Statistics Netherlands). Discrepancies of these types are very important in relation to the three assessments of care expenditure generally used in the Netherlands.

The Statistics Netherlands' Health and Social Care Accounts are intended to provide a comprehensive, coherent and consistent picture of care expenditure. A broad definition of care is applied, which encompasses important elements of welfare care, such as childcare. The accounting system used is based upon 'actors': (groups of) independent organizational units, consisting of individual practitioners or institutions, which undertake activities in the field of care. Expenditure is determined for each category of actor, by calculating the total value of the actors' activities, whether or not these activities are included in the statutory entitlement package. So, for example, the cost of pharmacy care is deemed to include spending on self-help remedies and other over-the-counter products, but not to include the cost of medication dispensed by GP-pharmacists, which is treated as part of the cost of GP care.

One of the strengths of the approach of Statistics Netherlands is that the time series are consistent. Comparison between different years is not complicated by field discrepancies, or differences in the way actors or cost items are defined. Furthermore, the analysis of cost developments over time is aided by the fact that the Health and Social Care Accounts recognize price and volume components. Finally, the Statistics Netherlands' accounts can readily be related to the internationally accepted definitions of the System of Health Accounts (SHA).

The Ministry of VWS categorizes care costs on the basis of ministerial responsibility. The Ministry's approach is concerned with exchequer-funded expenditure, such as that in the field of systematic prevention, and the Health Care Budget of the Ministry (BKZ), which covers mainly contribution-funded care. It does not therefore include the cost of providing municipal health services, occupational health and safety services or alternative health care. When government policy documents refer to care expenditure, it is nearly always BKZ expenditure that is meant – in other words, mainly spending on care as regulated by the Health Insurance Act and the AWBZ. The cost of care funded through supplementary private insurance is not included, nor is the cost of care providers' other activities. Furthermore, shifts in policy and in political circumstances can lead to year-to-year definition discrepancies within the BKZ. The BKZ is not therefore ideal for cost development analysis. Partly to assist the RIVM's research into the cost of illnesses in the Netherlands Statistics Netherlands has more clearly defined the relationship between the Health and Social Care Accounts and BKZ for the reference year 2003.

The OECD collects data on health and care in its member states for the purpose of international comparison. These data are organized according to the System of Health Accounts (SHA), which is based on care functions. These functions relate only to activities in the fields of curative and nursing care. Supportive care is not considered to be a form of health care by the OECD. Hence, most of the cost of providing care for people with disabilities, supportive residential care and home care is excluded from the OECD statistics. However, in contrast to the BKZ, the SHA does include, for example, the cost of providing public health care, dental care for adults, occupational health and safety services and alternative therapies. On the other hand, in common with the BKZ, the SHA does not treat the cost of care providers' non-care activities, such as training at teaching hospitals and independent services, as care expenditure.

Source: CBS, 2005

the cost of care the disability care is only to a very limited degree reckoned, compared to the Dutch figures.

Preventive care accounts for quite a small part of the calculated cost of care (1.3%). However, this figure by no means takes account of all preventive activities. Preventive care is provided by numerous different parties, most of which are outside the preventive care subsector. A significant amount of occupational health care, for example, is in fact preventive, as is a great deal of primary care, such as dental checkups. Furthermore, medication is sometimes used for preventive purposes, as with cholesterol-reducing drugs and anti-hypertensive drugs. In fact, very many preventive activities take place outside the health care sector altogether. So, to obtain a more complete picture of the cost of the various forms of preventive care, a comprehensive preventive care cost survey has been undertaken to support this PHSF. The results of the survey are summarized in *subsection 2.3.5*.

Table 2.22: Health care costs by sector in the Netherlands in 2003 (in millions of euros and percentages of the total), based on the definitions used for the Health and Social Care Accounts (Statistics Netherlands), the Health Care Budget of the Ministry (Ministry of VWS) and the System of Health Accounts (OECD) (Source: Slobbe et al., 2006).

	Health and Social Care Accounts		Health Care Budget of the Ministry		System of Health Accounts	
	Millions of euros	Percentage	Millions of euros	Percentage	Millions of euros	Percentage
Public health care and prevention	749	1.3	128	0.3	749	1.7
Primary care [a]	5,847	10.2	3,742	8.6	5,640	12.5
Hospital care and specialist medical care	15,459	26.9	13,272	30.4	14,972	33.2
Nursing, supportive care and home care [b]	12,272	21.3	11,704	26.8	6,404	14.2
Disability care	4,789	8.3	4,808	11.0	485	1.1
Mental health care and social support	3,886	6.8	3,305	7.6	2,961	6.6
Medication and medical devices, body materials	7,494	13.0	4,876	11.2	7,169	15.9
Ambulance and other transport services	553	1.0	521	1.2	553	1.2
Other forms of care [c]	2,296	4.0	27	0.1	2,125	4.7
Management	1,837	3.2	1,285	2.9	1,837	4.1
Child care	2,348	4.1	-	0.0	-	0.0
Capital expenditure	-	0.0	-	0.0	2,220	4.9
Total	57,529	100.0	43,666	100.0	45,113	100.0

[a] Including, for example, general social work, psychological care, dental fabrication and GP laboratory services (insofar as included in the various costing systems).
[b] Including maternity care (insofar as included in the various costing systems).
[c] Including occupational health and safety services, private clinic services and alternative health care (insofar as included in the various costing systems).

Mental disorders account for the highest expenditure

For the Cost of Illness in the Netherlands 2003 study, care expenditure was broken down according to the disease or affliction treated. It proved possible to allocate 82.6%

of the costs reported in the Health and Social Care Accounts in this way, and just less than 90% of the expenditure covered by the BKZ. The costs that could not be allocated included the costs of playgroups, occupational health care and supportive residential care, and much of the over the counter drugs.

The largest portion (22%) of the care budget was spent on the treatment of mental disorders (see *figure 2.18*). Under the ICD-9 system, this heading includes mental disabilities (8.0%) and dementia (5.4%). The next largest segments, after non-allocable costs, were spent on cardiovascular disease (9.2%) and digestive disorders (7.9%). Digestive disorders account for such a large portion of care costs largely because, under the Health and Social Care Accounting principles, they include dental care. As *figure 2.18* shows, a large part of the cost associated with digestive disorders is outside the scope of the Ministry's BKZ system, which covers very little dental care other than that provided to children up to the age of eighteen. A similar discrepancy is seen where disorders of the nervous system and senses are concerned, due to the cost of spectacles, contact lenses and hearing aids being included in the Health and Social Care Accounts, but not in the BKZ. Notably, cancer (neoplasms) appears well down the list, despite being very common and a major cause of death. The total spending associated with cancer in 2003 was a mere 4.1% of the total care budget. In other words, it is mainly chronic diseases that lead to high levels of care consumption and high costs (as defined, at least, in the context of the Health and Social Care Accounts and the BKZ). If a breakdown is made on the basis of OECD definitions, mental disorders remain the largest contributors to cost, but the gap between such disorders and cardiovascular disease and other less chronic disorders is not so great. For the purposes of international comparison, this is a significant observation, for the reasons set out below.

The distribution of costs across the ICD headings is broadly similar for men and women, except insofar as the costs associated with pregnancy and childbirth are obviously exclusive to women. However, a larger portion of overall budget (58%) is spent on caring for women. The discrepancy is due partly to the aforementioned exclusive costs, and partly to the fact that on average women live longer. This point is considered more closely below.

Major differences in health care use associated with various diseases

A more detailed breakdown of the data presented in *figure 2.18* has been made, with costs allocated to just under a hundred diseases and afflictions. The ten of these associated with the highest levels of care consumption are listed in *table 2.23*. Together, they account for approximately a third of all care consumption by both men and women. Where male consumption is concerned, mental disabilities head the list, accounting for 10.4% of costs. Among women, dementia is the largest single reason for care consumption, absorbing 7.2% of spending. For both sexes, the second item on the list is 'Symptoms, signs and ill-defined disorders '. This is an ICD-9 group that is used mainly in primary care, where it is often not possible to make a 'proper' diagnosis and patients can if necessary be referred to a hospital. Other groups that account for high levels of care among both men and women are coronary heart disease, stroke, dental

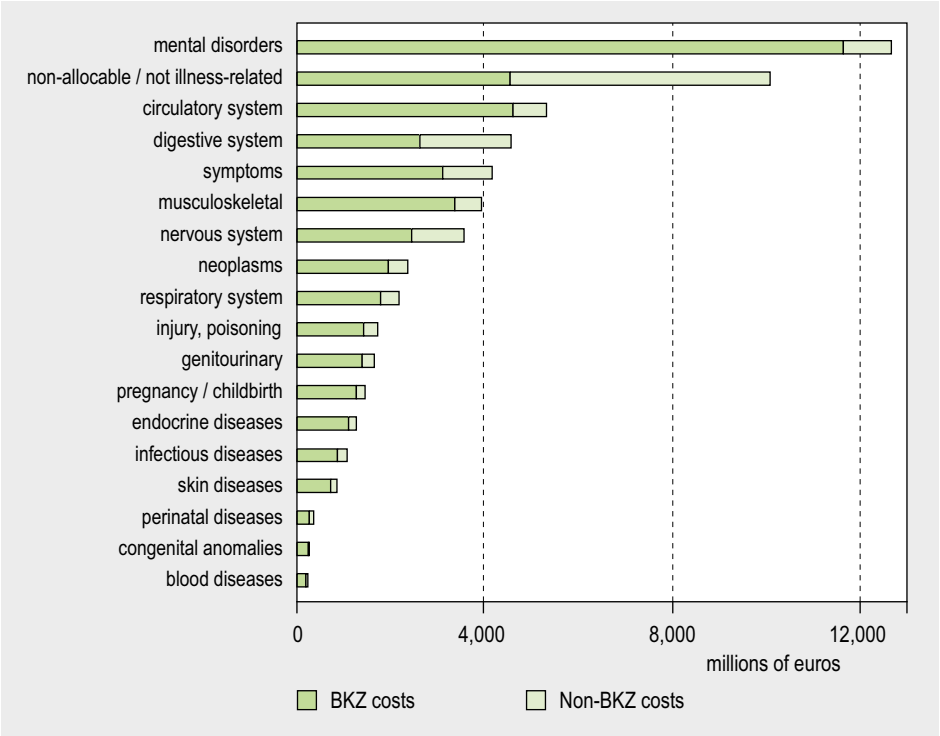

Figure 2.18: Cost of health care in the Netherlands in 2003, broken down by ICD heading (in millions of euros); the total cost in each case is as calculated in accordance with Health and Social Care Accounting principles; the portion of the total covered by the Health Care Budget of the Ministry of Health (BKZ) is also indicated (Source: Slobbe et al., 2006).

caries and – among spectacle and contact lens wearers – refraction and accommodation disorders. In other words, the main cost items are largely the same for both sexes, although the order differs somewhat. According to *table 2.23*, men consume more care for asthma and COPD, which is consistent with smoking habits of the past; male consumption of care for diabetes and schizophrenia is also higher, reflecting the higher prevalences among men. Where women are concerned, the remaining items on the list are disorders affecting the female reproductive organs, dorsopathy (neck and back problems) and depression.

Table 2.23: The ten most expensive illnesses (in terms of overall cost, in millions of euros) for men and women in 2003, indicating the associated percentages of overall care costs per sex and the average cost per case (in euros, rounded off to the nearest hundred or thousand, depending on the sum involved) (Source: derived from Slobbe et al., 2006).

	Men				Women			
	Illness	Total cost (millions of euros)	%	Case costs [a] (euros)	Illness	Total cost (millions of euros)	%	Case costs [a] (euros)
1	Mental disabilities, including Down's syndrome	2,514	10.4	42,000	Dementia	2,386	7.2	33,000
2	Symptoms, signs and ill-defined disorders	1,818	7.5	-	Symptoms, signs and ill-defined disorders	2,333	7.0	-
3	Coronary heart disease	804	3.3	1,500	Mental disabilities, including Down's syndrome	2,092	6.3	46,000
4	Dental caries	774	3.2	100	Stroke	872	2.6	7,300
5	Dementia	739	3.1	25,000	Dental caries	825	2.5	100
6	Stroke	580	2.4	5,200	Disorders of the female genital tract	524	1.6	-
7	Refraction and accommodation disorders	394	1.6	100	Refraction and accommodation disorders	490	1.5	100
8	Asthma and other COPD	386	1.6	900	Coronary heart disease	458	1.4	1,200
9	Diabetes mellitus [b]	332	1.4	1,100	Dorsopathies	447	1.3	500
10	Schizophrenia	317	1.3	18,000	Depression	447	1.3	1,800
	Total for listed disorders	8,657	35.8		Total for listed disorders	10,875	32.6	
	Total men	24,179	100.0		Total women	33,350	100.0	

[a] Excluding the cost of prevention.

[b] Including complications such as diabetic retinopathy, but excluding co-morbid diseases, such as cardiovascular disease.

Table 2.23 also shows the average cost per case for the various diseases in 2003. In calculating these costs, the cost of preventive care, including preventive medication such as cholesterol-reducing drugs, has been excluded. Because such costs are incurred to prevent new cases, not to treat cases that do occur. From the results, it is apparent that some illnesses that are associated with high national levels of care consumption are actually quite cheap to treat at the level of individual patients. Examples include dental caries and eye disorders that can be corrected using spectacles or contact lenses. Conversely, there are numerous other diseases that bring high costs per case, but do not contribute greatly to national expenditure because they are relatively uncommon. *Table 2.24* lists the ten most expensive illnesses on a case-cost basis; notable inclusions are the infectious diseases meningitis and septicaemia, a number of forms of cancer

and hip fractures. Premature birth also necessitates a great deal of expensive care and results in a high case cost. Total amount of expenditure associated with these ten most expensive disorders is still a little more than 15% of the total, with more than 13% attributable to mental disorders and dementia, among both men and women.

It is important to bear in mind that the figures quoted are all averages; individual care costs vary greatly from person to person. In many cases, the existence of co-morbidity (having several medical problems at the same time) is an important factor. Research by the RIVM indicates that, in 1999, 30% of the spending on hospital care related to the treatment of 1% of the population. Indeed, 70% of the spending involved caring for 10% of the population (Kommer et al., 2005). This inevitably leads on to the subject of solidarity in health care. The present distribution pattern is indicative of a high degree of solidarity. However, it is important to ask whether people will retain this level of solidarity in the future. Analyses of care in the last year of life suggest that almost everyone will ultimately go through a period when they require a lot of (expensive) care (Polder et al., 2006). In *chapter 3*, this question is considered further in our examination of the course of life.

Table 2.24: The ten most expensive diseases (in terms of average cost per case, in euros, rounded off to the nearest hundred or thousand, depending on the sum involved) for men and women in 2003, indicating the associated percentages of overall care costs per sex and the total cost per disease (in millions of euros).

	Men				Women			
	Illness	Total cost (millions of euros)	%	Case costs a (euros)	Illness	Total cost (millions of euros)	%	Case costs a (euros)
1	Mental disabilities, including Down's syndrome	2,514	10.4	42,000	Mental disabilities, including Down's syndrome	2,092	6.3	46,000
2	Dementia	739	3.1	25,000	Dementia	2,386	7.2	33,000
3	Oesophageal cancer	24	0.1	23,000	Oesophageal cancer	12	0.0	27,000
4	Meningitis	11	0.0	22,000	Hip fracture	319	1.0	25,000
5	Hip fracture	104	0.4	22,000	Meningitis	11	0.0	25,000
6	Schizophrenia	317	1.3	18,000	Septicaemia	25	0.1	19,000
7	Septicaemia	19	0.1	14,000	Lung cancer	63	0.2	14,000
8	Lung cancer	119	0.5	12,000	Schizophrenia	169	0.5	12,000
9	Stomach cancer	32	0.1	12,000	Stomach cancer	20	0.1	11,000
10	Premature birth	78	0.3	10,000	Premature birth	66	0.2	10,000
	Total for listed disorders	3,957	16.4		Total for listed disorders	5,162	15.5	
	Total men	24,179	100.0		Total women	33,350	100.0	

[a] Excluding the cost of prevention.

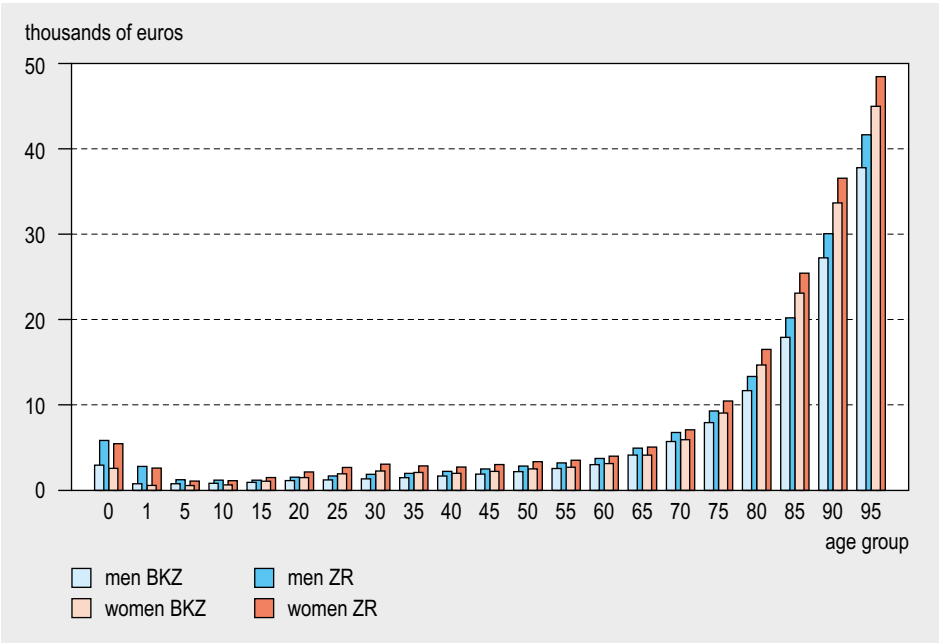

Figure 2.19: Average expenditure (in euros) per head in the Netherlands in 2003, broken down by age and sex, as calculated using the definitions of care used for the Health and Social Care Accounts (ZR) and the Health Care Budget of the Ministry (BKZ) (Source: Slobbe et al., 2006).

Care for elderly women particularly costly

Annual care consumption per head of the population increases sharply with age. It costs more than 40,000 euros a year to care for the average man of ninety-five or above, and nearly 50,000 euros to care for the average woman in that age group (see *figure 2.19*). Application of the Ministry of VWS's BKZ definition of care results in slightly lower figures, but does not significantly alter the general pattern. Only where children under the age of five are concerned does application of the Health and Social Care Accounting principles produce a significantly higher cost figure (the reason being that playschools are excluded from the BKZ calculations). *Figure 2.20* shows a breakdown of total expenditure costs, from which it is apparent that care for the under-fives is associated with high national levels of expenditure. Along with playschools, the main contributory factor is hospital care for neonates with congenital abnormalities and other health problems. The graph also shows women consume a lot more care than men. For many years, the cost ratio between the sexes has been approximately 60:40. The difference is, of course, partly due to pregnancy and childbirth, but it is also a reflection of the fact that women typically live longer. Greater female life expectancy means that the oldest people in society are predominantly women. Two other facts are relevant here: on average women spend longer living in ill health, and women are more likely to live alone. Together, these factors mean that women make more use of formal care than men, and that the average cost of caring for a woman is higher.

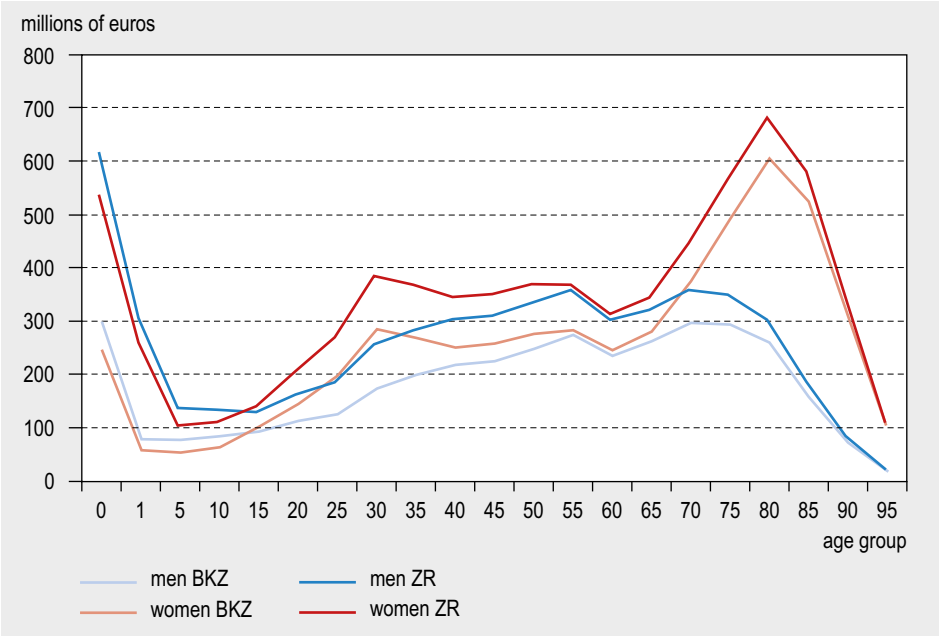

Figure 2.20: Total cost of care (in millions of euros) per head in the Netherlands in 2003, broken down by age and sex, as calculated using the definitions of care used for the Health and Social Care Accounts (ZR) and the Health Care Budget of the Ministry (BKZ) (Source: Slobbe et al., 2006).

Rising costs 1999 to 2003

Health expenditure rose sharply in the period 1999 to 2003. This was mainly as a consequence of government policy. In the late 1990s, the care sector was experiencing shortages; therefore, because the economy appeared to be doing well, the budgetary constraints on the health care system were loosened under a series of medium-term agreements and in the context of the so-called 'immediate payment' policy. This approach did not win universal approval. In 2003, the Council for Public Health and Health Care warned of 'an explosion in health expenditure' (RVZ, 2003a) and shortly after their appointment in 2003 new Health Minister Hans Hoogervorst and State Secretary Clémence Ross introduced measures to control expenditure. Since 2003, the rate of cost growth has consequently eased.

Nevertheless, we are concerned here with the period 1999 to 2003. The Statistics Netherlands' Health and Social Care Accounts put the total rise in the cost of care provision in this period at more than 45%, or an annual growth rate of 9.7%. More than half of the growth (5.4% per year) was accounted for by inflation, while approximately 4% was due to volume expansion. A small part of volume growth (1% per year) was a consequence of demographic developments, so 'real' growth in this period was about 3% per year.

Figure 2.21 shows the cost development for the entire Dutch population, broken down by age. It is easy to see the effect of the first postwar 'baby boomers' moving from the

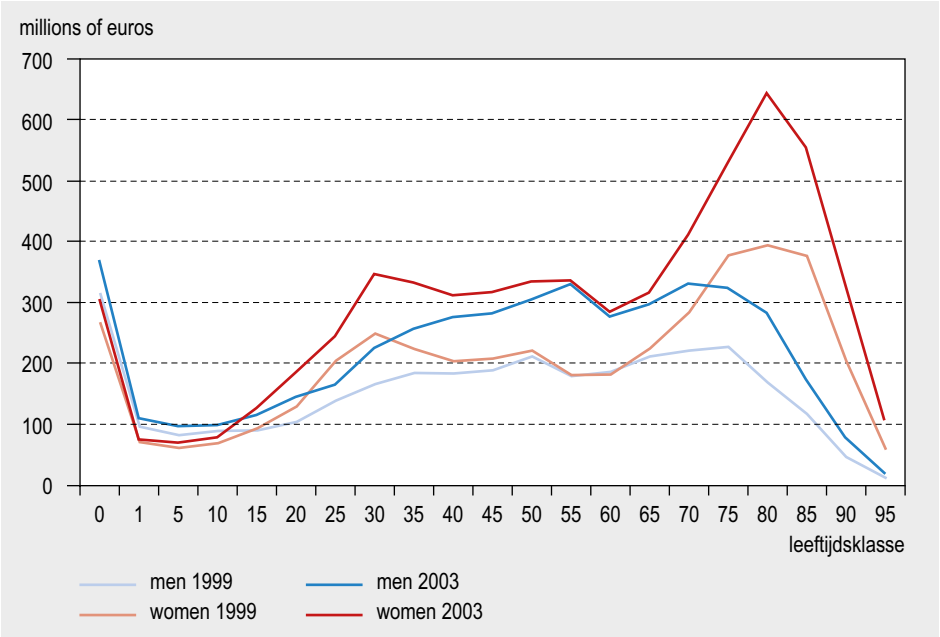

Figure 2.21: Health expenditure (in millions of euros) in 1999 and 2003, broken down by age and sex; only comparable costs are included, being approximately 90% of the total cost in the two years (Source: Kommer et al., 2006).

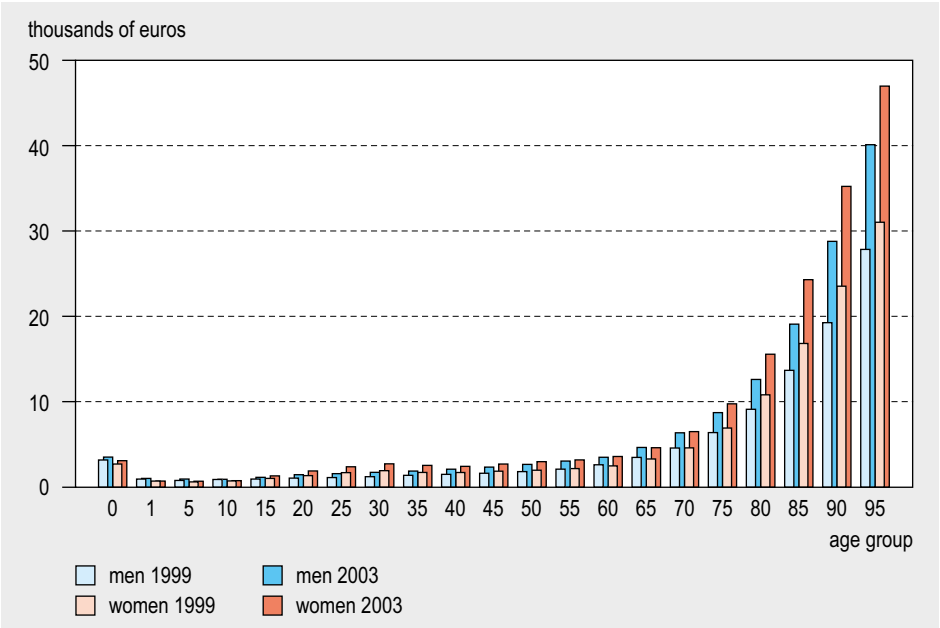

Figure 2.22: Average cost of care (in euros) per capita in the Netherlands in 1999 and 2003, broken down by age and sex; only comparable costs are included, being approximately 90% of the total cost in the two years (Source: Kommer et al., 2006).

50-54 age group to the 55-59 group. The figure also clearly shows how expenditure has risen mainly in respect of middle-aged and older people. This reflects a combination of inflation and the volume growth associated with the intensification of care. *Figure 2.22* shows the increase per head in the Netherlands, broken down by sex and by age group. As will be seen, the absolute cost increases go up sharply with increasing age. These disproportionate rises mean that the age-related cost distribution curves now go up even more steeply. This has serious implications for the sustainability of cost trends and solidarity across generations.

Table 2.25: Growth in the health expenditure between 1999 and 2003, broken down by diagnosis; figures are total annual percentage growth rate and rates attributable to demographically driven volume development, other volume development and price inflation; growth figures relate to approximately 90% of the overall cost of care in the two years (Source: Kommer et al., 2006).

	Demography	Other volume development	Price inflation	Total growth rate
Infectious diseases	1.1	12.1	5.7	19.6
Neoplasms	1.1	4.0	5.3	10.7
Endocrine diseases	1.2	4.5	5.3	11.3
Blood disease	1.1	5.0	5.7	12.2
Mental disorders	0.9	5.2	5.4	11.8
Nervous system	1.1	4.1	5.0	10.4
Circulatory system	1.2	1.7	5.3	8.4
Respiratory system	1.1	1.5	5.3	8.1
Digestive system	0.9	6.1	5.4	12.8
Genitourinary	1.1	3.7	5.2	10.3
Pregnancy / childbirth	1.0	2.9	5.8	9.9
Skin disease	1.1	4.0	5.7	11.2
Musculoskeletal	1.0	8.9	5.6	16.3
Congenital anomalies	1.0	1.9	5.0	8.1
Perinatal diseases	1.1	1.1	5.4	7.7
Symptoms, ill-defined	1.0	3.2	5.7	10.2
Total	1.0	3.0	5.4	9.7

The rise in the cost of care can also be broken down on the basis of diagnosis. As *table 2.25* shows, the growth rates associated with the various ICD groups vary considerably: from 7.7% for perinatal disorders to nearly 20% for infectious diseases. These differences can be explained only partially by disparities in the specific levels of price inflation or in the demographic influences. In the period 1999 to 2003, the key factor was 'other' volume growth. This remaining growth in fact reflects the 'real' expansion of care, from which – as the tabulated data show – all diagnosis groups benefited, albeit to varying degrees. This is indicative of complex dynamic trends, which will be the subject of a separate report (Kommer et al., 2006).

2.5.2 International context

The Netherlands' expenditure growth in the period 1999 to 2003 exceptional within Europe

Health care levels differ from country to country. To some extent, consumption differences reflect variations in demand and cultural factors. Dutch people, for example, are less inclined to use medication than their counterparts in neighbouring countries. However, the most significant differences concern the provision of care. Homes for the elderly, for instance, are peculiar to the Netherlands, while Germany has health resorts, which have no Dutch equivalent. Germany has a lot more dentists per head of the population than the Netherlands, while Belgium has more pharmacies, albeit with a role that is quite distinct from their Dutch equivalent. Substantial differences also exist with regard to nursing homes and organizations caring for people with disabilities. In many countries, care for people with disabilities is not regarded as a form of health care. Another influential factor, in addition to supply and demand, is the way the health care system is organized and funded. In this context, it is not only macro-influences such as planning, government supervision and market forces that make a difference, but also more practical issues. People in Germany, for example, have direct access to medical specialists, while people in the Netherlands need a referral by their GPs.

The OECD has established a system that makes overall care costs reasonably comparable. The System of Health Accounts (SHA) provides correction for international differences in the definition and extent of health care (OECD, 2000a). As previously demonstrated, the cost of care in the Netherlands calculated by the OECD method is lower than the figure reported in the Health and Social Care Accounts (*figure 2.17*). Presented in *figure 2.23* is a long-term comparison between cost development in the Netherlands and a number of neighbouring countries and other OECD states, selected to illustrate the span of variation. Spending on health care is far higher in the USA than anywhere else, at approximately 15% of GDP. Luxemburg is at the other end of the range, with only about 6% of GDP spent on care. Since 1999, care costs have increased everywhere relative to GDP, partly because economic growth has been modest over the period in question. The growth in the cost of care in the Netherlands has nevertheless been exceptional. This is undoubtedly due to the relaxation of funding constraints in connection with efforts to cut waiting lists and the policy. Introduced by Health Minister Els Borst, this policy brought an end to years of working to fixed budgets. Under the old system, an annual spending ceiling was set, with the result that, for example, a hospital might sometimes be unable to perform any more hip operations after October. By contrast, the new policy guaranteed that all care of approved types that had actually been provided qualified for funding. By entering into covenants with the relevant umbrella organizations and pursuing targeted policies, the government has nevertheless recently been seeking to contain the cost development. The most recent statistics indicate that it has been successful in doing do. Unfortunately, though, it is not yet possible to make international comparisons for 2004 or later years.

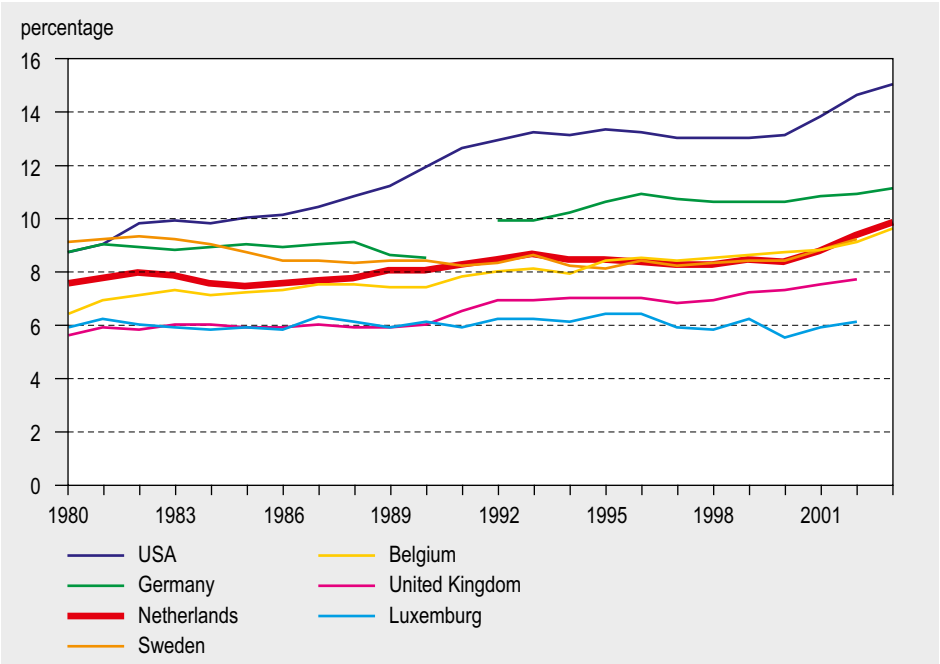

Figure 2.23: Health expenditure as a percentage of GDP in seven countries between 1980 and 2003 (Source: OECD, 2005a; the OECD has no statistics for Germany in the period immediately following 'die Wende').

It is helpful not only to measure the volume of health care provision relative to national income, but also to compare developments in the cost per head of the population between different countries. This exercise reveals a clear divide between the USA and Europe (*figure 2.24*). Within Europe, the differences are modest, with the highest per capita cost in Luxemburg. From the latter fact, it becomes clear that Luxemburg's low care bill as a percentage of GDP is primarily a reflection of the country's prosperity, rather than low spending. Notably, the cost of care provision in the Netherlands was rising comparatively slowly in the 1980s, but has gone up more quickly in recent years to largely make good the lost ground. As a result, spending in the Netherlands was fairly average by European standards in 2003. It should be noted, however, that the Netherlands' 'catch-up effort' was made in a period when the nation's population was ageing less quickly than those of neighbouring countries. The cost growth was greater in relative terms than in absolute terms; furthermore, with the big 'jump' in the average age of the population still to come, the Netherlands' middle-ranking position in the expenditure table is not as good as it might appear.

Similar distribution of care costs across illness groups in all prosperous countries

Health expenditure has been broken down by disease or disorder for a number of other western countries, as well as the Netherlands. Presented in *table 2.26* is a summary of estimated cost-of-illness (CoI) data for Australia, Canada, Germany, France and the Netherlands. The data are based on the System of Health Accounts (SHA) and compari-

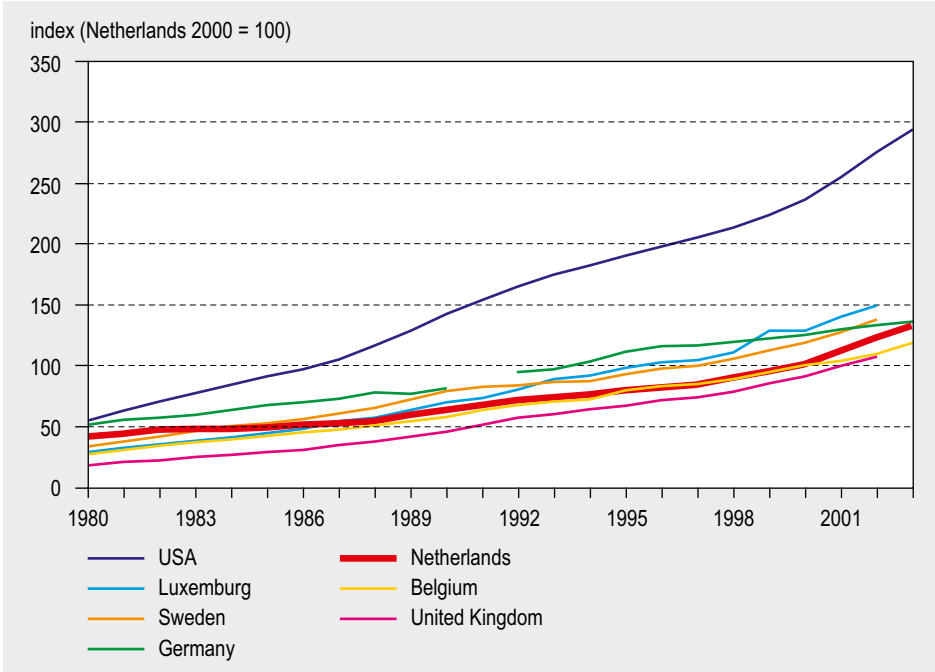

Figure 2.24: Trends in per capita health expenditure in seven countries between 1980 and 2003 (index figures, Netherlands 2000 =100); cost differences relative to the Netherlands in 2000 have been calculated using euro exchange rates (Source: OECD, 2005a; the OECD has no statistics for Germany in the period immediately following 'die Wende').

son is confined to four reasonably comparable sectors, namely hospital and specialist medical care, GP care, dental care and pharmaceutical care (Heijink et al., 2006).

From *table 2.26* it will be apparent that the distribution of care costs across diseases and disorders is broadly similar in all the countries considered. Furthermore, per capita care costs for the various ICD-9 groups are generally similar. Indeed, there has been considerable international convergence of the cost of illness since similar comparisons were made for the PHSF 2002 and other publications. Clearly, the illnesses that contribute most to the cost of care in the Netherlands – mental disorders and cardiovascular disease in particular – are also major determinants of expenditure in the other featured countries. Of course, it is also apparent from *table 2.26* that considerable differences exist between countries. The costs associated with endocrine disorders, cardiovascular disease and disorders of the musculoskeletal and digestive systems are relatively high in Germany, while in the Netherlands it is mental disorders that stand out and in Australia respiratory disorders. To some extent, these differences merely reflect epidemiological and demographic characteristics. The average age of the German population is quite high compared with the other featured countries, which has implications for expenditure on cardiovascular disease and musculoskeletal problems. The high level of spending on endocrine disorders in Germany is almost entirely attributable to dia-

betes, which is believed to be more prevalent in Germany, while expenditure on the digestive system is to a significant extent due to more comprehensive dental provision.

It should nevertheless be borne in mind that *table 2.26* shows only the cost of illnesses in sectors that are readily comparable. However, various other sectors also contribute to the total cost of care falling within the scope of SHA, including nursing and ambulant forms of care and physiotherapy. Costs associated with these other sectors were not readily comparable, partly because of discrepancies in the attribution of cost to illnesses and partly because of considerable differences between the countries with regard to what is included under the SHA's 'Nursing and rehabilitation' heading. A lot of the care provided by nursing homes in the Netherlands is accounted for under this heading, resulting in relatively high per capita costs (see *table 2.26*), especially given that the average age of the population is lower in the Netherlands than in Germany. And that is even without taking account of the cost of supportive residential care and home care, which fall outside the scope of the SHA (see *table 2.21*), but account for a lot of additional spending covered by the Health and Social Care Accounts and the Health Care Budget of the Ministry.

The survey described above illustrates that, within the different health care systems, certain fields can be defined for which readily comparable CoI data can be compiled using the System of Health Accounts. This represents an important step forward since PHSF 2002, and the expectation is that further developments in this field can contribute to understanding of the international differences in the performance and cost-effectiveness of health care systems. The advantage of the CoI approach is that the cost of care can be related to the crux of health care: the health status of the population and associated health care needs.

Table 2.26: Per capita cost of health care provision in five countries, broken down by diagnosis, in PPP-US dollars [a] and as percentages of the total; costs are based on the OECD's System of Health Accounts and include only comparable sectors [b] (Source: Heijink et al., 2006).

	Australia, 2000		Canada, 1998		Germany, 2002		France, 1998		Netherlands, 2003	
	US$	%	US$	%	US$	%	US$	%	US$	%
Infectious diseases	39	2.6	25	1.6	36	2.0	40	2.4	51	3.0
Neoplasms	97	6.3	67	4.5	132	7.1	102	6.2	103	6.0
Endocrine diseases	82	5.3	44	2.9	120	6.4	53	3.2	50	2.9
Blood disease	0	0.0	6	0.4	11	0.6	7	0.4	11	0.6
Mental disorders	95	6.1	132	8.7	153	8.2	186	11.2	225	13.1
Nervous system	70	4.5	79	5.2	121	6.4	88	5.3	101	5.9
Circulatory system	175	11.3	191	12.6	297	15.9	205	12.4	210	12.2
Respiratory system	118	7.7	97	6.4	114	6.1	114	6.9	96	5.6
Digestive system	227	14.7	276	18.2	305	16.3	215	13.0	240	13.9
Genitourinary	76	4.9	73	4.8	89	4.7	94	5.7	69	4.0
Pregnancy / childbirth	50	3.2	37	2.4	38	2.0	58	3.5	57	3.3
Skin disease	40	2.6	42	2.7	37	2.0	25	1.5	41	2.4
Musculoskeletal	124	8.0	74	4.9	202	10.8	98	5.9	131	7.6
Congenital anomalies	7	0.4	5	0.3	10	0.5	8	0.5	11	0.7
Perinatal diseases	13	0.9	9	0.6	9	0.5	12	0.7	19	1.1
Symptoms, ill-defined	191	12.4	50	3.3	67	3.6	60	3.6	186	10.8
Injury, poisoning	138	9.0	91	6.0	84	4.5	97	5.9	70	4.1
Not allocated	0	0.0	54	3.6	0	0.0	141	8.5	47	2.7
Not known	0	0.0	163	10.8	45	2.4	52	3.1	0	0.0
Four-sector total	1,543	100.0	1,512	100,0	1,871	100,0	1,655	100,0	1,719	100,0
Total for all SHA sectors	2,406		2,291		2,915		2,234		3,022	

[a] PPPs: Purchasing Power Parities, which correct for international differences in purchasing power.

3 CROSS CUTTING THEMES

The importance and significance of health and health care for the individual and for the community can be viewed and interpreted in various ways. In the previous chapter, the now well-established PHSF model (see *subsection 1.3* and the *introduction to chapter 2*) was used as a basis for examination of the facts, statistics, analyses and associations pertaining to Dutch public health. In this chapter, health, health care, preventive action and health policy in the Netherlands are considered from other angles and perspectives.

The previous chapter focused mainly on public health in the Netherlands as a whole. However, considerable health diversity exists within the Netherlands. This chapter therefore begins by describing this diversity in more detail and analysing its nature. First, the temporal dimension of diversity is considered, by looking at health in relation to phase of life (*subsection 3.1*). Illness, health and care consumption differ considerably according to phase of life, and patterns of life are increasingly diverse. We then move on to look at health deprivation (*subsection 3.2*). Health deprivation is evident in various vulnerable groups, such as people of lower socio-economic status and ethnic minorities; this is the social dimension of diversity in health. Because vulnerable groups are not evenly distributed across regions and neighbourhoods, socio-economic and ethnic health differences create geographical differences: the spatial dimension of diversity.

In connection with the (new) epidemic-related risk to and vulnerability of the Netherlands, an update of the situation with regard to infectious disease in the Netherlands is presented in *subsection 3.3*. The amount of attention given to this topic may seem disproportionate, in view of the modest contribution that infectious disease presently makes to morbidity and mortality in the Netherlands. However, the level of public disquiet seen whenever there is even a threat of an outbreak (as with SARS or avian influenza) suggests that the significance of infectious disease cannot be judged solely in terms of the quantitative effects on public health, as defined in the context of the PHSF model. The potentially catastrophic implications of a pandemic, and the disruptive effect of loss of confidence in everyday social institutions, such as the postal service (because of, for example, anthrax letters), indicate that other perceptions of illness and the risk of illness – associated with factors such as controllability, consent and fairness – have a major influence on the way that infectious disease is viewed by society.

Public health and preventive action are placed in a European context in *subsection 3.4*. What happens in the Netherlands is increasingly closely linked to what is happening on the international stage, particularly within Europe; this is certainly the case where public health, preventive action, health care and health policy are concerned. First, the public health situation in the Netherlands is compared with that which prevails elsewhere in the European Union (we assess how well the Netherlands is doing) in order to add further detail to the geographical dimension of health diversity. We then

consider what the Netherlands can learn from the public health policies pursued in other countries that face many of the same health problems and policy challenges. Finally, consideration is given to the often-underestimated influence of Europe on public health in the Netherlands.

Subsection 3.5 looks into the future. One the main drivers of future developments in health and care will be the demographic makeup of the population. In 2010, the first of the 'baby boomers' will reach the age of sixty-five, and the wave of people entering old age will continue to get higher until about 2040. Because illness is concentrated within the elderly population, increasing average age will mean higher levels of disease burden and care consumption. Alongside such demographic determinants, other factors, which can more readily be influenced by policy, will influence the nation's health. In order to shed light on the effect of these factors, two strongly contrasting scenarios for the future are briefly explored and used as a basis for the examination of certain dilemmas and political and policy tradeoffs.

This chapter concludes with a look at the economics of health care (*subsection 3.6*). Many people are inclined to think of care as a cost item. However, care is in fact a component of prosperity. Not only has increasing prosperity led to better health, but also improved health has contributed to growing prosperity. This subsection compares the costs and benefits of care and seeks to quantify the 'yield' of health care.

3.1 Health in relation to life pattern

Different phases of life are associated with different health problems

Child mortality is associated mainly with perinatal complications, congenital abnormalities and accidents. The young and young adults are vulnerable mainly to suicide and road traffic accidents. Among middle-aged and older people, the biggest causes of death are cardiovascular disease, cancer and COPD. Taking both mortality and quality-of-life impairment into account, mental disorders are particularly significant. Such disorders form the biggest burden on health among the young and young adults. In comparison with other EU member states, perinatal mortality is high in the Netherlands; mortality among the young and middle-aged is low, while among the elderly it is again high. Furthermore, life expectancy is barely increasing among the over-eighties in the Netherlands, in contrast to the situation in neighbouring countries.

Life pattern-related preventive action

The age-related distribution of illness does not accurately reflect the age-related distribution of health determinants. Most risk factors lead to manifest ill health only after the passage of considerable time. A life pattern-related prevention policy addresses the various determinants that influence the occurrence of illnesses over a person's lifetime, taking account of the timing of the various risks. Preventive intervention begins before birth, with antenatal care. During childhood, prevention is provided primarily through the youth health care system and takes the form of vaccination and screening. Although young people have relatively few health problems, childhood is the key life phase in terms of fostering healthy habits. Among young adults, the greatest health benefit can be obtained by preventing mental disorders. Screening for breast and cervical cancer is of particular significance in relation to the health of middle-aged and elderly people. Other important forms of preventive intervention include guarding against the over-burdening of lay carers and promoting the health of the elderly through special clinics.

Life pattern-related variations in care usage and care costs

The age-related distribution of illness gives rise to age-related variations in care usage and care costs. Curative care accounts for the greater part of the cost of caring for young and middle-aged people, while nursing and supportive care are increasingly significant in relation to older people. A portion of overall care expenditure is devoted to prevention during all life phases, but in comparison with curative care and nursing and supportive care the sums involved are small. Care tends to be particularly costly in the last year of life, but the sums involved depend on age at death. The older a person is when he or she dies, the lower the cost of care normally is in the last year of life. This has implications for care cost forecasting. Population ageing implies a higher average age at death and therefore a lower average cost of final-year care, thus offsetting the growth in the overall cost of caring for a person throughout his/her lifetime.

3.1.1 Why consider health in relation to life pattern?

In *chapter 2*, health and the determinants of health were considered in relation to the population as a whole; in this subsection, the same matters are examined in terms of their distribution across the various age groups. This is important because, for example, the illnesses and causes of death that are most significant for one age group can be very different from those that affect another. Information about the disorders that cause the most health impairment in the various phases of life provides a basis for determining where the greatest potential lies for improving health. In this context, a picture of the age-related distribution of health determinants is also valuable.

In order to improve health, it is necessary to understand how determinants and illness are interrelated. A proper understanding of these interrelationships cannot be obtained without considering health from various perspectives. For example, many researchers study risk factors among adults and the development of illness among adults. There has been a great deal of (highly successful) work done, for instance, to identify the factors associated with cardiovascular disease, such as cholesterol levels and blood pressure. However, if one views illness in relation to life pattern, the occurrence of illness can be seen to result from a variety of biological, lifestyle-related and environmental factors at work during the course of a person's life. One important consideration in this regard is the way that the timing of risks influences the occurrence of illness. The significance of timing is closely related to the fact that most chronic diseases do not develop until well after exposure to the associated risk factors.

Not only is it instructive to consider the aetiology of illnesses in relation to life pattern, but also it is important to recognize that people are more receptive to health information at certain times in their life. Parents, for example, are open to information concerning the wellbeing of small children, and people confronted by the first health problems of old age are also often willing to modify their lifestyles. In this context, it is not only certain life phases, but also the transitions from one phase of life to the next, which are of particular significance. If, for example, a person does not take up smoking in the 'experimentation' phases of childhood and youth, there is a good chance that he or she never will.

One important aspect of a life pattern-based approach to health is the influence that (early) childhood has on health in adulthood. However, while a person's vulnerability and susceptibility to illness are to a large extent determined during his or her youth, it is not the case that once adulthood is reached nothing can be done to influence health. Preventive intervention remains possible in adulthood and even old age. In this report, therefore, prevention is viewed as relevant throughout life, from birth to extreme old age, and we seek to provide some preliminary answers to the question of which preventive strategies are most beneficial at which age.

The age-related distribution of illness determines the way levels of health care consumption vary over the course of life. Age-related levels of, for example, preventive

intervention, curative care and nursing and supportive care provision can all be traced back to the health problems associated with the different phases of life. Using data from the study The Cost of Illnesses in the Netherlands 2003, a life pattern-based perspective on health has been developed. This subsection also considers the cost of care over the course of a person's life and the extent to which whole-life care costs go up as life expectancy increases.

Life phases and life pattern

On the following pages, health, health determinants, preventive intervention and care over the course of life are described by reference to various life phases. To this end, life has been divided into phases primarily on the basis of the individual's roles and activities. Although the pattern of life is increasingly individualized, with more and more people combining or switching between work, care, education and leisure, common denominators can still be identified in the life patterns of most people in the Netherlands. The most striking difference between the modern pattern of life and that typical in the past is that two phases have been added to the traditional sequence of youth, adulthood, old age: one between childhood and adulthood, during which people assume relatively few responsibilities, and one between middle age and old age, in which people have fewer obligations than in established adulthood, but remain active participants in society (see *box text 3.1*). For the purposes of our analyses, life is divided into six phases (see bottom line in *figure 3.1*), with transitions at slightly different ages and with the established adulthood phase subdivided. This subdivision reflects the fact that, at about forty-five or fifty, the likelihood of ill health begins to rise.

So the average person's life pattern has changed significantly in the last fifty years. Shifts are also apparent in the field of health: people live longer and remain in good health longer (see *subsection 2.1*). This is part of the explanation for the emergence of the fourth life phase, i.e. active old age. The fact that the length of the average person's working life has not increased as life expectancy has risen therefore has little to do with health, but reflects economic opportunity and individual preference. Indeed, far from rising, the age at which people stop working has actually decreased (Henkens & Liefbroer, 1997).

We have been obliged to base the analyses presented in this subsection on age-related cross-sectional data and not on cohort or longitudinal data (see *box text 3.2*). Such cross-sectional data are used to describe the 'average' pattern of life. Needless to say, the lives of individuals can follow very different patterns of illness and care consumption. Furthermore, age group averages do not always provide a good picture, because illness and care consumption are concentrated in a relatively small portion of the population. So the averages hide considerable variations in the patterns of disease, care consumption and cost.

Structure of this subsection

Subsection 3.1.2 considers the likelihood of mortality and morbidity in the various phases of life, while *subsection 3.1.3* describes the age-related distribution of a number

Box text 3.1: Definition in life phases.

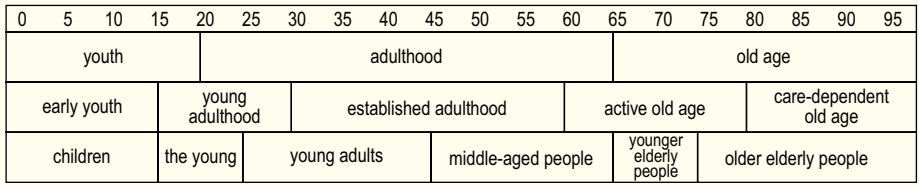

Figure 3.1: Three life phase definition systems: the traditional system, the modern five-phase system and the PHSF system.

Fifty years ago, the lives of most Dutch people followed a fairly fixed pattern. First came learning, then work (for men) or caring (for women), and finally retirement and old age (see *figure 3.1*, top line). Nowadays, there is much more differentiation and diversity in the pattern of life. People have much more choice as to how they divide their time between learning, working and caring. It is increasingly common, for example, for people to combine working with caring for children and/or with continued education. Broadly speaking, modern life may be divided into five phases, rather than three (see *figure 3.1*, middle line).

After the early youth comes a period when people typically have little responsibility. In this phase, which tends to go on until people reach the age of about thirty, few young adults commit themselves to work or long-term relationships. Then comes a phase, roughly spanning the ages thirty to sixty, when most people's lives are dominated by family and children. This third phase is extremely busy, with many people combining work, learning and caring. The fourth phase of modern life, starting around sixty and continuing to about eighty, is active old age. Elderly people in this phase of life are typically no longer working, but remain actively involved in society in other ways. In the fifth phase, people gradually cease to be socially active and become dependent on the care of others.

In terms of health, however, life is best seen as divided on a slightly different basis, partly reflecting the particular health problems associated with the various phases. The main difference between this health-oriented system and the five-phase system is that the Established Adulthood phase is subdivided. Up to the age of forty-five relatively few people have health problems. Thereafter, however, the risk of ill health increases (see *figure 3.2*, bottom line).

It should be noted, however, that the division into life phases is not valid for everyone in society. The extent to which the young and young adults assume responsibility, for example, depends on the age at which they have children. Also, the point at which a person enters care-dependent old age is closely linked to their physical and mental wellbeing. Some people will not go through this phase at all, while others will become dependent on the care of others at a relatively young age. In addition to such individual differences, there are considerable differences in the averages for different social strata and different ethnic groups. Women of lower socio-economic status and those from ethnic minority background generally have children much earlier in life. For such women, the third life phase (younger adulthood) will therefore be a lot shorter than indicated in the diagram.

Source: RMO, 2002a; SZW, 2002a; SZW, 2002b

of determinants. In *subsection 3.1.4*, the life phases and phase-related opportunities for preventive intervention are examined in more detail. Finally, care consumption and care costs are dealt with in *subsection 3.1.5*.

Box text 3.2: Age, period or cohort.

Rather than present cross-sectional data, in the present context we would have preferred to work with longitudinal or birth cohort data, since this is the best way to shed light on health in relation to life pattern. Cross-sectional differences may be caused by differences in age (for example, a fifty-five-year-old being healthier than a sixty-five-year-old), or by differences in birth cohort (for example, someone born in 1950 being healthier than someone born in 1940). Longitudinal differences, by contrast, may be caused by age differences or temporal differences (for example, people being healthier in 2005 than people were in 1950, regardless of age). To properly examine differences between age groups, one should ideally combine cross-sectional, cohort and longitudinal analyses.

Turning to survival, data are available showing, for example, that the survival rates increase in successive birth generations. Thus, the likelihood of a man reaching the age of 85.5 years has almost tripled in the space of less than a hundred years. Among the generation born in 1851 to 1855, only 5% reached this age, whereas for the generation born in 1911 to 1915, the figure was 14%. Where women are concerned, the increase has been even more dramatic: from approximately 10 to 45%. When the present generation of elderly people were born (between 1921 and 1925), average life expectancy at birth was sixty-one years for men and sixty-two for women. These statistics also make it clear that the next generation of elderly people is not necessarily going to be the same as the present generation.

However, very little longitudinal or cohort data are available regarding illness or the determinants of health. We have therefore been obliged to use age-related cross-sectional data for the purpose of the analyses presented in this subsection. Such data may serve as a 'proxy' for illness during the course of a person's life.

3.1.2 Mortality and morbidity

Life expectancy and healthy life expectancy

In 2003, average life expectancy in the Netherlands was seventy-six years for men and eighty-one years for women (see also *subsection 2.1*). Overall total life expectancy can be divided into years spent in good health and those spent in ill health. Ill health is liable to occur at any point in a person's life (see *figure 3.2*); it is not the case that the average person becomes unhealthy at a particular age and remains so for the rest of his/her life. Overall life expectancy is higher among women than among men, but healthy life expectancy is about the same. *Figure 3.2* also shows that the risk of mortality is low for the young, and high for the elderly. More than half of men and nearly three quarters of women are seventy-five or older at death. This has not always been the case: in the mid-nineteen century, the risk of mortality was particularly high in the early years of life (see *box text 3.3*).

The young succumb to suicide and accidents, elderly to cardiovascular disease and cancer

Differences exist between the various age groups, not only in terms of the likelihood of death, but also in terms of the causes of death. The small proportion of children who nowadays do not live to the age of five typically die as a result of perinatal complications (sometimes associated with prematurity), congenital abnormalities and accidents. Among the young and younger adults, mortality is also very low. The main causes of death in this group are suicide and road traffic accidents. Most of the middle-aged people (forty-five to sixty-four-year-olds) who die are victims of cancer (particularly lung, breast and colorectal cancer) or coronary heart disease. The same causes

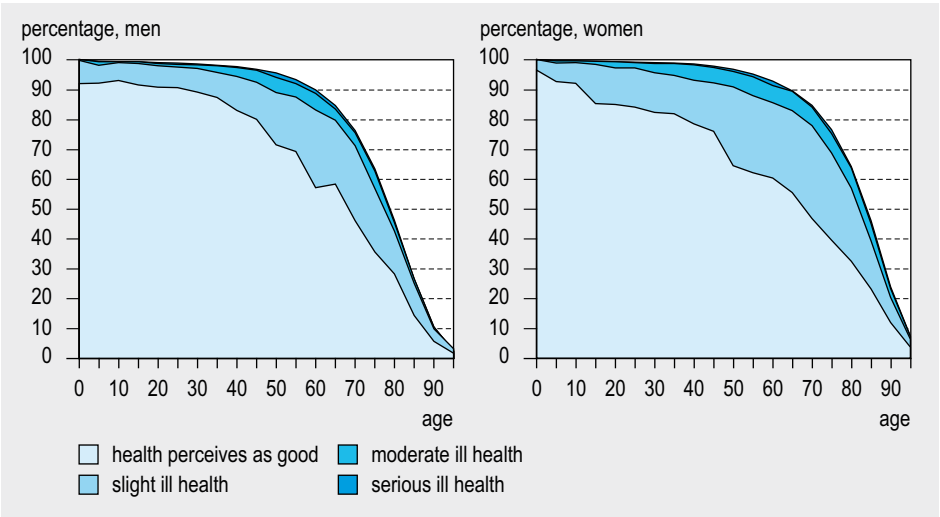

Figure 3.2: Life expectancy and perception-based healthy life expectancy for men and women. The area enclosed by the curve represents total life expectancy; this is divided into time spent in good health and time spent in ill health, and the latter subdivided into periods of slight, moderate and serious ill health.

of death predominate where the elderly are concerned, but there is a shift away from cancer towards cardiovascular disease, and COPD plays a more significant role. Among very old people, dementia and pneumonia are also major causes of death.

Mortality in the young lower in the Netherlands than other EU member states

In the Netherlands, mortality in the younger age groups is relatively low. *Figure 3.3* shows that, particularly where the fifteen to sixty-five age group is concerned, mortality in Dutch males is much lower than the average for the fifteen 'old' EU member states (in the figure, the average for the EU-15 equals 1.0; WHO-HFA, 2005). The Netherlands compares even more favourably with the average for all twenty-five EU member states. However, the statistics for women are a little less encouraging. In young women, mortality is relatively low, but in middle-aged Dutch women it is not. Mortality in the latter age group is nevertheless better than in Denmark or the UK. The Netherlands' very low mortality rates for young people (fifteen to twenty-nine-year-olds) is partly due to the nation's good record on accidents – one of the main causes of death in the young (see also *subsection 2.1*). Notably, Dutch child mortality – perinatal mortality in particular – is not below the EU average. Perinatal mortality rates are considered in their international context in *box text 3.4*.

Mortality in the elderly barely declining in the Netherlands

From *figure 3.3*, it is apparent not only that mortality in the young is relatively low in the Netherlands, but also that mortality in the elderly is relatively high. The residual life expectancy of eighty-year-old men has barely increased in the Netherlands over the last twenty years, while considerable progress has been made in other EU-15 countries (see *figure 3.4*). The average eighty-year-old man in the Netherlands now has one of the

Box text 3.3: Mirror images.

Author: P. Bol

Let's start at the end. The end of man's life, here and now. In most cases Death comes to the Dutch after a long life. And since all endings are difficult, many troublesome years precede. But repeatedly doctors and hospitals succeed in fooling poor old Death. Until at a given time all resistance proves in vain. For after 70 or 80 years the curves for many serious diseases and causes of death increase sharply. This is the era of the competing illnesses and causes of death: heart- en vessel disease deny the several forms of cancer their toll, and at their turn pneumonia and Alzheimer's disease try their best. Scylla and Charybdis welcome their victims. This is also the era of the replacing illnesses and causes of death: if medical shrewdness convicts a certain cause of death, many others are greedy to take its place. It seems to be the struggle with the Hydra of Lerna. Nevertheless we succeeded in expanding the life expectancy to 75 years for men and even more than 80 years for women. And expansion is still feasible to 85 till 90 years. Much was due in this respect to the suppression of infant and children's mortality. At the start of this century one in ten new born died before the age of one and again one in ten of the survivors deceased before the age of five. And those 20% were still favourable compared to a century before, when it was double.

We end with the beginning. The beginning of life, as it looked in 1800 in this country and untill recently in the poorest developing countries (and still in a few, like Afghanistan, Congo and Madagascar). Dozens of diseases surround the child before and during its birth. Diarrheal diseases, diphtheria, whooping cough, meazles, tuberculosis, malaria, (traffic) accidents, avitaminoses, starvation, iron and calcium deficiency, it is an innumerable list. So, the images are mirror like. What happens here at the end of life, played there at its very beginning: competing and replacing illnesses and causes of death. But the course of events that elapsed here, a slow improvement in circumstances and reduction of risk factors, happens there now at express speed. The positive changes tumble over each other: vaccinations, water supply, waste transport, increased food supply, improved diet, policlinics, tuberculosis control, etc. For, just as it is here useless to improve only one factor in an elderly's life, a real take off was there only possible after many improvements started to coincide and reinforce each other. That causes an amusing phenomenon: all experts and development assistants claim the victory. The engineers are sure that things only started to improve after their arrival, the doctors are of the same opinion and the economists can prove that their influence was decisive. Yes, Success has many fathers and Failure is an orphan. Truth is, of course, that an upward spiral could begin beause many benificial factors were thrown together in an incubator. That's why India and China could halve their infant mortality in less than 25 years, an achievement that took us one century. Here, the several favourable factors appeared slowly on stage, one by one, and the large medical breakthroughs even came last.

shortest residual life expectancies in the EU. France now has the highest residual life expectancies for both men and women of eighty, and there is no sign of the trend toward greater residual life spans easing in France. Notably, residual life expectancy for Ireland's eighty-year-old men and women has been rising very rapidly. Dutch women of this age fare a little better than Dutch men, but are now merely average within the EU.

A thesis was recently published, in which Dutch mortality trends in the elderly were compared with those seen in other countries (Janssen, 2005). After many years of steady decline, mortality ceased to fall in the Netherlands from 1980, particularly in older men. This was partly a reflection of adverse trends in the rates of various smoking-related causes of death (cancer, cardiovascular disease, COPD), but was also associated with trends in mortality attributable to diseases of old age, such as dementia, pneumonia and influenza. Mortality rates have similarly ceased to fall among elderly Danish and Norwegian men, but not among their French or British counterparts. Marked differences were also found in the decline in mortality associated with cardiovascular dis-

Box text 3.4: Perinatal mortality in an international context.

Various international comparative studies have shown that perinatal mortality has been falling more slowly in the Netherlands than in other countries (Mackenbach, 2006c). Until the 1980s, Dutch rates of perinatal mortality were falling sharply. However, the speed of improvement then slowed, and no further progress of note has been made since the second half of the 1990s. In many other European countries, perinatal mortality rates continued to fall swiftly in the 1980s, and have not levelled off as they have here. As a result, the Netherlands now compares poorly with its peers.

A number of risk factors for perinatal mortality can be identified, which are, or in recent decades have become, much more pronounced in the Netherlands than in many other European countries (Achterberg & Kramers, 2001; Buitendijk & Nijhuis, 2004; Mackenbach, 2006c):

- The average age at which Dutch women have their first child is relatively high (see also *box text 3.5*).
- The multiple birth rate in the Netherlands is relatively high, to a significant extent as a result of infertility treatment (IVF).
- A relatively high percentage of mothers in the Netherlands come from ethnic minority backgrounds.
- A relatively high percentage of Dutch women smoke during pregnancy.

In addition, differences in the care provided to women during pregnancy and childbirth, and to neonates, may play a role. In the Netherlands, there is less antenatal screening for various congenital abnormalities. Resulting differences in terms of the termination of abnormal pregnancies may influence perinatal mortality figures. Furthermore, when it comes to judging whether it is appropriate to attempt to keep very premature babies alive, Dutch neonatologists are apparently less inclined toward intervention than their counterparts elsewhere (Achterberg & Kramers, 2001; Buitendijk & Nijhuis, 2004; Mackenbach, 2006c).

The care provided in perinatal mortality cases in various European countries has been studied, and the frequency of 'avoidable' deaths compared. The rate of possibly or probably 'avoidable' perinatal mortality in the Netherlands was found to be roughly the same as in most of the other countries studied, but higher than in Sweden or Finland (Vredevoogd et al., 2001). The main substandard factors in the Netherlands were the prevalence of smoking during pregnancy and the frequency with which serious growth retardation was overlooked.

ease, indicating that risk factors other than smoking play a significant role, including physical exercise, blood pressure, eating habits and access to medical care. It is unlikely that the stagnation of Dutch mortality rates for the elderly is a result of mortality selection (a process by which high mortality among younger people has a selective effect, so that only the most robust survive into old age and average life expectancy among the elderly is high). However, exposure earlier in the life may be a factor (Janssen et al., 2005); in this regard, adverse socio-economic circumstances in childhood or even in middle age appear to be influential. It has also been suggested that the approach taken by medical personnel caring for people at the end of their lives may be a factor, but Janssen's research suggests that any influence is small. Nevertheless, the possibility cannot be excluded that international differences in the organization, intensity and quality of the medical treatment and care provided to the elderly may contribute to differences in survival. Furthermore, it appears that mortality among the elderly at a given point in time may be influenced by the socio-economic climate of the day. The situation in Ireland, where the life expectancy of elderly has been rising relatively quickly while the economy has been doing well, would tend to support this theory.

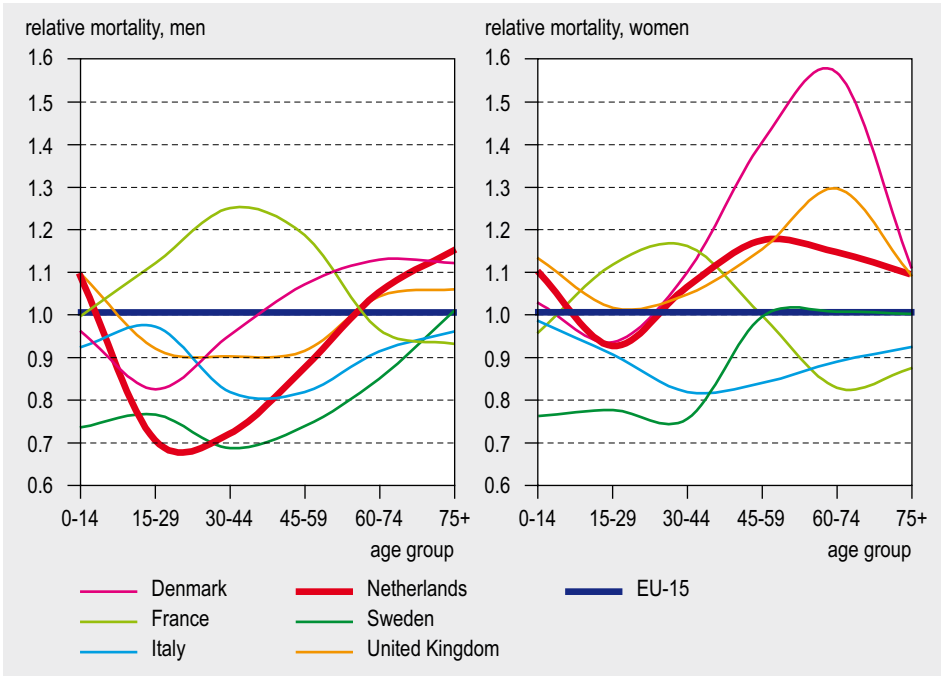

Figure 3.3: Relative mortality according to age among men and women in the EU-15 (Source: WHO-HFA, 2005).

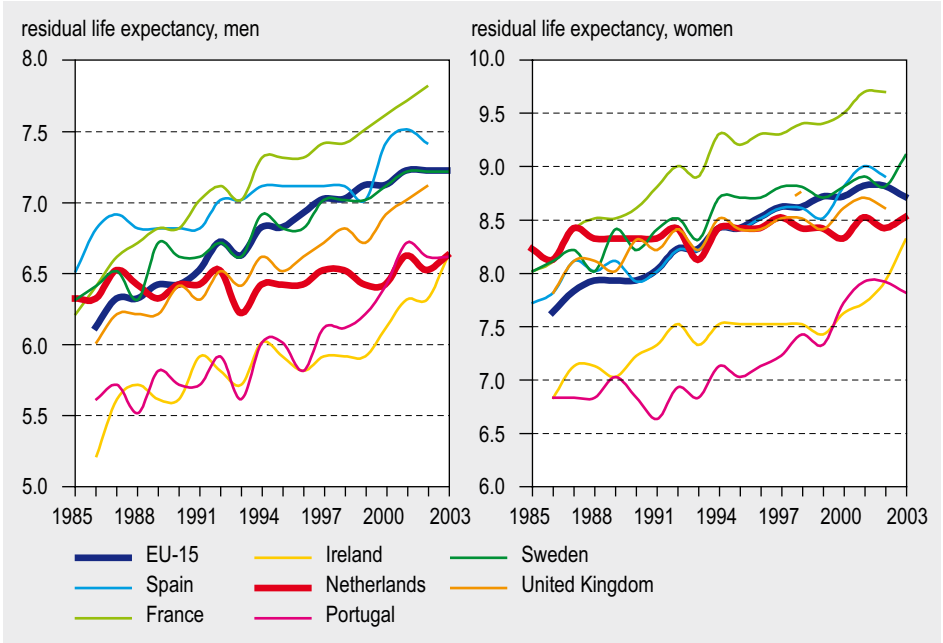

Figure 3.4: Trends in the residual life expectancy of eighty-year-old men and women in the EU-15 (Source: Eurostat, 2006).

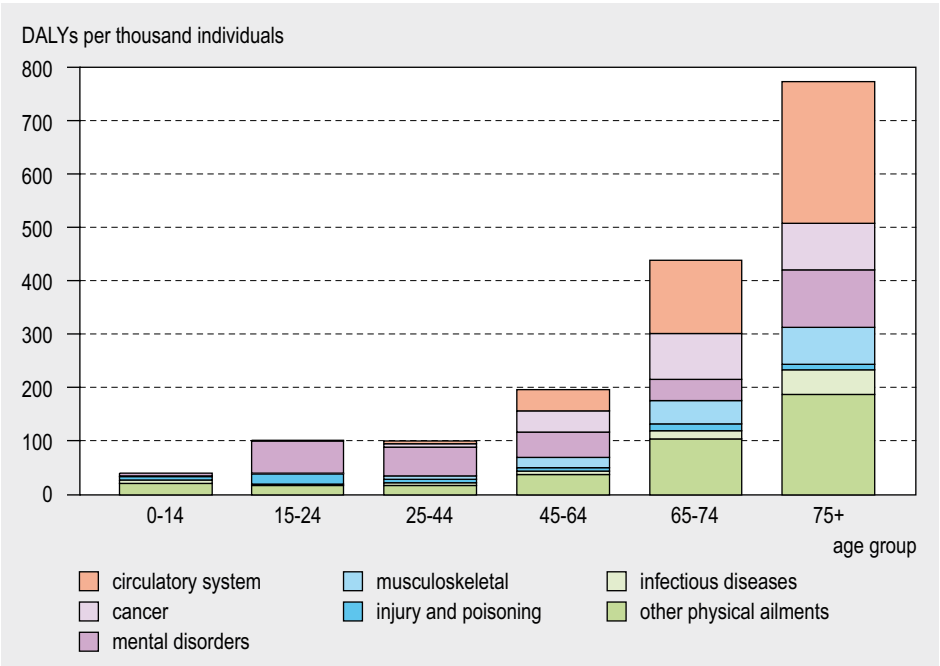

Figure 3.5: Disease burden (DALYs per one thousand individuals) by age and condition (other physical ailments include diabetes, asthma and COPD, visual and auditory impairment)..

There is no reason to believe that life expectancy in the Netherlands cannot be increased from its present level. The differences in mortality trends within Europe are indicative of considerable heterogeneity in circumstances and risk factors, leading to different influences on health and possibly justifying different approaches to prevention and care.

Each phase of life is associated with a particular set of health problems

Just as the risk of mortality increases with age, so does the risk of illness (see *figure 3.5*). The total disease burden among the over-seventy-fives is nearly twenty times as high as that among children. In addition, each phase of life is associated with a particular set of health problems (see *table 3.1*). Among children, the disease burden is attributable mainly to abnormalities developed before or during birth, to accidents and to asthma and other respiratory problems. As people move into youth and early adulthood, accidents continue to be a relatively common cause of ill health, and mental disorders become problematic as well. From the age of about forty-five or fifty, the so-called diseases of old age, such as cardiac disease, stroke, COPD, lung cancer, diabetes and arthritis become prevalent. Once people enter old age, dementia and visual and auditory impairment play a role as well (update of Hoeymans et al., 2002).

The disease burden data presented here relate to the 'PHSF list' of more than fifty disorders identified as the main contributors to overall disease burden. Because the overall

Table 3.1: The five disorders that account for the greatest disease burden [a] in each of six age groups.

	0-14	15-24	25-44	45-64	65-74	75+
1	congenital anomalies	alcohol dependency	anxiety disorders	coronary heart disease	coronary heart disease	coronary heart disease
2	mental disabilities	anxiety disorders	depression and dysthymia	anxiety disorders	stroke	stroke
3	non-occupational accidents	depression and dysthymia	alcohol dependency	lung cancer	COPD	dementia
4	lower respiratory tract infections	road traffic accidents	suicide	depression	lung cancer	COPD
5	asthma	mental disabilities	road traffic accidents	diabetes	diabetes	diabetes

[a] Disease burden is expressed in DALYs, i.e. the sum of years lost to premature mortality and years spent with reduced quality of life due to illness (see *subsection 2.1* for further explanation of disease burden).

burden is largely a product of the disorders that affect the elderly, this list may not be entirely valid for young people; it does not, for example, include any of the forms of cancer that tend to affect children.

3.1.3 Determinants

Although determinants influence ill health, their distribution across the various age groups does not exactly reflect the distribution of illness. There is usually a time lag between the presence of a determinant or risk factor and the development of the associated illness. The effects of lifestyles acquired or pursued during youth, for example, are typically seen only in later life. Most people realize the implications of unhealthy living only when they develop problems much later on. By then, while lifestyle changes can still be beneficial, the worst of the damage has already been done. This subsection describes the age-related distribution of a number of key determinants.

Smoking: starters are mostly young, stoppers are in all age groups

The highest smoking rates are in the twenty-five to fifty-four age group: roughly 35% of men and 30% of women in this group smoke. Among the elderly, smoking is a lot less common: only about 14% of over-sixty-fives are smokers (Willemsen, 2005). This is partly because smokers tend to die younger, but is also a consequence of people giving up the habit. As people get older, they are increasingly unlikely to start smoking, while in all age groups the percentage of people that stop smoking is higher than the percentage that start or restart (see *figure 3.6*). The most important reasons why adults stop smoking are: no longer wishing to damage their health (48% of stoppers), health problems (13%), loss of fitness (10%) and a partner's wish to stop (22%) (STIVORO, 2004a). Among the young, health considerations play a much less prominent role: they stop mainly because they don't enjoy it anymore (34%), and fully half of young people who stop also say that they were never 'real' smokers, and were simply trying it out.

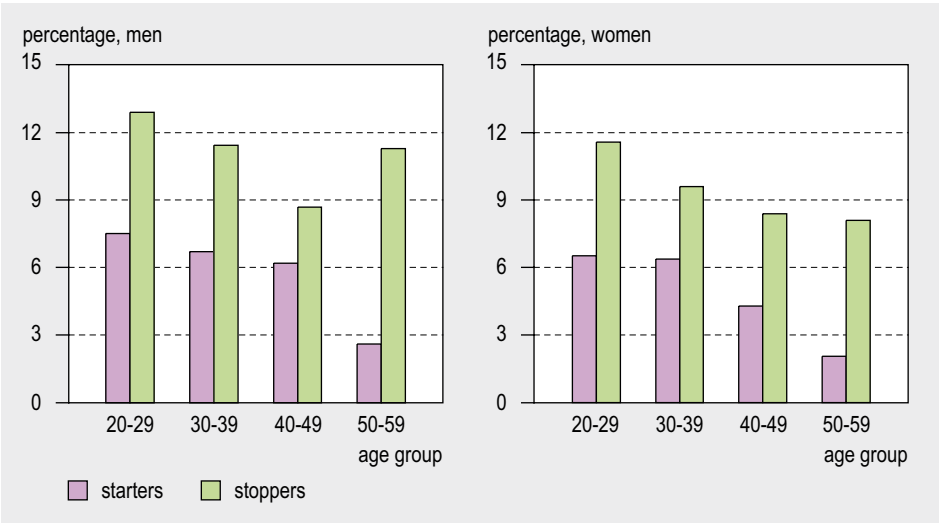

Figure 3.6: Percentages of people in various age groups who (re)started smoking during an eleven-year period and percentages who stopped (Source: Blokstra & Schuit, 2003).

Drug use confined mainly to the young; alcohol used by all age groups

The use of drugs is high mainly among the young and younger adults. Up to the young adult phase, drug use increases with age. Some 2% of twelve-year-olds admit to ever having used cannabis; by the age of sixteen, the figure has risen to more than 30%. The highest proportion of people saying they have tried cannabis is in twenty to twenty-four-year-olds, of whom more than 40% have used the drug. Of these, approximately a quarter (10% of the total) was current users (Van Laar, 2005). Levels of hard drug use are much lower, with the young and young adults again the main groups involved.

Unlike drug use, the use of alcohol varies much less from one age group to another. The proportion of the population using alcohol increases up to the age of twenty, and then remains reasonably stable. Among men, excessive alcohol consumption is most common between the ages of twenty and thirty and between the ages of fifty and sixty; among women, excessive use peaks slightly later in life, between the ages of fifty and seventy (see *figure 3.7*).

Unsafe road use most common among young men

Alcohol consumption is in itself hazardous to health; alcohol consumption in combination with road use is particularly dangerous. Driving under the influence of alcohol is most common among males aged thirty-five to forty-nine and least common among females under the age of twenty-five. In road safety terms, however, it is alcohol consumption among young men that is most dangerous. Men aged eighteen to twenty-four do cause approximately a quarter of all serious alcohol-related road traffic accidents, despite constituting less than 5% of the population. No reliable recent data are available regarding the alcohol consumption of road users other than car drivers (Mathijsen, 2001).

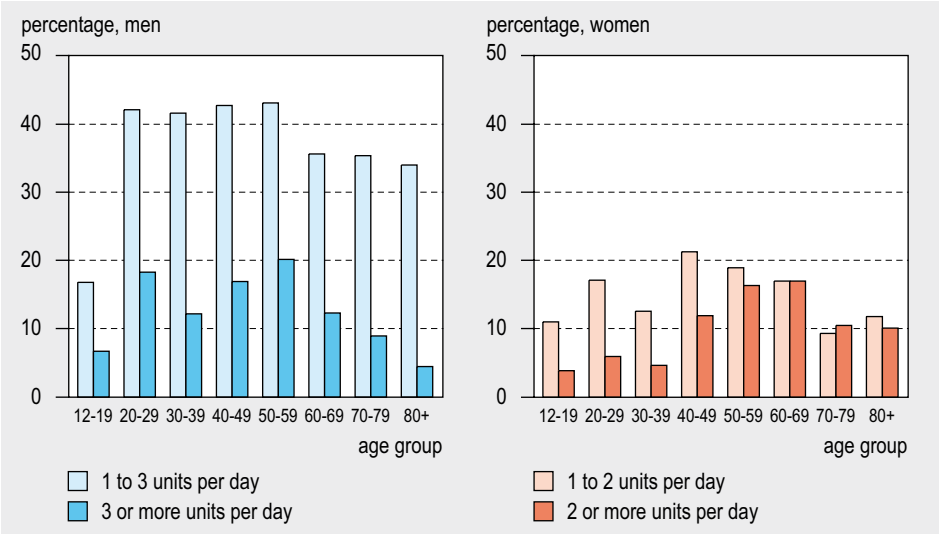

Figure 3.7: Moderate and excessive alcohol consumption by age and sex in 2003 (Source: POLS, gezondheid en arbeid).

Other unsafe forms of road-user behaviour, such as speeding and failing to use seat-belts or helmets, are also most common among young males. However, there are various safety issues that predominantly involve other age groups, such as the use of child seats, which mainly concerns the parents of young children, and driving under the influence of medication, which mainly concerns the elderly.

It is worth noting that, where road use is concerned, in contrast to the situation with, for example, smoking, the distribution of health consequences does mirror the distribution of propensity to unsafe behaviour. Thus, young men are not only the group most inclined to unsafe behaviour on the road, but also the group most likely to be involved in road traffic accidents. A quarter of all RTA victims are young (fifteen to twenty-four) and three quarters are male (Lanting et al., 2006).

Weight problems most common among the middle-aged

The percentage of people who are overweight or obese is greatest among the middle-aged (see *figure 3.8*). Nearly 70% of all men aged 55-64, and more than half of women in the same age group, are too heavy. About 15% of both men and women in this group are obese. Up to the age of fifty-five, the corresponding percentages rise consistently. In the group aged 20-24, approximately 15% are overweight and only a small proportion is obese. Among the over-sixty-fives, the percentages of both men and women with weight problems begin to decline, albeit less markedly where women are concerned. However, BMI data concerning elderly people (the over-seventies) have to be interpreted with care, because height and physical make-up change in old age.

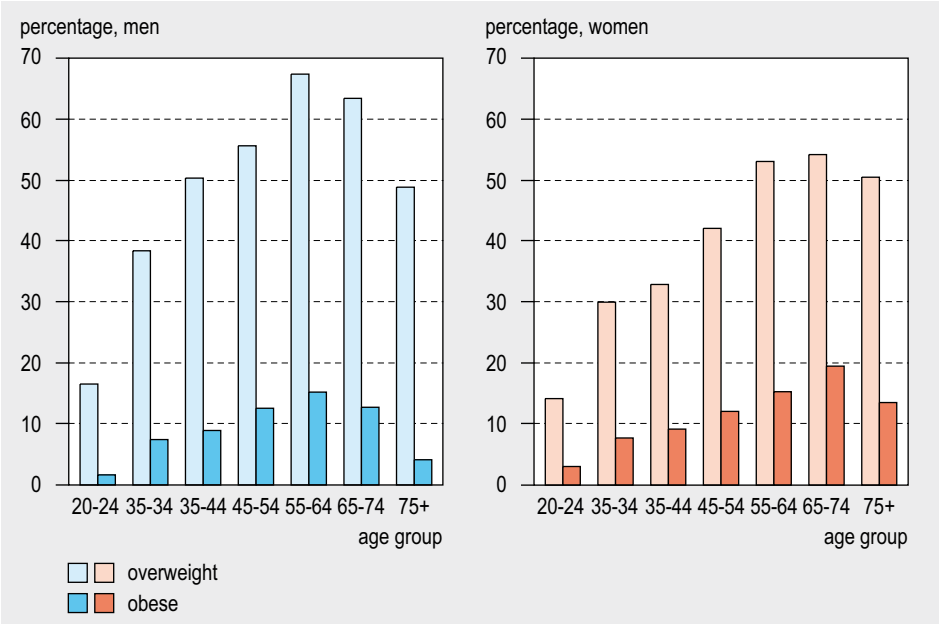

Figure 3.8: Percentages of men and women who are overweight or obese (Source: CBS StatLine, 2005).

Lifestyle and weight problems among young people

It is worth giving specific attention to health determinants in young people for two reasons. First, in youth one to a significant extent lays the basis for one's health in the rest of one's life. Lifestyle characteristics such as dietary and exercise patterns tend to develop early in life. Although people can change their behaviour, it often proves to be the case that habits acquired in youth are difficult to shake off. The second reason for looking specifically at young people is that the position with regard to health determinants in this group gives particular cause for concern, and the trends are by no means all favourable (see *table 3.2*). For example: smoking rates are falling in the Dutch population as a whole, but barely changing among young people. Furthermore, alcohol consumption continues to rise among the young in the Netherlands, so that the Dutch are now among the heaviest young drinkers in Europe (see also *box text 2.8*: Alcohol consumption is rising among the young, particularly girls). In addition, less than one young person in ten eats sufficient vegetables, and the percentage is falling. Weight problems are increasingly common in children: 14% of boys and 17% of girls aged four to fifteen are overweight, and about 3% are obese (Van den Hurk et al., 2006). Not all the trends are negative, however. Drug use and unsafe sexual practices are declining among the young, while physical activity is increasing (although the majority of children still get insufficient exercise).

Table 3.2: Lifestyle factors and overweight in the Netherlands: the present situation and trends among the young.

Lifestyle factor	Definition	Year	Boys (%)	Girls (%)	Trend
Smoking (10-19-year-olds)	Smoked in the last four weeks	2004	25	22	Stable, 2002-2004: slight decrease
10-14-year-olds			13	8	Stable, 2002-2004: slight decrease
15-19-year-olds			45	36	Stable, 2002-2004: slight decrease
Alcohol consumption (12-19-year-olds)	Consumption in the last month	2003	58	58	Adverse: rising
Soft drug use (12-19-year-olds)	Recent use (in last four weeks)	2003	10	7	Favourable: declining (1996, 1999 and 2003), particularly among boys
Hard drug use (12-19-year-olds)	Recent use (in last four weeks) of cocaine, Ecstasy, amphetamines or heroine	2003	0.8-1.5	0.3-0.8	Stable or declining slightly (1996, 1999 and 2003), depending on the drug
Physical inactivity (12-18-year-olds)	< five days/week at least one hour moderately strenuous exercise	2005	67	78	Favourable: declining among boys and stable among girls (2001-2005)
Insufficient vegetable intake (12-19-year-olds)	< 200 gram/day	1998	91	95	Adverse, slight rise (1987, 1992 and 1998)
Insufficient fruit intake (12-19-year-olds)	< 200 gram/day	1998	70	60	Stable (1987, 1992 and 1998)
Excessive saturated fat intake (12-19-year-olds)	> 10% of energy intake	1998	93	95	Favourable, slight decrease (1987, 1992 and 1998)
Overweight	BMI >=25kg/m^2	2002-2004	13.5	16.7	Adverse: increasing
Obesity	BMI >=30kg/m^2	2002-2004	2.9	3.3	Adverse: increasing
Sexual behaviour (12-25-year-olds)	Failure to always use a condom with casual partners	2004	38	47	
	Using a condom when having sex for the first time				Favourable, increase (2004 compared with 1995)

3.1.4 Preventive intervention

In this subsection we take a closer look at the various phases of life and the forms of preventive intervention associated with each. We also relate the information presented to the phase-specific pictures of health and health determinants sketched above. As indicated in the introduction, the consideration of health in the context of life pattern provides an alternative framework for preventive action, with the emphasis on the timing of the risks and opportunities that arise during the course of life. If one has a

clear picture of the determinants that can impact negatively on health in the various life phases, one is in a position to develop a highly effective preventive strategy. That, however, goes beyond the subject matter of this subsection, which is concerned only with identification of the key prevention issues associated with each life phase, i.e. with establishing a starting point for the development of a life pattern-based prevention policy.

The timing of risks

The timing of risks is significant in relation to the development of illnesses in two respects. First, certain risk factors (and protective factors) influence health only if effective in a particular period of life, known as the 'critical period'. So, for example, an unborn child may be harmed by exposure to certain infections or medications while in the womb, but if exposure does not occur in that critical period, the risk passes. Where some factors are concerned, there is not so much a critical period for exposure, as a sensitive period: a phase in which the effect of the determinant is more marked than during the rest of a person's life. The second respect in which risk timing is significant to the development of illnesses, is insofar as it leads to the accumulation of risk. In this context, it may be either the total level of exposure that is important (as in a dose-response relationship) or the sequence of exposure. Other examples include the clustering of risks, as often seen in children from deprived socio-economic backgrounds, who are more likely have a low birth weight, more likely have a poor diet and more likely to be passively exposed to tobacco smoke. Risk accumulation can also be associated with risk chains, in which exposure to one risk increases the likelihood of exposure to another. Weight problems in childhood, for example, are liable to have a negative influence on exercise habits (Lynch & Davey Smith, 2005; Kuh et al., 2003; Hallqvist et al., 2004).

Example: diabetes risk in relation to life pattern

The ideal approach is to draw up a life pattern profile for each illness, showing how exposure is distributed across the various phases of life and when illness risk arises or accumulates. Taking diabetes mellitus as an example, the profile would encompass unusually low or high birth weight, the speed of growth in the first years of life, weight problems and dietary patterns during youth, and weight problems, lack of physical exercise and the development of reduced glucose tolerance in adulthood (see also the passage on the application of clinical logic to diabetes in *subsection 2.4*). A life pattern-based approach would also address the fact that adults pass on the risk of diabetes to their children, both genetically and, for example, through diet during pregnancy (Lynch & Davey Smith, 2005).

Prevention begins before birth

As will be clear from the example of diabetes, the prevention of illness needs to begin before birth. Pregnancy-related factors and birth weight influence the risk of illness in later life. This is most obvious where congenital abnormalities are concerned. The Netherlands has an effective midwifery system, which enables most such health problems to be detected in good time. In addition, pregnant women and many women

hoping to become pregnant are given information about diet, smoking, alcohol consumption and the importance of folic acid supplementation. This has various benefits: congenital abnormalities of the central nervous system are less common now that a large portion (roughly 65% in the period 1998 to 2000) of expectant mothers take folic acid supplements (De Walle, 2001). Another important factor influencing the health of a child is the age of its mother at birth. As outlined at the start of this chapter, in modern society 'youth' has effectively been extended, as people tend to go on leading a relatively responsibility-free existence up to the age of about thirty. As a result, most women do not start families until they are in the thirties. The average first-time mother in the Netherlands is older than her counterparts in almost all European countries. The background to this situation and its implications for both mother and child are considered in *box text 3.5*.

Box text 3.5: Having a family in the Netherlands today.

Dutch women are postponing motherhood longer
Women are having children increasingly late in life. Since 1970, the age of the average first-time mother has risen from twenty-four to twenty-nine. This trend is associated with the increased tendency for women to remain in education longer, the growing importance of labour market participation for women and declining interest in parenthood. Other factors are also at work, however. In various neighbouring countries, where women are just as well educated, the age of the average first-time mother is lower (Palomba & Kotowska, 2003). Dutch women postpone motherhood so long partly because of the childcare situation. The easier it is to combine parenthood with work, the earlier in life women are inclined to have children. The affordability and quality of childcare are therefore key factors, but by no means the only factors. The belief that it is better for a child to be looked after at home, rather than in a nursery or similar establishment, is stronger in the Netherlands than in many other European countries (Cloïn & Boelens, 2004).

Implication for women: unintended childlessness
Because conception becomes increasingly difficult for a woman after the age of thirty-five, some of the women that postpone trying for a family find that they require medical assistance. However, fertility treatment is mentally and physically stressful and entails certain risks. Furthermore, quite a high proportion of such women remain childless. More-educated women are especially affected: approximately 30% of them never become mothers, and it is estimated that only half of those concerned remain childless by choice. Another consequence of late motherhood is an increase of the care burden on many women. An increasing number belong to the so-called 'sandwich generation', caring simultaneously for their children and their parents (as well as working in many cases).

Implication for children: more complications during pregnancy and at birth
Older women are more likely to have multiple pregnancies, to give birth prematurely, and to develop complications during pregnancy. Partly as a result, older mothers are more likely to have low-birth-weight babies. As a result of these interlinked factors, perinatal mortality is higher among the children of older mothers. Indeed it is approximately twice as high in the children of women who are over forty when they give birth as in the children of women aged about thirty (Garssen & Van der Meulen, 2004). Furthermore, the risk of Down's syndrome is closely linked to maternal age, although two in every three affected children are born to younger mothers (Health Council of the Netherlands, 2001). The latter statistic is a reflection of two facts: there are still a lot more young mothers than old mothers, and antenatal screening is made available to older expectant mothers.

Implication for society: increased costs and a shift in population age profile
The postponement of motherhood results in increased medical expenditure, as more women require infertility treatment and complications become more likely. In addition, lower birth rates lead to a shift in the age profile of the population. Furthermore, this shift comes at a time when the population is ageing anyway, making children increasingly important.

Source: Hooghiemstra & Distelbrink, 2005

Children: vaccination and screening in youth health care

Preventive intervention during childhood is performed largely in the context of the Youth Health Care (YHC) system. YHC is a vehicle for monitoring, promoting and protecting the physical, cognitive, social and mental health and development of all children and young people. The Netherlands' health centres and MHSs see more or less all children under the age of nineteen. The YHC system has been in existence for more than a hundred years and has made numerous forms of intervention possible, varying from vaccination to testing for linguistic deficiencies (see *box text 3.6*). This has had various benefits: infectious diseases were, for example, once the most serious threat to the health of children, but have largely been confined to history by the National Vaccination Programme. Nevertheless, infections do still break out from time to time, making continued vigilance important (see *subsection 3.3*). At present, the priorities within YHC are addressing psychosocial problems and assessing the effectiveness of intervention strategies.

There is also considerable academic interest in young people at the moment. A few years ago, a major study was started in Rotterdam, looking at children's growth, devel-

Box text 3.6: Youth health care.

Youth health care (YHC) is a form of preventive health care, intended to help parents provide for the healthy growth and development of their children and protect their children from health hazards. YHC is provided on a proactive, systematic and free basis to all children in the Netherlands under the age of nineteen (of whom there are approximately four million). Most services are provided at health centres (where preschool children are concerned) or through schools (where older children and adolescents are concerned). However, other channels are used as well: parental instruction is given during house visits and information gatherings are organized. The range of YHC services is defined in the Youth Health Care Entitlement Package, which consists of a uniform element, made up of systematic preventive activities, and a customized element. The services, which are aimed at disease prevention and health promotion, may grouped under the following headings: vaccination against childhood illnesses (National Vaccination Programme); screening for abnormalities (of the eyes, ears, heart, speech, etc); monitoring of development and the identification of problems (relating to weight and height, and psychosocial problems); and the provision of information, advice and guidance (e.g. regarding (breast) feeding, teeth and upbringing).

Services are provided at up to twenty consultations during the child's first eighteen years, with the emphasis on the first five years of life. The providers are doctors, nurses and assistants at health centres and MHSs. Support is available as required from experts, including psychologists, educationists, dieticians, speech therapists, lactation experts, health educators, interpreters and presenters able to communicate in the client's own language and in a manner sympathetic to his/her culture.

The YHC system reaches a high proportion of the nation's children and their parents. Although parents have to accompany with their children to health centres, the participation level is high. Nevertheless, as children grow up, participation gradually tails off, from nearly 100% where neonates are concerned, to just under 90% where four-year-olds are concerned (Statistics Netherlands StatLine). Depending on age, between 83 and 98% of children benefit from YHC services (Burgmeijer et al., 1997). The effectiveness of YHC activities differs considerably from one field to another. Vaccination is very effective, but the effectiveness of screening varies according to the sensitivity and specificity of the methods used, and data are not available on all screening activities. The detection of PKU, CHT and AGS (by means of a 'heel prick test') is effective and, provided that the correct method is used with care, screening for non-scrotal testes is 100% effective. Little evidence is available regarding the effectiveness of certain other services, in particular many of the monitoring and information/consultancy services, but it is considered plausible that they are effective.

opment, health and care consumption and the respective influences of predisposition and environmental factors. The study has been focusing particularly on how factors present during pregnancy and shortly after birth influence health development from birth to young adulthood (Hofman et al., 2004). Rotterdam's Generation R study, as it is known, now has its counterpart in Amsterdam: the ABCD study (www.generationr.nl; www.abcd-study.nl). Because both studies are concerned with major urban areas, they also offer the opportunity to learn more about the health of children from ethnic minority backgrounds.

Operation Youth

Not all preventive actions are initiated within the Youth Health Care Service. Young people are high on the agenda in other policy domains as well. Although the focus in other domains is often not primarily on health, but on, for example, the prevention of abuse or the reduction of the school dropout rate, the initiatives concerned do have implications for health. Several government ministries have recently joined forces to start a project called Operatie Jong (Operation Youth), with the aim of making policies aimed at young people more coherent. One of its themes is 'physical space'; initiatives taken in connection with this theme are intended to provide more space for youngsters in the public areas and thus to improve the quality of urban life. The creation of more places for children and youngsters to play also represents recognition of the child's right to play under international treaty (Unicef, rights of the child). As a spin-off of this initiative, it may be expected that children will be able to get more exercise, so it should have a health-promoting effect. The reduction of the school dropout rate – another theme of Operation Youth – could eventually have a positive effect on public health as well, since more-educated people tend to be healthier (see *subsection 3.2*).

The young: teaching healthy behaviour

The young (fifteen to twenty-four-year-olds) have relatively few health problems. The overwhelming majority of people in this age group are healthy. The largest contributors to the modest disease burden borne by this age group are mental problems and accidental injury. Hence, the health of people in this group would benefit most from the prevention of psychosocial problems and accidents, particularly road traffic accidents. There is nevertheless scope for effective health promotion activities aimed at this age group with a view to influencing their subsequent susceptibility to illness. However, we are confronted by a paradox here: the basis is laid for many of the problems that ultimately arise at a time in life when people have very few health problems. As a result, health promotion among the young is difficult. Although health is an issue for the young, they are concerned mainly with matters such as sexually transmitted diseases and other health problems of the moment. They have much less interest in information about diet, smoking and exercise: factors whose impact will not be manifest until well into the future. It is therefore debatable to what extent the young can actually be persuaded to modify their behaviour by the provision of information. However, information campaigns are not the only means of diverting people from unhealthy lifestyles. Raising the price of cigarettes is known to be an effective means of deterring smoking, for instance (Van Baal et al., 2005; Feenstra et al., 2006a). It is also possible to

Box text 3.7: Cirrhosis of the liver increasing in the UK.

Since the early 1950s, mortality associated with cirrhosis of the liver has risen considerably among both men and women in Scotland, England and Wales (Leon & McCambridge, 2006; Department of Health, 2001). The increasing level of mortality in younger people has been a particular cause of concern (Department of Health, 2001).

The most likely explanation for the rise is increased alcohol consumption, combined with changes in drinking patterns (more binge drinking and heavy drinking). Between 1969 and 1976, alcohol consumption by Britons aged fifteen and older went up from 6 to 9.5 litres per head per year. Consumption then remained relatively stable for some time, but has apparently been rising again in recent years. Cirrhosis of the liver is an illness that takes several years to develop. An upward mortality trend therefore reflects an earlier increase in alcohol consumption (Department of Health, 2001; WHO-HFA, 2006).

Notably, while most other European countries also saw a growth in cirrhosis deaths up to the 1970s, the numbers then began to fall outside the UK. Particularly in the traditional wine-drinking countries of southern Europe, there was first a decline in alcohol consumption, followed some time later by a big drop in cirrhosis-related mortality. By contrast, Scotland, England and Wales, along with certain other northern European countries witnessed significant increases. In the 1950s, these countries still had some of the lowest levels of mortality attributable to cirrhosis of the liver, but the level in the UK is now close to the European average, while that in Scotland is one of the continent's highest (Leon & McCambridge, 2006).

influence behaviour by addressing social values (e.g. conveying the idea that smoking is for 'losers').

Current levels of alcohol consumption by the young will mean future cirrhosis problems

One form of behaviour among the young, which has health implications for the future, is alcohol consumption. Cirrhosis of the liver is presently a fairly rare disorder in the Netherlands. However, if young people in the Netherlands continue their current drinking habits (see *subsection 2.2*), some of them will develop cirrhosis later in life. This trend is already apparent in the UK (*box text 3.7*).

Younger adults: the prevention of mental disorders

Most young adults (the 25-44 years old) also enjoy good health. However, in this period, people's lives typically become very busy. Many people in this age group (and especially in the over-thirties) combine employment with caring for children and/or parents. This probably helps to explain why mental disorders are the largest contributors to the disease burden borne by this group. Hence, the greatest benefit to the health of people in this phase of life is to be obtained by preventing burnout problems and other mental disorders (see *subsection 2.3* for more information on the prevention of depression).

Burnout problems are attributable partly to work-related factors. The prevention of these and other work-related health problems therefore needs to begin in this life phase. Occupational accidents, for example, are most common among younger workers. Furthermore, the workplace is a potentially valuable setting for more general preventive interventions aimed at, for example, encouraging people to exercise and eat healthily (see *subsection 2.3.3*).

Middle age: the prevention of cardiovascular disease and cancer

Mental disorders continue to be a major source of disease burden as people move into middle age (forty-five to sixty-four). However, in this phase of life, cancer and cardiovascular disease become prominent as well. Each of these three categories of illness is responsible for roughly 20% of the age group's disease burden. As previously indicated, the prevention of cardiovascular disease and cancer needs to begin earlier, with the promotion of healthy eating and the discouragement of smoking in young people. Furthermore, much of the work done to prevent cancer is necessarily of a systematic nature (see also *subsection 2.3*). Breast and cervical cancer screening programmes are already in place. Breast cancer screening is available to women in the 50-74 years age group, and is aimed at detecting the presence of (early stages of) breast cancer. Women aged between thirty and sixty are also invited to undergo smear testing, with a view to picking up cervical cancer and, more particularly, its precursors before irreparable harm is done. Early detection through screening facilitates prompt treatment, which in turn increases the chances of survival.

Lay carers are often middle-aged

In middle age, not only are people liable to need care, as they begin to develop health problems, but also they are more likely to be carers themselves than in other life phases. The care provided by the middle-aged is typically for children still living at home, for a partner, or for one or more parents. Long-term, unpaid, often intensive care provided to a chronically ill or disabled partner, parent, child, friend or acquaintance is referred to as lay care. In 2001, there were 2.4 million lay carers in the Netherlands: people who provided care for a period of more than three months or for more than eight hours a week. The majority (32%) were aged between forty-five and fifty-four years old, were caring for a parent living elsewhere (44%) or were living in a family unit with children (47%; De Boer et al., 2003). Some 13% of the lay carers felt seriously burdened by their care obligations. They experienced considerable stress or had developed problems of their own due to the pressures associated with their circumstances (Timmermans et al., 2005). However, it should be pointed out that middle age is not the only phase of life in which people provide lay care (see *box text 3.8*).

If the burden on lay carers is to remain tolerable, proper coordination with professional care providers and welfare organizations is vital. The principle underpinning the Social Support Act (WMO) presently before parliament is that each individual has primary responsibility for him/herself and his/her family. The municipality then has the job of determining what support the lay carer requires, and may decide that, for example, additional care should be provided to ensure that the lay carer is not overburdened (VWS, 2006).

The elderly: preventive action remains important

The main health problems affecting people aged sixty-five to seventy-four are cardiac disease, stroke, COPD, lung cancer and diabetes. Although the potential benefit of preventive intervention is greatest where younger people are concerned, prevention remains important in relation to the elderly. Stopping smoking, taking more exercise

Box text 3.8: Lay care in relation to life pattern.

The average person's care responsibilities are not evenly distributed throughout their life. The young and young adults (people up the age of about thirty) are generally free of such obligations. It is in the middle phase of life (between the ages of about thirty and sixty) that people provide the most care, both for their own children and for relatives with health problems. The Netherlands does not presently have a significant 'sandwich generation' (people who have to care for their own children and for their parents). However, because Dutch women are postponing motherhood until later and later in life (see *box text 3.5*), there will in the future be more people who find themselves in this position. During active old age (roughly sixty to seventy-five), most people are free of work and childcare responsibilities, although some are involved in caring for their grandchildren. In later old age, almost everyone eventually becomes dependent on care.

Because lay care is normally provided in the busy middle phase of life, the fact that some people find themselves giving intensive long-term care to a relative during other phases of life is often overlooked. It is estimated that approximately 10% of young people care for a parent with a chronic mental or physical disorder. Some of these young people consequently encounter difficulties with their education or work. Often, they are also deprived of emotional and physical support and obliged to accept responsibilities inappropriate to their age, increasing the likelihood of them encountering developmental problems of their own. At the other end of the age range, many elderly people also act as lay carers. People over the age of fifty-five provide 35% of the care given to the elderly; in many cases, this involves people caring for their own partners (Timmermans, 2003). Because these elderly carers frequently have health problems themselves, providing intensive lay care is particularly demanding for them. Very little research has been done into this group of lay carers.

Source: Morée, 2005

and eating healthily can still help to prevent, or at least to postpone or mitigate cardiovascular disease, diabetes and cancer (Van den Berg Jeths et al., 2004). Exercise is also valuable insofar as it promotes general physical fitness, which in turn may even have a favourable effect on cognitive performance in the elderly (Kramer et al., 2005).

Unlike the young, the elderly do normally experience immediate physical effects from healthy living. As a result, they are generally more open to health messages than young people. In recent times, we have seen health centres established specifically for elderly people, providing checkups and advice on matters such as diet and exercise, and also regarding the avoidance of loneliness and other psychosocial problems (see *box text 3.9*).

Many elderly people who have health problems remain active

Most elderly people are affected by one or more disease or disorder. However, this certainly does not mean that the individuals concerned are all confined to their homes or residential accommodation, leading inactive and care-dependent lives. Most elderly people are very active, doing voluntary or other work and engaging in cultural, recreational or other leisure activities. The purpose of preventive action aimed at people in this life phase is therefore not only the prevention of illness or other physical ailments (by health promotion or disease prevention), but also the improvement of self-sufficiency and participatory capacity. The use of devices and medical technologies can increase the scope for people with chronic diseases to continue leading independent lives (see also *subsection 2.1*). However, it is not only by prevention and treatment that the consequences of illnesses can be diminished; there are other ways of promoting

Box text 3.9: Health centres for the elderly.

Health centres for the elderly are a growing phenomenon. At various places around the Netherlands, elderly people and care and welfare organizations have joined forces to establish such centres. Older people can go to these centres for preventive checkups and for advice on all sorts of health-related matters. The centres interpret health broadly, as a state of physical, mental and social wellbeing. As a result, health centres for the elderly have a distinct character. As well as considering the more obvious issues, including cardiovascular problems, the risk of falling and problems associated with memory impairment, loneliness, depression and anxiety, these centres take an interest in matters such as clients' lifestyles and general wellbeing and the avoidance of over-burdening resulting from the need to provide lay care. It should be recognized that these centres do not exist to provide medical care, for which the elderly still need to consult a GP or specialist.

Health centres for the elderly play a role in the early detection of health problems. The client receives personalized advice and tips on how to look after his or her own health, for example by taking more exercise, eating more healthily, drinking sufficiently, making new contacts and participating in socio-cultural activities. Nevertheless, the philosophy underpinning the centres is that elderly people should be empowered to take responsibility for their own health and wellbeing, and enabled to control their own lives and remain independent for as long as possible.

Before health centres for the elderly are created in greater numbers, it is important to learn more about the way preventive action impacts on older people's health and quality of life. There is also a need for additional information regarding the illnesses that can usefully be addressed by (secondary) preventive action and for further methodological development. There is ample evidence that preventive care for the elderly can be very beneficial, but little is known about the best ways to achieve results. The Knowledge Centre on Ageing has made a start by setting up a platform for health centres for the elderly, with the focus on gathering and sharing knowledge from preventive health research.

In the policy document, Ouderenbeleid in het perspectief van de vergrijzing (Policy for older persons in the perspective of an ageing population), the Ministry of Health, Welfare and Sport recommends research to establish whether health centres can contribute to the extension of healthy life for elderly people (VWS, 2005b). In addition, the parliamentary Theme Commission for Policy on the Elderly is a strong advocate of such centres.

Not everyone favours close monitoring of the health of the elderly, however. Within the medical professions, some people have highlighted disadvantages, in particular the fact that checkups tend to detect a lot of disorders that can neither be cured nor slowed in their progress. All that is achieved, therefore, is that people have to live longer with the burden of knowledge (Meijer van Putten, 1999; Eekhof, 2001). As with other systematic prevention programmes, it is therefore important to consider the relationship between the benefits of health centres and possible disadvantages such as these.

Source: Knowledge Centre on Ageing, 2006.

self-sufficiency. These include environmental adaptations (e.g. modifications to the home, accessible public transport and safety) and lifestyle changes. Unfortunately, little empirical research has been conducted into the reduction of disability, and that which has been done has been fragmented (Health Council of the Netherlands, 2005).

Psychosocial problems in elderly people often undetected

Even quite seriously disabled people can be satisfied with their lives. Because illness and disability are ever-present threats in the lives of elderly people, insight into the other factors that influence welfare is of particular interest where this group is concerned. These factors relate not only to physical problems, but also to psychosocial problems. Many elderly people lose their loved ones and/or become dependent on care, and such developments can lead to depression and loneliness. Anxiety disorders are also common among the elderly. Such problems often go undetected, even though

they are treatable (Stek et al., 2004; Van Tilburg & Beekman, 1997; Fokkema & Van Tilburg, 2005). The promotion of social contacts can serve to combat loneliness, but may also be regarded as an end in its own right. Social contacts have a welfare benefit, but also provide physical and social support. An older person can therefore protect his/her future interests, not only by pursuing a healthy lifestyle, but also by investing in a social network (Van Overbeek & Schippers, 2004).

The final phase of life: easing problems and promoting welfare

The last phase of life is often characterized by functional impairment and the development of various concurrent health problems (co-morbidity). This can lead to various physical and mental difficulties. Memory problems affect almost everyone in due course, but in some people such problems lead ultimately to dementia. When an elderly person is no longer able to lead an independent life, he or she becomes dependent on care. In first instance this care is typically provided by their partner or children (lay care; see *box text 3.8*). However, when it is no longer possible to manage on this basis, professional care becomes essential (see *subsection 3.1.5* on care consumption in the various phases of life). In this life phase, little or no preventive health care is provided, with the emphasis rather on making life as comfortable as possible. As curative care becomes less feasible, the focus of care shifts to making the inevitable problems more tolerable and promoting the welfare of the patient and his/her family. Such care comes under the heading 'palliative care', which also includes terminal care and death counselling, with a view to providing for the most comfortable and dignified possible end.

What is the benefit of a life pattern-based approach to preventive intervention?

In the paragraphs above, we have identified the main health problems associated with each phase of life and given one or two examples of related preventive strategies. The point has been made that health problems often do not occur in the same life phases as the opportunities for their prevention. It therefore follows that a life pattern-based approach to health and preventive action can be advantageous for the population as a whole. Young people form an important target group, since many health problems result from behaviour and exposure to environmental influences during or accumulating since the early part of life. Consequently, where most lifestyle-related and physical environmental factors are concerned, the sooner favourable conditions are (re) established, the greater the potential health benefits. A number of endogenic factors in young people have been identified, which influence later vulnerability to illnesses. Naturally, with some health problems there is no temporal discrepancy between intervention opportunity and manifestation. To prevent falls among the elderly, for example, it is best to focus one's efforts on the elderly. Thus, a life pattern-based prevention strategy is concerned with the whole of life. People could participate in the National Vaccination Programme beyond the age of nine, for example, if influenza vaccination for the chronically ill and the elderly were included. Health centres for the elderly appear to be here to stay, and one could imagine similar facilities for screening programmes. By linking life pattern-based prevention to activities aimed at particular target groups and settings, preventive intervention could possibly be organized more effectively. First, however, it is desirable to invest in more research into the develop-

ment of illness in relation to life pattern and into the effectiveness of intervention at various points in life.

3.1.5 Care consumption and costs in the various phases of life

The life pattern-based approach is also useful for studying the health care use and expenditure. In this context we are concerned with formal care, as described in *subsection 2.5*, lay care having already been considered earlier in this chapter. Using data from the study 'Cost of illnesses in the Netherlands', it is possible to build up life pattern profiles for consumption and expenditure. The data relate to the Dutch population as a whole in 2003, but the profiles can nevertheless be constructed by reference to age.

Emphasis on curative care in youth and middle age, on nursing and supportive care in old age

Figure 3.9 shows how the total cost of care is divided across prevention, curative care (including diagnostics) and other functions, including nursing, supportive care and residential care. In childhood, health care use is relatively high. The care consumed in this phase is both curative (most of it given to a small group of very vulnerable neonates) and non-curative (mainly playschools; see *box text 2.24* regarding the Health and Social Care Accounts). During adulthood, the emphasis is on curative care, a heading that includes the costs associated with pregnancy and delivery. In old age, long-term care becomes increasingly important. Women are particularly heavy users of such care, be-

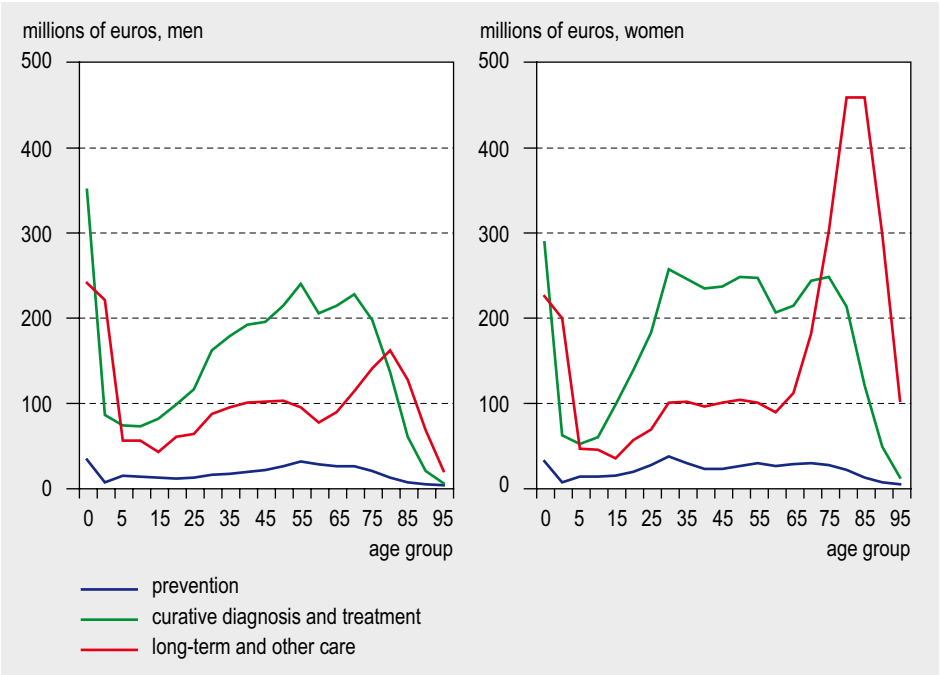

Figure 3.9: Health care expenditure in the Netherlands in 2003, broken down by function and by recipient age and gender (Source: Slobbe et al., 2006).

cause they tend to live longer and are therefore more likely to be widowed at the end of life and therefore dependent on formal care for the elderly.

Cost of prevention spread over the full course of life

Prevention costs are low and only marginally dependent on life stage. The costs that are phase-dependent relate mainly to care for the elderly and children (in particular neonates), and to screening programmes for the early detection of cancer, which result in a cost peak for middle-aged women. The cost of preventive medication, such as cholesterol and blood pressure reducing drugs, is also significant in this regard.

Care provisions utilized also vary over the course of life

Moving on to consider the nature of the health care provisions associated with the forms of care provided in the different phases of life, in the early years of life the need is mainly for hospital care and welfare care (childcare). Subsequently, care for people with disabilities and mental health care become more significant, before hospital care increases in prominence once more. Women become significant users of hospital care earlier in adulthood than men, because of their need for reproduction-related care. Men's use of hospital care is associated mainly with cardiovascular disease and other disorders that become more common with advancing middle age. After the age of sixty-five, the forms of care provision that are specifically for the elderly rapidly rise to predominance (see *figure 3.10*). *Chapter 2* described how the cost of providing care goes up sharply in the later years of life. From the figures presented here, it is clear that the increase is linked mainly to greater consumption of nursing and supportive care.

It is important to remember that the information presented relates to the pattern of an average person's life, defined on the basis of cross-sectional data (see also *box text 3.2*). In reality, of course, people's lives follow individual patterns. Most people, for example, make no use of care for the disabled, or of mental health care. Also, the majority of older people in the Netherlands lead independent lives, albeit sometimes with a modest degree of help and support.

Breakdown of expenditure by diagnosis group

Figure 3.11 shows the breakdown of health expenditure by diagnosis group. For the analysis, those diagnosis groups that account for the greatest costs and are also relevant in relation to life pattern have been selected. Together, these groups are associated with approximately 65% of all care expenditure. Costs that are not allocable to any particular disorder have been discounted, as have the costs associated with mental disabilities and other congenital abnormalities.

Where neonates are concerned, perinatal disorders form by far the largest cost group. Infectious diseases are also prominent because of the cost of vaccination. In later childhood, relatively large amounts are spent in connection with disorders of the respiratory tract, nervous system and the senses (eyes and ears). (All parents will recognize tonsillectomies and the treatment of ear infections.) In proportion to overall expenditure, mental disorders are also a major cost item. However, the costs in question are for the

Figure 3.10: Health expenditure in the Netherlands in 2003, by sector, age and sex (share of eight sectors within age groups, percent) (Source: Slobbe et al., 2006).

treatment of specific groups of children who require care in highly specialised organizations. As people get older, larger groups of mental disorders account for a great deal of expenditure; in men the main disorder concerned is schizophrenia, while women tend to be affected by depression and anxiety disorders. Injuries are a major cost heading at both ends of the age range, although the injuries in question differ considerably: young people are affected mainly by the consequences of road traffic accidents, whereas older people's injuries are typically hip fractures and the like. The high cost of treating disorders of the digestive system in people aged up to about sixty-five is partly a reflection of the need for dental care. In young female adults, costs associated with pregnancy gradually become more significant. As middle age progresses, cancer and cardiovascular disease lead to high levels of care consumption and cost. In the final years of life, many people need care for dementia, bringing considerable costs.

Last year of life entails considerable costs

Like other aspects of life, illness patterns are very individual. No one will develop all the illnesses identified above as being associated with the various phases of life. Sooner or later, though, everyone will die. Death typically follows a period of illness and high

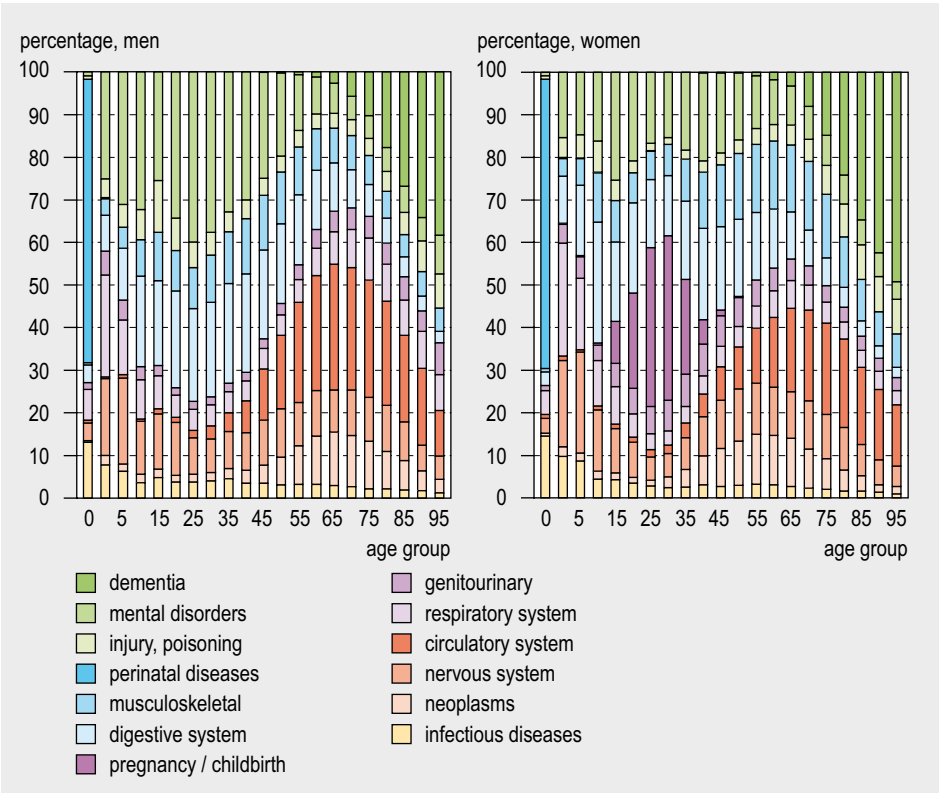

Figure 3.11: Health expenditure in 2003, broken down by diagnosis, age and sex (percentage contribution of each of several key diagnosis groups to the total for each age group). These selected diseases account for approximately 65% of all care costs. Costs that could not be allocated to particular illnesses, the costs associated with mental disabilities and other congenital abnormalities and the costs associated with a number of smaller diagnosis groups have all been excluded (Source: Slobbe et al., 2006).

levels of health care use. Because most Dutch people are quite old at the time of death, it has been suggested that the higher care costs associated with the older age groups (see *subsection 2.5*) are more a product of life phase, i.e. of the fact that people in the relevant age groups are approaching the end of life, than a product of age itself. This is a significant distinction, because if the contention is correct, it implies that population ageing is liable to bring about cost deferment, rather than cost increases. With life expectancy increasing, this is an important hypothesis.

To establish just what the situation in the Netherlands is, a calculation has been made of the final-life-year cost of all curative care covered by health insurance, plus home care and nursing home care. The calculation was based upon a random group of 2.1 million people (13.4% of the population in 1999). For people who had died the health care costs in the 365 days prior to death were investigated. On average, such care was found to have cost more than 15,000 euros, approximately 13.5 times as much as the average cost of caring for the other people in the study group (Polder et al., 2006). The

distribution of costs per mortality cause was considerable, but no demonstrable differences could be found between men and women. The costs associated with death due to myocardial infarction or road traffic accident were somewhat lower than the average, on account of the unexpected nature of such deaths. Otherwise, there was little difference between the various causes of death. Apparently, it is common for people to suffer from a variety of ailments in the final year of life, and provision of the associated care is more significant in cost terms than the ultimate cause of death.

The cost of care in the final year of life is, however, closely related to age at time of death. The pattern of final year costs is more or less the mirror image of the pattern of the 'ordinary' care costs illustrated in *figure 2.19*: the final-year cost of caring for people who die young is higher than the cost of caring for those who reach a greater age. This age-related tapering of mortality costs is almost entirely attributable to lower hospital costs for people who die old; that in turn probably results from the weaker physical condition of older people and a disinclination to use very onerous and intensive therapies due to age-related contra-indications.

Using the data thus calculated, it has been possible toestimate lifetime health expenditure. For 1999, the figures came out at more than 94,000 euros for men and 126,500 euros for women, given life expectancies of 75.1 and 80.5 years, respectively (see *table 3.3*). Where men were concerned, 16% of the lifetime costs was associated with the final year of life. For women, the figure was lower (12%), because of females' higher care consumption and longer life expectancy. *Table 3.3* also shows the influence of population ageing in the period up to 2020. If no account is taken of the extra cost of care in the final year of life, forecasts indicate that the lifetime costs of care may be expected to rise by about 12% for men and 5% for women. When allowance is made for final final-year costs, the forecasts indicate that lifetime costs will rise, but not by quite as much. In other words, it appears that deferment will mitigate the cost growth associated with longer life expectancies, rather than negate it.

However, research in the USA has produced evidence suggesting that cost growth can be prevented. The researchers found that the cost of caring for people between the age of seventy and their death was roughly the same, regardless of how long they lived. Less healthy people lived for a shorter time beyond seventy, but ran up higher annual care costs, while healthier people lived longer at a lower annual cost (Lubitz et al., 2003). This would indicate that healthy ageing is doubly beneficial, since it means better public health without added care costs. It is not yet known whether the reported cost pattern is valid for the Netherlands as well – something that cannot be assumed, in view of the considerable cost of caring for the elderly in this country. The topic has not been studied in the Netherlands, and we consider it desirable that the various aspects of 'healthy ageing' be investigated in the context of the next PHSF. Public health is worth the necessary investment, since life is not only expensive, but also valuable.

Table 3.3: Life expectancy and estimated full-life care costs [a] for men and women, as calculated from mortality tables for the Dutch population in 1999 and 2020, at 1999 prices, expressed as percentage growth rates for the period 1999 to 2020 (Source: Polder et al., 2006).

			Growth rate 1999-2020 (%)	
	Men	Women	Men	Women
1999				
Life expectancy at birth (years)	75.1	80.5		
Estimated full-life care cost (euros)	94,233	126,536		
final-year cost	15,077	15,021		
annual average cost for preceding years	79,156	111,515		
Final year as % of full-life cost	16.0	11.9		
2020				
Life expectancy at birth (years)	78.4	82.1	4.4	2.0
Estimated full-life care cost (euros)				
Simple model (no account of high final-year cost)	105,733	133,276	12.2	5.3
Enhanced model	102,811	131,785	9.1	4.1
final-year cost	14,783	14,651		
annual average cost for preceding years	88,028	117,134		
Final year as % of full-life cost	14.4	11.1		
Difference (% of improved-model estimate)	2.8	1.1		

[a] Second compartment (= basic health insurance entitlement package), nursing home care and home care.

3.2 Health deprivation

The less educated and the ethnic minorities have more health problems

In the Netherlands, the main social groups that are likely to suffer health deprivation are people of low socio-economic status and the ethnic minorities. Less-educated people do not live as long and have more health problems than their better-educated counterparts. Furthermore, health inequalities have not decreased in recent years. People from ethnic minority backgrounds also tend to experience relatively poor health, although the picture is more complex. Moroccan-Dutch men, for example, live longer than men of indigenous origin and suffer less cardiovascular disease. Unfortunately, the available data are patchy: little is known, of instance, about the health of people of Antillean origin.

The causes of health inequalities are diverse

The relatively poor health of the less educated and the ethnic minorities is caused partly by poorer housing and working conditions, and partly by the greater prevalence of unhealthy lifestyles in these groups. The higher care consumption of the less educated and the ethnic minority merely reflects their poorer health, although there are signs of under-consumption where some forms of care are concerned.

Health deprivation concentrated in certain neighbourhoods

People in vulnerable groups are more likely to live in deprived areas. This is one of the reasons for health inequalities between neighbourhoods. However, a neighbourhood can also contribute to ill health – by serving as a concentration point for exposure to adverse physical and social factors, for example. Health inequalities between neighbourhoods must therefore be viewed in conjunction with inequalities in numerous other fields. Problems are concentrated mainly in the four large cities, particularly the urban areas outside the city centres. However there are isolated 'health black spots' in many parts of the country.

Regional differences in health and lifestyle could be reduced

The health inequalities between socio-economic groups, between ethnic groups and between neighbourhoods give rise to regional differences. These regional differences are indicative of the range within which public health varies in the Netherlands and thus of the scope for improvement. In terms of overall average life expectancy, the difference between the best and worst regions is three years, but in terms of healthy life expectancy it is twelve years. There is also considerable scope for improvement in relation to smoking and weight problems.

Government policy aimed at reducing health deprivation

The Dutch government aims to reduce socio-economic inequalities in healthy life expectancy by 25%. Because of the clustering of both behavioural and contextual factors, a neighbourhood-based approach promises to be the most effective. In addition, the 'Health in the Cities' policy can serve as a useful framework for reducing health differ-

ences. Nevertheless, little concrete action has been taken and health deprivation has not diminished in recent years.

In the Netherlands, the chance of enjoying a long and healthy life varies from one population group to another. Considerable health inequalities exist, with health problems more common in the so-called vulnerable groups, i.e. groups of people amongst whom health deprivation is more prevalent. *Subsection 3.2.1* focuses on health deprivation among the lower socio-economic strata and the ethnic minorities. Brief consideration is also given to other vulnerable groups, such as homeless and shelterless people, asylum-seekers and illegal immigrants. Children and the elderly can be vulnerable in some respects, as well. Their health status is described in *subsection 3.1*.

The socio-economic and ethnic health inequalities give rise to geographical differences in health, as described in *chapter 2*. In *subsection 3.2.2*, such geographical differences are placed in a more coherent context, and the position of deprived areas is examined.

The subsection concludes with a description of what the government is doing to reduce health inequalities between socio-economic and ethnic groups, with particular emphasis on the neighbourhood-based approach (*subsection 3.2.3*).

3.2.1 Vulnerable groups

On average, people of low socio-economic status live nearly four years less and enjoy ten to fifteen years' less good health than people of high socio-economic status (Van Herten et al., 2002). In Van Herten's study, educational status was used as the measure of socio-economic status (SES); another widely used indicator is income. Furthermore, health problems are generally more common among people from ethnic minority backgrounds in the Netherlands than among ethnically indigenous people. It should be noted that there is considerable overlap between the two groups (i.e. people of low socio-economic status and people from ethnic minority backgrounds) in the Netherlands: people from the non-western ethnic minorities tend to be concentrated at the bottom of the national income 'league table' (Vrooman et al., 2005).

This subsection begins by describing the socio-economic health inequalities that currently exist in the Netherlands, and considering the possible explanations. The developments seen in the last ten years are also examined, with a view to determining whether the differences between socio-economic groups are increasing or diminishing. Thereafter, the health inequalities between the Netherlands' various ethnic groups are described, and the possible explanations again considered. The subsection ends with an outline of the problems affecting asylum-seekers, illegal immigrants and homeless and shelterless people in the Netherlands.

Less-educated people tend to be in poorer health

People with less education do not generally enjoy such good health as more-educated people (see *table 3.4*). The less educated are more likely to have chronic afflictions and more likely to suffer from several disorders at once. There are quite large differences between the educational groups in terms of physical disability, perceived health and joint ailments. However, there are also a number of chronic disorders of which the prevalence does not appear to be related to education. These are chronic eczema, psoriasis, cancer and bowel disorders. None of the afflictions considered proved to be more common among more-educated people.

The information on health deprivation among less-educated people presented in *table 3.4* is derived from self-reported data. Other studies, also based on self-reporting, such as the GLOBE Study (Van Lenthe et al., 2004) and the Second National Study (Westert et al., 2005) confirm the findings outlined above. Furthermore, the NEMESIS Study has revealed that mental disorders are more common among people with less education and/or low to average income (Vollebergh et al., 2003).

Data on socio-economic status (SES) and health collected by means other than self-reporting also show that people of low SES tend to be less healthy. One study based on the Health Statistics Database linked income tax data to diagnostic data from the national hospital data registries. The results of this study revealed that most chronic diseases were more prevalent among low-SES groups (the 30% of the population with the lowest income) than among high-SES groups (the 30% of the population with the highest income; Kunst et al., 2005). The main exception to this picture was cancer, whose distribution in men was unrelated to SES and in women actually occurred slightly more often in the high-SES group.

Why are lower-SES groups less healthy?

Possible explanations for the relatively poor health of people of low SES include such people being more likely to live and work in an unhealthy environment, less likely to lead a healthy lifestyle, liable to receive less care or poorer-quality care and/or to be affected by adverse biological or genetic factors (see also *subsection 2.2*). These causes of ill health are not only more prevalent among lower-SES groups, but also more likely to occur in combination.

Less favourable living and working conditions

Health deprivation tends to be concentrated mainly in certain urban areas (see *subsection 3.2.2*). The most vulnerable groups, including less-educated people, have the least freedom of choice as to where they live. As a result, they are more likely to live in a deprived area, where both the social and physical environments are less conducive to good health. In deprived areas, for example, the housing is poorer, there is more social fragmentation and unhealthy lifestyle factors are more likely to be the norm than in more prosperous areas (Bosma et al., 2001). At work, people of low SES more often undertake arduous, physical activities and tend to have less autonomy and less scope for managing their own work (Schrijvers et al., 1998).

Table 3.4: Relationship between education and differences in health and lifestyle [a] (Source: POLS, gezondheid en arbeid, 2003).

	Low educational level [b]
Chronic disorders	
One or more chronic disorders	-
Two or more chronic disorders	--
Cancer	0
Diabetes	-
Cardiac diseases	-
Stroke (55+)	-
Hypertension	-
Vascular constriction in the abdomen or legs	--
Asthma and COPD	-
Bowel disorders	0
Chronic eczema	0
Psoriasis	0
Arthrosis	--
Ailments of the elbow, wrist or hand	--
Ailments of the neck or shoulder	-
Rheumatism	--
Back problems	--
Migraine	-
Disabilities and perceived health	
ADL limitations	--
Auditory impairments	--
Visual impairments	--
Transient disabilities	-
Mobility impairments	--
Perceived ill health	--
Lifestyle	
Excessive alcohol consumption	--
Total abstinence	-
Non-participation in sports	-
Overweight	--
Smoking	--
Heavy smoking	-

[a] See also Health Inequality Monitor (*box text 3.10*).
[b] Health of less-educated people relative to that of more-educated people: 0 = no difference; - = less-educated people less healthy than more-educated people ($1 > RII < 2$); -- = less-educated people a lot less healthy than more-educated people ($RII \geq 2$). RII (Relative Index of Inequality) is an expression of the ratio between the risk of a disorder for less-educated people and the risk for more-educated people, corrected for age and sex.

A less healthy lifestyle

Less-educated people tend not to look after their health as well as more-educated people. Among the less-educated, excessive alcohol consumption, lack of exercise, weight problems and (heavy) smoking (all of which have negative health implications) are more common than among more-educated people (see *table 3.4*). What is more, the less educated are not as likely to be successful in attempts to stop smoking as more-

Box text 3.10: Health Inequality Monitor.

In the summer of 2000, the Health Inequality Monitor was added to the National Compass on Public Health (www.nationaalkompas.nl). The Monitor provides detailed information on educational status-related differences in several health indicators (diseases and afflictions, perceived health and physical disabilities), lifestyle factors, environmental factors and care consumption.

The first version of the Monitor is based mainly on data from the Statistics Netherlands' health surveys (since 1997, the Work and Health module of POLS). In the future, the information will be obtained from the Local and National Public Health Monitoring System, through which the RIVM and the MHSs periodically collect data on the (determinants of) health.

educated people (Droomers et al., 2002). Interestingly, the less educated include both more excessive drinkers and more total abstainers. The healthiest level of drinking, i.e. moderate alcohol consumption, is less common among this group than among other groups.

Care consumption reflects poorer health

Socio-economic health differences can also arise from differences in the care consumption patterns of the different SES groups. This phenomenon was studied by the Erasmus MC in conjunction with the RIVM and Statistics Netherlands (Kunst et al., 2006). Analyses of POLS survey data for the years 2001 to 2003, inclusive, show that care consumption (e.g. GP consultations) is strongly linked with education. If one looks at the total number of GP consultations in the two months prior to the survey date, the lower educational groups prove to visit their GPs 84% more often than the higher educational groups. Considerable differences are also found where other forms of care consumption are concerned (see *figure 3.12*). Less-educated people consume 30% more prescription medication, consult a physiotherapist 50% more often, receive hospital treatment

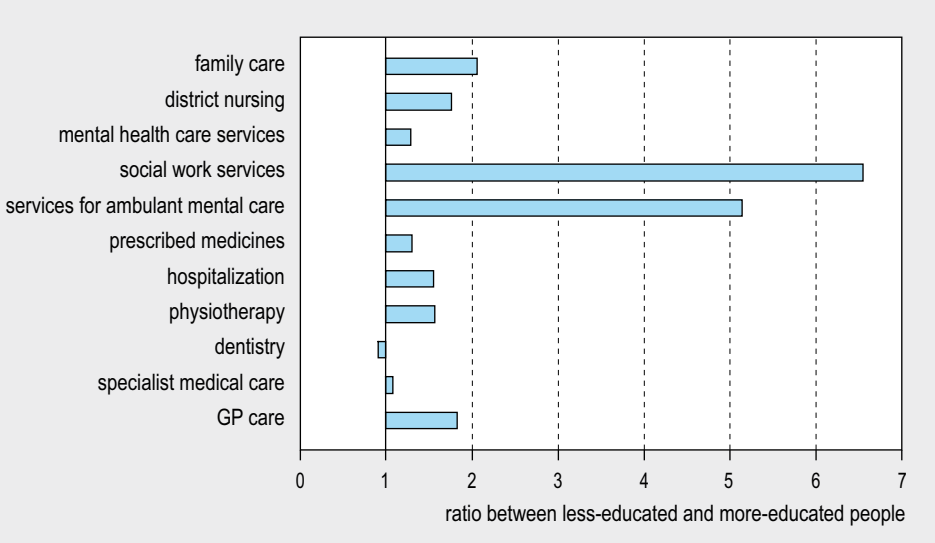

Figure 3.12: Educational status-related volume differences in the consumption of various forms of care (Source: Kunst et al., 2006).

50% more often, use family supportive care and district nursing services about twice as often, and visit Regional Institutes for Outpatient Mental Health Care (RIAGGs) and social workers at least five times as often. By contrast, less-educated people are only slightly (8%) more likely to consult a medical specialist, and actually consult their dentists 9% less often than the more educated.

In the Netherlands, higher care consumption is associated not only with lower levels of education, but also with other forms of socio-economic deprivation. Broadly similar patterns also emerge when consumption is related to, for example, occupation and household income. However, the patterns do differ somewhat in detail. People on low incomes visit their GPs more often than the well off, but they are admitted to hospital much more frequently (100%) (see *figure 3.13*, blue bars). Furthermore, both medication use and consultations with medical specialists are considerably (about 35%) higher among lower-income groups than higher income groups. These differences can be explained partly by the effects of education and occupation. However, even after correcting for these effects, a correlation remains between income and care consumption (see *figure 3.13*, red bars). Income is therefore an independent determinant of care consumption.

Socio-economic differences in care consumption can to a considerable extent be attributed to differences in the prevalence of health problems. If correction is made for the poorer average health status of people in lower income groups, income-related dif-

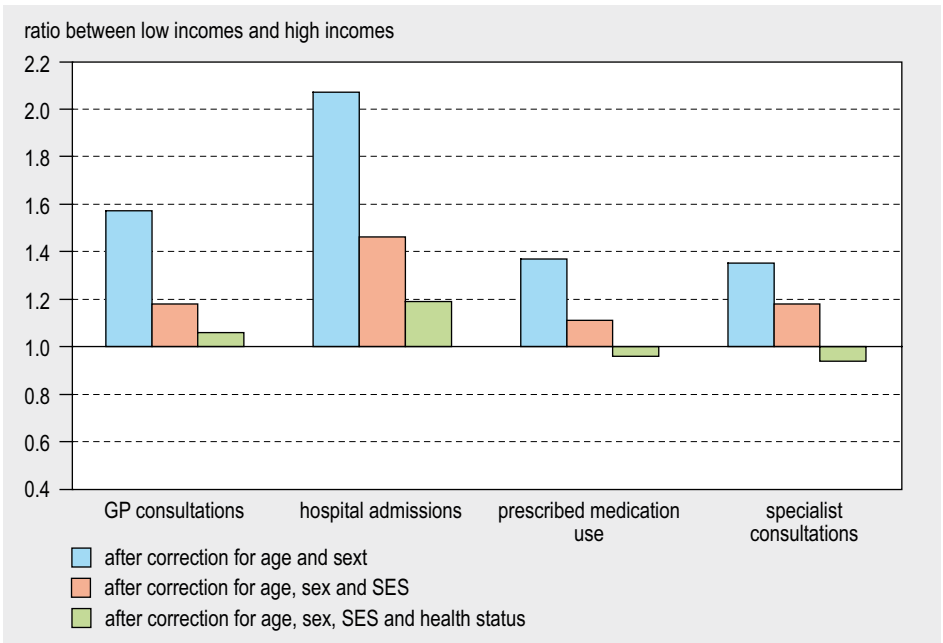

Figure 3.13: Differences in care consumption between the lowest and highest income deciles in the Dutch population: the role of other SES factors (education, occupation) and health status (Source: Kunst et al., 2006).

ferences in the volume of care consumed become much less pronounced. Allowing for the fact that people on lower incomes have more health problems, they are only a little more inclined to visit their GPs or to be admitted to hospital than people on higher incomes. Moreover, they are slightly less likely to consult a specialist or use medication (see *figure 3.13*, green bars). In other words, poor people use the health care provisions in question about as much as wealthy people with the same health problems. Whether differences exist in terms of other aspects of care, such as accessibility, quality, or satisfaction, is not known.

Socio-economic health inequalities quite stable

Most health and lifestyle differences between educational status groups neither became greater nor diminished in the period 1990 to 2003 (see *table 3.5*). This does not, however, imply that there were no changes in the health status or lifestyles of the various groups. Diabetes, for example, became a lot more common, but the rise in its prevalence was equally great in all educational status groups, with the result that the difference between more-educated and less-educated people remained unaltered.

Where a number of chronic disorders and lifestyle factors are concerned, socio-economic health inequalities have been increasing, but where others are concerned, the inequalities have been diminishing. In all cases, however, such diminution has resulted

Box text 3.11: Educational status-related trends in overweight.

Overweight is more common among less educated people than among more educated people. This general pattern has not changed over the years, but the differences between the various educational status groups are becoming smaller. Although diminishing education-related differences might appear to be a positive development, it conceals certain worrying trends. Overweight increased in all educational status groups, but (relatively speaking) it increased more among the most educated than among the least educated, particularly in the period up to 2000 (see *figure 3.14*). This trend was evident among both men and women and in all under-sixty-five age groups. In the over-sixty-fives, overweight also increased in all educational status groups, but at a similar rate. It, however, appears that the growth of weight problems among the most educated has been easing somewhat since 2000.

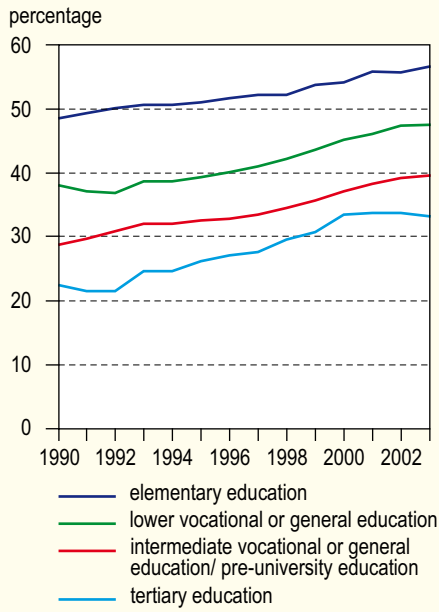

Figure 3.14: Trends in educational status-related prevalence of overweight, 1990-2003 (Source: POLS, gezondheid en arbeid, 2003).

Table 3.5: Change in educational status-related health inequalities and lifestyle differences between 1990 and 2003 (Source: POLS, gezondheid en arbeid, 2003) [a].

	Health differences [b]	
	Men	Women
Chronic disorders		
Cancer	0	0
Diabetes	0	0
Cardiac diseases	0	0
Stroke (55+)	0	0
Hypertension	+	-
Asthma and COPD	-	0
Bowel disorders	-	0
Arthrosis	0	+
Rheumatism	0	+
Back problems	0	0
Other chronic disorders (one or more)	0	-
Disabilities and perceived health		
ADL limitations	0	0
Auditory impairments	0	0
Visual impairments	0	+
Transient disabilities	0	0
Mobility impairments	0	0
Perceived ill health	0	0
Lifestyle		
Excessive alcohol consumption	0	0
Total abstinence	-	-
Non-participation in sports	0	0
Overweight	-	-
Smoking	0	+
Heavy smoking	0	0

[a] The indicators listed in *table 3.5* are not exactly the same as those listed in *table 3.4*, because trends could not be determined for all the latter indicators.
[b] 0 = stable, + = increased inequality, - = diminished inequality.

only because of an adverse health or lifestyle trend being even stronger in the higher socio-economic groups than in the lower groups. This is the case with, for example, weight problems, which have increased more among more-educated people than among less-educated people (see *box text 3.11*).

Ethnic minorities tend to be in poorer health

Some of the Netherlands' ethnic minority population is vulnerable in health terms. The ethnic minorities are generally in poorer health than the ethnically indigenous population. This is apparent from comparison of the health of the country's four largest ethnic minority groups (Turkish-Dutch, Moroccan-Dutch, Surinamese-Dutch and Antillean-Dutch) with the health of ethnically indigenous people, on the basis of various indicators (see *table 3.6*). Where people of Antillean origin are concerned, only limited comparison is possible, because relatively little is known about the health status of this group (see *box text 3.12*).

Box text 3.12: Information about the health of the ethnic minorities remains scarce.

Data on the health and care consumption of the ethnic minorities relate mainly to the four largest racial minority groups in the Netherlands: people of Turkish, Moroccan, Surinamese and Antillean origin. However, even where these minorities are concerned, data are quite scarce, so that what we have is only really a general outline of the situation within these communities. There may well be significant differences between first and second-generation immigrants, or between men and women, but in most cases they cannot be discerned. Of the four groups, less is known about the health of the Antillean community than the others.

Furthermore it is not easy to compare information from various sources on the health of the ethnic minorities, because different researchers have tended to use different definitions of ethnicity.

Much of the information on the health of ethnic minority people comes from questionnaire-based surveys. However, little is known about known such people's interpretation of the terminology used in many survey questions, or the extent to which words such as 'health' are used by respondents in a manner consistent with usage in the ethnically indigenous population. Since they reflect information provided by the respondents themselves, the survey findings may to some degree reflect differences in perception, in the social desirability of certain answers or in (culturally determined) views on what constitutes problematic or acceptable behaviour, health and illness, how one should behave when ill, and illness perception.

Infant, child and adult mortality higher among ethnic minorities than among ethnically indigenous people

Perinatal mortality is higher in the four large ethnic minority groups than in the ethnically indigenous population (Garssen & Van der Meulen, 2004). A similar picture emerges in relation to infant and child mortality (Garssen et al., 2003; Van Duin, 2002; Van Driel et al., 1999).

Among men of Turkish, Surinamese and Antillean origin, mortality is approximately 25% higher than among men of ethnically indigenous origin. Among Moroccan-Dutch men, however, mortality is actually 15% lower. The mortality risk among Surinamese and Antillean women is elevated in comparison with that among ethnically indigenous women (Bos et al., 2004a). These differences are partly attributable to the lower general socio-economic status of the ethnic minorities. When correction is made for socio-economic status, the inequalities in mortality become somewhat smaller. Where Surinamese and Antillean men are concerned, the inequalities are also influenced by marital status: single men tend not to live as long (Bos et al., 2004a).

Different illness patterns in ethnic minorities

Various Dutch studies have found that the prevalence of diabetes mellitus is higher among the ethnic minorities than among ethnically indigenous people (see *table 3.6*; Weijers et al., 1998; Dijkshoorn et al., 2003; Kriegsman et al., 2003; Middelkoop et al., 1999). The prevalence is greatest among people of Hindustani-Surinamese origin, particularly older people (37% among the over-sixties). The prevalence of diabetes mellitus among people of Turkish, Moroccan and Surinamese origin is broadly similar, at between three and six times that seen in the Caucasian population. Differences also exist in the pattern of cardiovascular disease, which is more prevalent in the Turkish and Surinamese-Dutch, but not among the Moroccan-Dutch. Hospital admissions

data show a similarly mixed picture. Hospitalization for cardiovascular disease is lower among people from the Moroccan community than among the majority population, while hospitalization for cancer is lower for both the Moroccan and Turkish communities. Furthermore, breast cancer is much less common among ethnic minorities (Verweij et al., 2004).

Table 3.6: Health [a] inequalities and lifestyle differences between the four largest ethnic minority groups in the Netherlands and the ethnically indigenous population; sources: see passage headed 'Different illness patterns in ethnic minorities'.

		Turks	Moroccans	Surinamese	Antilleans
Mortality					
Perinatal mortality	neonates	-	-	-	-
Infant mortality	0-1 years	-	-	-	-
Child mortality	1-14 years	-	-	0	0
Overall mortality	men	-	+	-	-
	women	0	0	-	-
Illness and health					
Diabetes		-	-	-	?
Cardiovascular disease		-	0	-	?
Depression	elderly	-	-	?	?
Schizophrenia		0	-	-	-
Mental illness	children	-	-	?	?
Perceived ill health		-	-	-	-
Lifestyle and overweight					
Smoking	men	-	+	-	-
	women	0	+	0	0
Excessive alcohol consumption		0	0	0	0
Total abstinence		+	+	+	+
Recommended exercise levels		-	-	-	-
Sports participation		-	-	-	-
Breakfast		-	0	-	-
Fruit consumption	men	0/+	0	0	?
	women	+	0	+	?
Vegetable consumption	men	0/+	0	+	?
	women	+	+	+	?
Fat consumption	men	0	0	?	?
	women	0/+	0/+	?	?
Overweight	children	-	-	?	?

[a] 0 = same as ethnically indigenous population; - = minority less healthy than ethnically indigenous population; + = minority healthier than ethnically indigenous population; ? = no information available.

People from ethnic minority backgrounds are more likely to describe themselves as being in poor health than ethnically indigenous people (Reijneveld, 1998; Van Bergen et al., 2003; Struben & Middelkoop, 2002). People of Surinamese, Antillean and Moroccan origin suffer more schizophrenia than ethnically indigenous people, but the prevalence among Turkish-Dutch people is comparable with that among ethnically indigenous people (Selten & Sijben, 1994; Selten et al., 1997; Schrier et al., 1996; Selten et al., 2001). A study conducted in Amsterdam found that elderly people in the Turkish

and Moroccan communities were more likely to suffer depression than their Caucasian counterparts. It is also worth noting that there is a considerable difference between Turks and Moroccans: depression affects Turkish-Dutch people a lot more than Moroccan-Dutch people. The highest prevalence of the affliction was recorded among women of Turkish origin over the age of sixty-five (Van der Wurff et al., 2004; Spijker et al., 2004). Children from the Turkish and Moroccan communities are in poorer mental health – as measured in terms of withdrawal, anxiety, depressions (internalizing problems) and in terms of delinquent or aggressive behaviour (externalizing problems) – than children from the ethnic majority (Stevens et al., 2003).

Why are people from ethnic minorities less healthy than ethnically indigenous people?

The possible explanations for the relatively poor health of the largest ethnic minority groups are much the same as the possible explanations for socio-economic health inequalities. These include the influence of adverse housing and working conditions and of a relatively unhealthy lifestyle. Furthermore, ethnic minority people may be liable to receive less care or poorer-quality care and/or to be affected by adverse biological or genetic factors. In the following paragraphs, the lifestyles of ethnic minority people are compared with those of ethnically indigenous people, and the relationship between ethnicity and care consumption is considered.

Ethnic minorities smoke more, exercise less and are more likely to be overweight

Smoking is more common among ethnic minority men than ethnically indigenous people. This is particularly so where Turkish men are concerned, but Surinamese and Antillean men smoke more as well. The smoking habits of women in the largest ethnic minority groups are broadly similar to those of ethnically indigenous women. However, Moroccan men and women are less inclined to smoke than their ethnically indigenous counterparts (Nierkens, 2006; Van Leest et al., 2002a; Van Lindert et al., 2004). Excessive alcohol consumption is equally common among ethnic minority people and ethnically indigenous people, but people from the ethnic minorities are more likely to be total abstainers (Van Lindert et al., 2004; Dijkshoorn et al., 2001). The ethnic minorities take less exercise and do less sport than ethnically indigenous Dutch people (Uitenbroek et al., 2006; Dijkshoorn, 2006; Van Lindert et al., 2004; Keuzenkamp & Merens, 2006). Like the country's ethnically indigenous population, people from the Netherlands' ethnic minority communities are unlikely to comply with advice on the amounts of fruit, vegetables and fat in their diets. In some cases, however, their eating habits are not as far out of step with medical advice as those of their Caucasian counterparts. Turkish-Dutch people, for example, eat more fruit and vegetables than people from the ethnic majority (Van Leest et al., 2002a).

Weight problems are much more common among young people of Turkish and Moroccan origin than among Caucasians youths. Some 23% of Turkish-Dutch boys and 30% Turkish-Dutch girls up to the age of twenty-one are too heavy; the corresponding figures for the Moroccan community are 16 and 25%. By comparison: 9% of ethnically

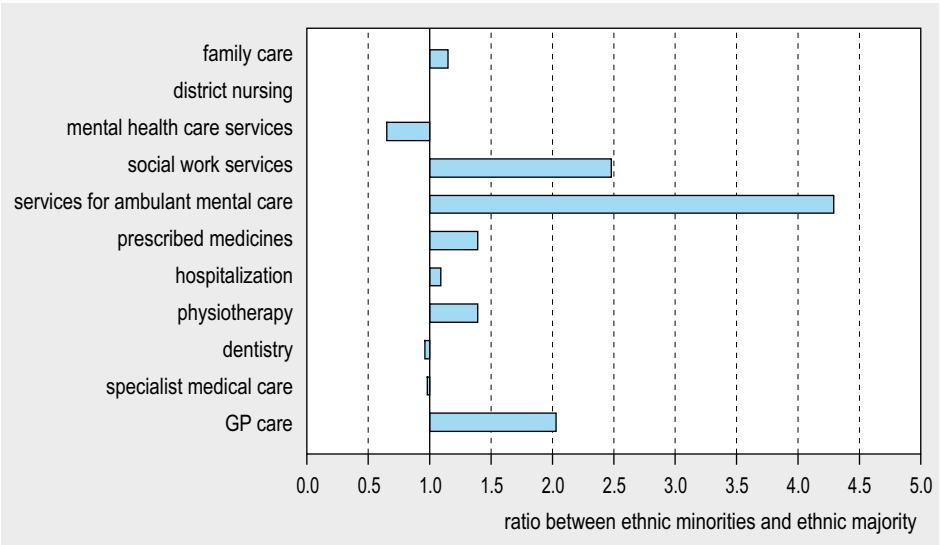

Figure 3.15: Ethnicity-related volume differences in the consumption of various forms of care (Source:Kunst et al., 2006).

indigenous boys and 11% of ethnically indigenous girls are overweight, while the figures for all children in the large cities are 13 and 17% (Fredriks et al., 2005).

More GP consultations, but possible under-consumption of specialist and hospital care

Among Dutch people of non-western origin, usage of some health provisions is very high (see *figure 3.15*; Kunst et al., 2006). Ethnic minority people visit their GPs roughly twice as often as ethnically indigenous people; they also visit Regional Institutes for Outpatient Mental Health Care RIAGGs) and social workers a lot more often. However, the pattern of ethnic health inequalities is much more varied than the pattern of socio-economic inequalities outlined above. Non-western ethnic minorities, for example, make about as much use of family supportive care and district nursing services as ethnically indigenous people. Furthermore, ethnic minority people visit dentists and medical specialists less often.

To a considerable extent, care consumption by ethnic minority groups reflects their less favourable socio-economic circumstances and health status (see *figure 3.16*, red and green bars). Ethnic differences in the frequency of GP consultations are largely attributable to the educational, occupational and income disadvantages of the non-western ethnic minorities. Compared with ethnically indigenous people of similar socio-economic status, people from the non-western ethnic minorities make only 25% more visits to their GPs; if correction is made for their poorer health status, even this difference disappears. The same is true where medication use is concerned. Notably, people from non-western ethnic minorities backgrounds consume roughly 40% less specialist medical care and 30% less hospital care than ethnically indigenous people of comparable SES and health status. Closer analysis indicates that this under-consump-

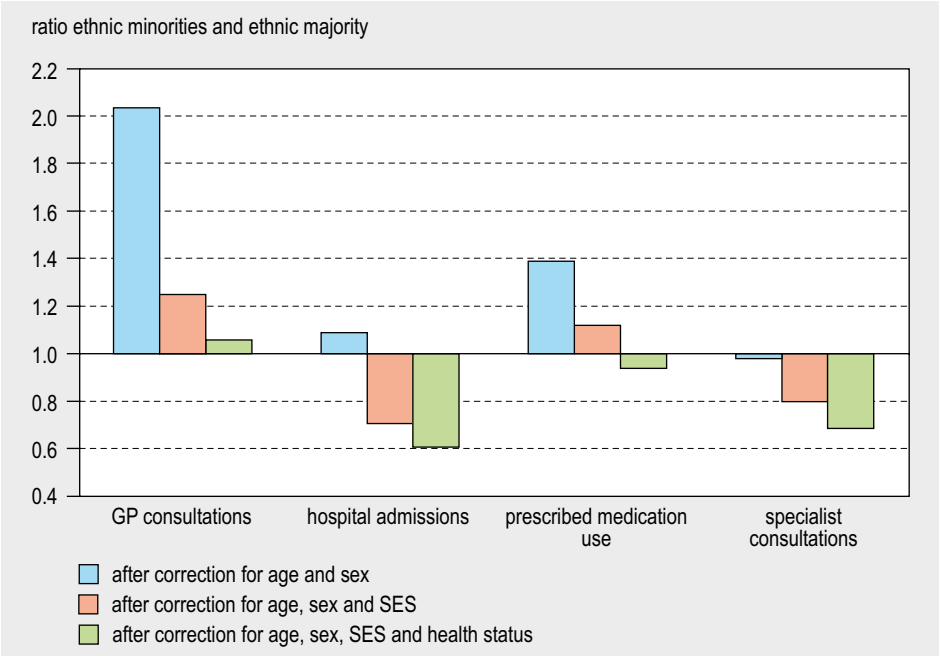

Figure 3.16: Differences in care consumption between different ethnic groups in the Netherlands: the role of other SES factors (education, occupation) and health status (Source: Kunst et al., 2006).

tion of intramural care is concentrated in the Turkish and Moroccan communities, in contrast to the Surinamese, Antillean and Aruban communities.

Mixed picture of ethnic differences in care consumption

The study referred to above, which was based on the Work and Health element of the POLS survey, did not distinguish to any significant extent between individual ethnic groups. In this subsection, we therefore present certain self-reported data on care consumption, which provide a basis for cross-comparison of the four largest ethnic minority groups in the Netherlands. The data in question come from the Second National Study, and paint a slightly different picture from that described above (see *table 3.7*). These data suggest that people from the ethnic minorities do visit their GPs and medical specialists more often, even allowing for the fact that, in general, they tend to be in poorer health. On the other hand, they make less use of physiotherapy. Furthermore, there are exceptions to the general picture. Moroccan-Dutch people, for example, do not consult medical specialists any more often than people from the ethnic majority, and the Surinamese-Dutch are no less inclined to seek the aid of a physiotherapist.

Care providers' manner influences care consumption ethnic minorities

Ethnic differences in the attitude towards seeking help with health problems may go some way to explaining the differences in care consumption reported above. Turkish-Dutch people, for example, are more inclined to seek the help of their GP than ethnically indigenous people. Also, in many ethnic minority communities, the view prevails

Table 3.7: Comparison of self-reported data on recent care consumption by people aged eighteen and over in the four largest ethnic minority groups against consumption by the majority of the population in 2001-2002: odds-ratio corrected for age, sex, educational status, health insurance status, degree of urbanization and health status (Source: Second National Study (Uiters et al., 2006)).

	Turkish-Dutch	Moroccan-Dutch	Surinamese-Dutch	Antillean-Dutch
GP care	1.55 *	1.56 *	1.90 *	1.46 *
Specialist medical care	2.37 *	1.26	1.61 *	2.38 *
Physiotherapy	0.70 *	0.53 *	0.93	0.64 *
Hospital care	0.93	0.84	0.74	1.23
Home care	0.95	0.46	0.68	1.59

* Significant difference between minority group and ethnic majority.

that one has a duty to care for one's parents in old age; consequently, people from these communities are less likely to seek care for elderly family members (Weide, 1998; Van Wersch & Van Poppel, 2003).

Care providers' manner influences care consumption ethnic minorities

The manner adopted by care providers also influences ethnic differences in care consumption. People from ethnic minority backgrounds are more likely than ethnically indigenous people to gain the impression that care providers, particularly GPs and mental health care workers, do not understand them or take them seriously (Weide, 1998; Rietveld & Van Erp, 2003; Van Wersch & Van Poppel, 2003; Bruijnzeels, 2001; Van Wieringen et al., 2002; Avezaat & Smulders, 1996). Care providers recognize that communication problems exist and consequently find the provision of care to ethnic minority people more difficult (Van Wersch & Van Poppel, 2003; Avezaat & Smulders, 1996). Communication problems result from both language and cultural differences and can compromise the quality of care and the patient's inclination to follow medical advice (Van Wieringen et al., 2002).

More and better information needed on care consumption by the ethnic minorities

There are signs, therefore, that the quality of the care provided to the ethnic minorities may not be as high as that provided to the wider community. It is often suggested that problems of this nature exist, but what exactly is going wrong and what the implications are is not clear. Furthermore, little information is available concerning trends or changes in care consumption by ethnic minority groups. Information about care consumption by other and new ethnic minority groups is even scarcer. This situation could be eased considerably if clients' ethnicity were recorded in the various care registers.

Other groups may be even more vulnerable

People of low socio-economic status and from ethnic minority backgrounds are known to be vulnerable; nevertheless, many individuals in these groups lead quite healthy lives in the midst of the community. However, there are other groups whose members lead a much more socially marginal existence and who may therefore be even more vulnerable. These include homeless and shelterless people and illegal immigrants. The circumstance in which such people live mean that they are more likely to develop health problems, yet are less 'reachable' for the providers of preventive and curative

care. Asylum-seekers and refugees are at additional risk, because they often bring particular health problems with them from their countries of origin. Information about the size of these three vulnerable groups and the main health problems affecting them is presented in *box text 3.13*.

3.2.2 Geographical health inequalities

The socio-economic and ethnic health inequalities described above result in geographical health inequalities. Geographical health inequalities are important both scientifically and in policy terms. Policy in the field of public health care (OGZ) is to a large extent decentralized, and local governments therefore need information about the health situation in the areas for which they are responsible. Local actors also have more scope for focusing on the specific problems that affect a neighbourhood or other well-defined area. Geographical inequalities are indicative of the range within which public health varies in the Netherlands and thus of the scope for improvement.

Analysis of regional differences in health, lifestyle and preventive action
An analysis has been made of the differences between thirty-nine regions of the Netherlands. These regions match the municipal health service regions, as they were in 2005. The thirty-nine regions differ quite considerably in character. The smallest has a population of about 150,000, while the largest is home to more than a million people. Some are predominantly rural, while others are urban; hence, the population density varies from 183 people per square kilometre to 5,711. Our analysis focused on mortality, health, determinants and preventive action. A number of indicators were selected on the basis of three criteria:

- Consistency with the indicator selections made in other contexts.
- Even, proportional distribution across health, determinants and preventive action.
- The availability of suitable regional data.

Application of these criteria led to selection of the indicators listed in *table 3.8*. In the context of the selection process, the availability of data proved to be particularly problematic. No sound regional data are available on, for example diet, illnesses and ailments or health promotion. (Although self-reported data on illnesses are available from the Statistics Netherlands' POLS survey.) Diabetes has been included because of the reliability of the spatial data on this disease (Kriegsman et al., 1996).

Across the Netherlands, there are major differences in health, determinants and preventive action
Table 3.8 gives a national average, plus the highest and lowest regional values for each of the various indicators. For each topic, a map has been included in the National Atlas of Public Health (www.zorgatlas.nl). Substantial regional differences exist in relation to all indicators. Across the various regions, for example, life expectancy varies by nearly three years and perceived healthy life expectancy by twelve years. Smoking rates range from 28% to more than 36%. Interestingly, considerable differences also exist in the lev-

Box text 3.13: Asylum-seekers, illegal immigrants and homeless and shelterless people.

Asylum-seekers, refugees, UMAs
An asylum-seeker is someone living in the Netherlands pending the outcome of an application for asylum. A refugee is someone who has been given indefinite leave to remain in the Netherlands because he or she has 'good reason' to fear persecution in his/her country of origin. The nature of these definitions is such that it is very difficult to ascertain the number of refugees living in the Netherlands. However, at the end of 2004, the United Nations High Commission for Refugees (UNHCR) estimated that the figure was more than 126,000. The number of asylum-seekers has fallen sharply in recent years, as has the number of unaccompanied minor asylum-seekers (UMAs). A third of all asylum-seekers are under the age of twenty, but this figure includes children living within a family unit. It is estimated that there are 24,000 (ex)UMAs living in the Netherlands (Tuk, 2006).

Pharos (the Knowledge Centre for Refugees and Health) published a meta-study on the health of asylum-seekers and refugees, which indicated substantially raised levels of mortality (Bartels, 2003). The main causes were TB, aids, meningitis and hepatitis – diseases that are endemic in the new arrivals' countries of origin. The prevalence of mental disorders was found to differ considerably from one study to another, and from one disorder to another. Posttraumatic stress disorder (PTSS) is ten times as common among refugees as among their peers in the same country (Fazel et al., 2005). In the Netherlands, it has also been demonstrated that mental disorders increase after prolonged detention in the Central Reception Centre (Laban et al., 2004).

UMAs are also more likely to be affected by mental problems. Internalizing problems and PTSS are both more common among UMAs than young Dutch people or than among young refugees living with their parents at the Reception Centre. Approximately 60% of UMAs report needing psychosocial assistance, but their needs usually go unnoticed by the adults around them (Bean et al., 2005).

Illegal immigrants
There are an estimated 125,000 to 225,000 illegal immigrants living in the Netherlands (Leerkes et al., 2004). The group is very diverse, including asylum-seekers who have not been given leave to remain and tourists whose visas have expired. Some have been living in the country and supporting themselves for years. Others are homeless and increasingly marginalized. The Netherlands does not appear to be affected by 'medical asylum tourism', even though some of the people who come here are from areas where HIV infection is endemic (LCMAV, 2004).

The health of illegal immigrants is influenced not only by the factors that affect other ethnic minorities, but also by problems that are specific to their circumstances (Van den Muijsenbergh, 2004). Of particular significance are mental problems, such as depression and stress, and (psycho) somatic problems, such as high blood pressure, gastric diseases, headaches and back problems. Infectious disease is also more prevalent among illegal immigrants; records maintained by Amsterdam's Medical and Health Service show seven times more tuberculosis among illegal immigrants as among ethnically indigenous people, for example (Erkens & Pot, 1999).

Obstacles to the provision of adequate care to illegal immigrants include the circumstances in which they live, fear of detection and financial problems. However, the complexity of the problems affecting such people and carers' relative lack of familiarity with many of the problems are also pertinent issues (Van den Muijsenbergh, 2004). Because illegal immigrants tend to put off seeking medical help, GPs often do not get to see such people until what ails them has progressed to an advanced and sometimes life-threatening stage (Van Oort et al., 2001). Another problem is that the 1998 Linking Act prevents illegal immigrants from taking out health insurance. Care providers consequently sometimes believe that they should not treat such individuals. In fact, however, illegal immigrants are entitled to health care, if only for humanitarian reasons, to protect public health and to comply with international treaties.

Homeless and shelterless people
A third vulnerable group is formed by the homeless and shelterless. Some of those who make up this group are illegal immigrants, but the majority are legally resident people from the ethnic minorities and ethnically indigenous people. Over the last few years, the Trimbos Institute has studied the health of homeless people in Utrecht (1998), The Hague (2001), Alkmaar (2002) and Leiden (2005). The institute's research suggested that between 0.2 and 0.4% of the people living in these four cities were homeless or shelterless. The physical and mental condition of these people was found to be

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poor. More than 40% had both mental and physical problems. Drug and alcohol consumption was also commonplace, with more than half of the subjects using several different types of drug. Almost no reliable statistics are available on low-threshold assistance for homeless and shelterless people in the Netherlands, with the exception of the records kept by the Salvation Army. At its shelters, the SA offers chairs (daytime shelter) and beds (overnight shelter) and the most elementary forms of assistance, in order to prevent its clients from declining further. Between 1999 and 2003, the SA increased its chair capacity from 626 to 691. In 2003, the SA received 4,482 requests for daytime shelter, up 45% since 1999. The organization's night shelter capacity increased from 232 beds to 464 between 1999 and 2003. There was little change, however, in the number of requests for overnight shelter (3,237 in 2003). The average duration of stay per person may have increased, but that cannot be discerned from the statistics.

The majority (80%) of the people taking advantage of the daytime or overnight shelter provided by the SA were single men aged between twenty-three and fifty-four. Compared to the population as a whole, they had relatively little education. Approximately two thirds were Dutch nationals and approximately 10% were Moroccan or Surinamese. People of Turkish origin were significantly under-represented.

Table 3.8: Regional differences in the selected indicators: average, highest and lowest values [a] (Source: National Atlas of Public Health, 2006).

Indicator	Average	Lowest value	Highest value
Mortality and health			
Life expectancy (years)	78.8	77.2	80.3
Perceived healthy life expectancy (years)	62.0	55.0	66.8
Physical disabilities (%)	11.8	7.4	16.7
Psychosocial problems (%)	10.2	7.6	15.9
Cancer (mortality) [b]	100.0	82.4	110.6
Cardiovascular disease (mortality) [b]	100.0	85.4	128.1
Asthma and COPD (mortality) [b]	100.0	58.7	124.7
Accidents (mortality) [b]	100.0	62.8	125.1
Diabetes (self-reported prevalence)	2.8	1.7	4.1
Determinants			
Smoking (%)	31.5	27.6	36.3
Heavy drinking (%)	19.1	13.3	23.0
Healthy exercise (% meeting recommendations)	52.5	41.5	61.9
Obesity (%)	9.8	6.4	15.7
NO_2 (annual average concentration µg/m)	19.8	13.5	34.3
Prevention			
DTP-polio vaccination (% of infants)	95.8	91.5	98.4
Mammography (% of women 50+)	75.7	65.5	83.8
Influenza vaccination (% of 65+s)	80.6	74.5	86.1
Stopping smoking: number of clients (per 10,000 smokers) using STIVORO's personalized advice service	24.0	17.5	40.6

[a] Most of the extreme values quoted are significantly ($p < 0.99$) above or below the national average. Only where diabetes is concerned is the significance level 95%. Where relevant, the figures have been corrected for the age and sex profiles of the various regions.

[b] Mortality is expressed in terms of CMF, with the average for the Netherlands set at 100.

els of obesity. The country's 'fattest' region has nearly 2.5 times as many obese people as the 'slimmest' region. There is evidently also considerable scope for improvement in terms of preventive intervention. Nationally, three out of four women of aged fifty or more undergo mammography, but regional screening participation rates vary from 65 to 85%.

Regions ranked on each indicator and group

In *appendix 3*, the thirty-nine regions are ranked in relation to each of the indicators, from the 'healthiest' region (number 1) to the 'unhealthiest' region (number 39). In addition to the individual indicator rankings, an overall score is given for each indicator group. This results in an overall health index, determinant index and preventive action index. Notably, each region's individual indicator rankings within each group are quite similar. So, for example, the Amstelland-de Meerlanden region is in the top six on all the health indicators. As a result, the region has the highest overall health index. However, a low-ranking region does sometimes achieve an exceptional indicator ranking. Rotterdam, for instance, has the lowest accident-related mortality rate (i.e. the highest ranking), despite featuring well down the ranking lists for most other health indicators. The reverse is sometimes the case as well, as with Midden-Holland, which has the third best overall health index, but a relatively high COPD-related mortality rate.

Where health determinants are concerned, each region's individual indicator rankings are fairly consistent. Smoking, drinking, overweight and exercise are particularly closely related. Atmospheric quality (NO_2 concentration), on the other hand, is fairly independent. The concentrations of NO_2 tend to be high in the urban areas and the west of the country.

Figure 3.17 shows the geographical distribution of the overall scores for the three indicator groups. The striking feature of this visualization is the lack of consistency between the maps. Amstelland-de Meerlanden may, for example, be the highest-ranking region on health status, but it ranks only thirty-third where health determinants are concerned. A similar contrast is seen with Gooi- en Vechtstreek. The opposite is the case with some regions, such as Noord-Kennemerland and Flevoland, albeit in less pronounced form. The regions ranking highest on the preventive action indicators are not the same as those that rank highest on health determinants or health status. Notably, a number of Brabant regions rank well where this indicator group is concerned.

The lack of consistency may be because the analysis is ecological in its nature. The people who die in a given region are not the same as the people who live unhealthy lives there. There can furthermore be a time-lag effect: exposure to risk factors can precede the associated health effects by anything up to thirty-five years (Kulaasma et al., 2000; Law & Wald, 1999).

The regional differences in health status and health determinants are attributable partly to socio-economic differences. This is the case, for example, with the major ur-

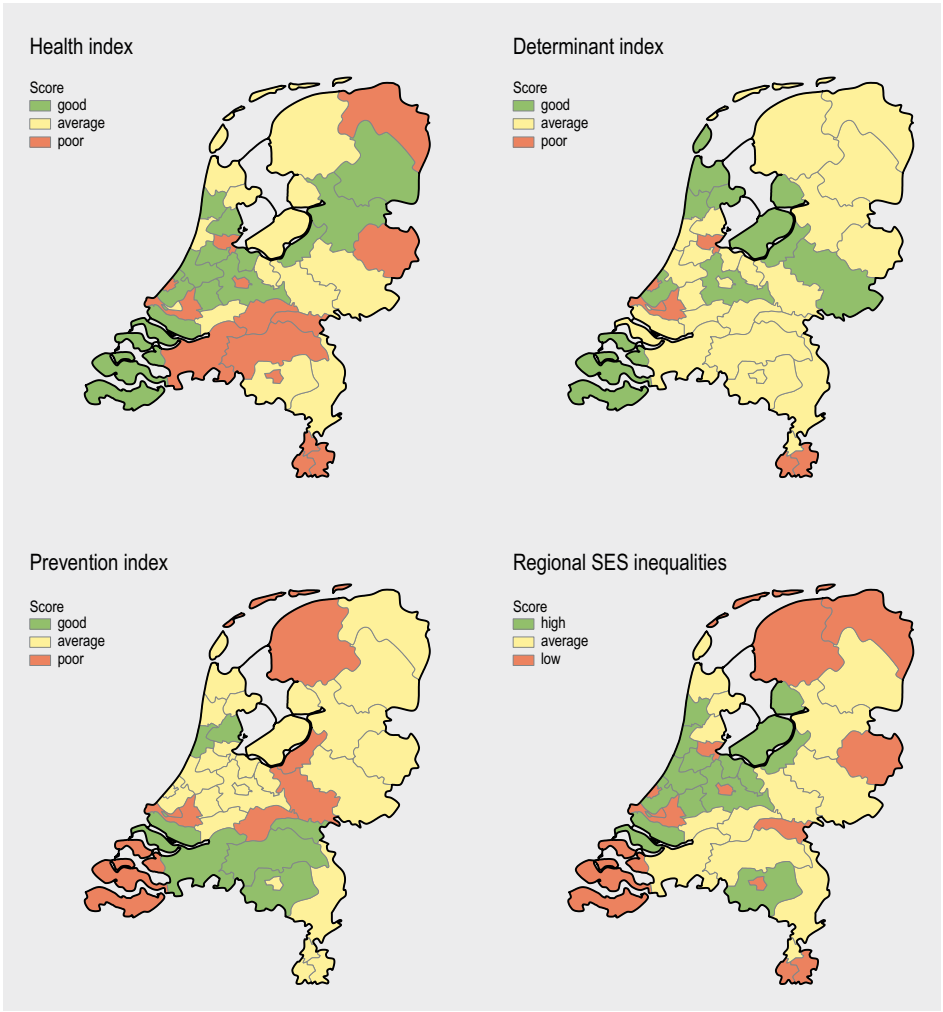

Figure 3.17: Aggregated public health index, determinant index, prevention index and socio-economic status per municipal health service region.

ban areas, the north of the country and Zuid-Limburg. However, considerable socio-economic differences also exist within the municipal health service regions. These can be highlighted by examining the situation in smaller areas within the regions, such as neighbourhoods. Inter-neighbourhood differences are even greater than inter-regional differences.

People in high-SES neighbourhoods are healthier and lead healthier lifestyles

Health deprivation tends to be concentrated in certain neighbourhoods, many of them in the main urban areas, but some elsewhere. This results in sizeable inter-neighbourhood health differences, reflecting the socio-economic statuses (SESs) of the neighbourhood. People in neighbourhoods with a low average SES tend to be less healthy than people in neighbourhoods with a high average SES. Such SES-related differences exist

in, for example, perceived health (Reijneveld, 2002a) and mortality (Van Lenthe et al., 2005).

People living in low-SES neighbourhoods are also more likely to have unhealthy lifestyles than those living in high-SES neighbourhoods. For example, smoking (Van Lenthe & Mackenbach, 2006), obesity (Van Lenthe & Mackenbach, 2002) and leisure-time physical inactivity (Van Lenthe et al., 2006) are all more prevalent in neighbourhoods where the average SES is low than in neighbourhoods where it is high. Where unhealthy eating is concerned, the picture is less clear. In Eindhoven, for instance, there is no consistent pattern of inter-neighbourhood differences in diet (Giskes et al., 2006).

Reasons for inter-neighbourhood differences in health and lifestyle

Certain neighbourhoods are both the site of and the cause of health deprivation (Van der Lucht & Verkleij, 2001). A neighbourhood becomes a site of deprivation on account of the make-up of its population (*compositional explanation*). Deprived areas contain concentrations of people of low SES; such people tend to be in relatively poor health and lead relatively unhealthy lives compared with people of high SES. The make-up of a neighbourhood is the result of long-term migration and selection processes, in which health plays little part (Van Lenthe et al., 2006). A neighbourhood may be the cause of health problems insofar as certain social and physical environmental determinants of health become established within it. This is the so-called *contextual explanation*: people who live in low-SES neighbourhoods are more likely to be exposed to adverse physical and social environmental factors than people who live in 'better' neighbourhoods.

Researchers have so far failed to show that either of the above explanations is more compelling than the other; there is probably a complex interaction between the individual and his/her environment. Social cohesion serves as a useful example in this regard: the individual contributes to social cohesion in his/her neighbourhood and at the same time benefits from it (Kawachi & Berkman, 2000). The relationship between social cohesion and health is considered in more detail in *box text 3.14*.

Particular behavioural phenomena are sometimes attributable partly to very specific physical environmental factors. The poor physical design of many low-SES neighbourhoods, for example, goes some way to explaining why local residents are disinclined to walk, cycle or do any gardening. In addition, the lower level of security (expressed in terms of the policing requirement) that tends to exist in such neighbourhoods contributes to the low levels of sports participation (Van Lenthe et al., 2005).

Accumulation of adverse factors in certain neighbourhoods

Problems of various kinds tend to accumulate in certain neighbourhoods, particularly in the major urban areas. This accumulation is indicative of the close association of various domains. For health differences between neighbourhoods do not exist in isolation, but are closely related to deprivation in various spheres of life. In order to build up a picture of this accumulation of factors, a cluster analysis has been performed at the level of the neighbourhood, urban districts or villages (the four-digit postcode level). This

Box text 3.14: The relationship between district-level social cohesion and health.

Data from the Housing Demand Survey (WBO) have been analysed to determine whether the level of social cohesion within a district may be related to the perceived health of the people who live there. The exercise entailed multilevel logistic regression analysis of information about 55,403 people living in 1,601 districts (four-digit postcode zones). Social cohesion was considered to be a phenomenon reflected in, for example, contact with neighbours and other neighbourhood residents, a sense of belonging to the district and mutual acquaintance with district residents. The districts were divided into quartiles on the basis of their social cohesion score.

In the 25% of districts with the least social cohesion, people were 44% more likely to be unhealthy than people in the districts with the most cohesion (see *figure 3.18*). The results were corrected for the influence of cohesion as personally experienced by the individual resident, so the figures given relate purely to the influence of social cohesion as an environmental characteristic.

To verify the observed correlation between health and cohesion, correction was then made for personal socio-economic status (SES) and for the average SES in the district. For this purpose, educational status and income were used as indicators of SES. This correction was made because districts with less social cohesion tend to be lower-SES districts and because SES and health are related. When personal and district average SES were taken into account in this way, the apparent influence of social cohesion diminished (see *figure 3.18*). Nevertheless, people from the 25% of districts with the least social cohesion remained 27% more likely to be unhealthy than people from the districts with most social cohesion.

It may therefore be concluded that district-level social cohesion is associated with differences in the perceived health of district residents.

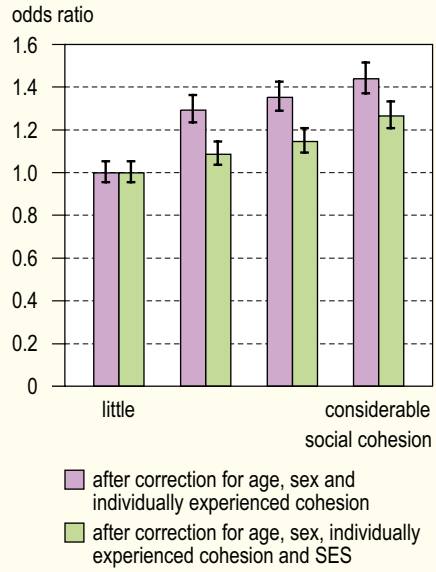

Figure 3.18: Relationship between district-level social cohesion and perceived health (less than good) odds ratio and 95% confidence interval.

involved establishing the frequency with which a large number of more or less adverse factors coincided in a given neighbourhood. These factors included lack of greenery, high work incapacity rate, unsatisfactory housing, nuisance and low dwelling value. The design and findings of this cluster analysis are described in *box text 3.15*.

The greatest accumulation of problems is seen in the four main urban areas, and particularly the districts around the city centres. However, similar conditions are also found at scattered locations outside the four large cities (see *figure 3.19*). In the hearts of the large cities, the concentration of problems is less pronounced. Nevertheless, the areas of high wellbeing and the least accumulation of problems are outside the four major urban areas, particularly in the south and east of the country.

The problem accumulation map also shows how problems are concentrated within the various municipal health service regions, as described in this subsection.

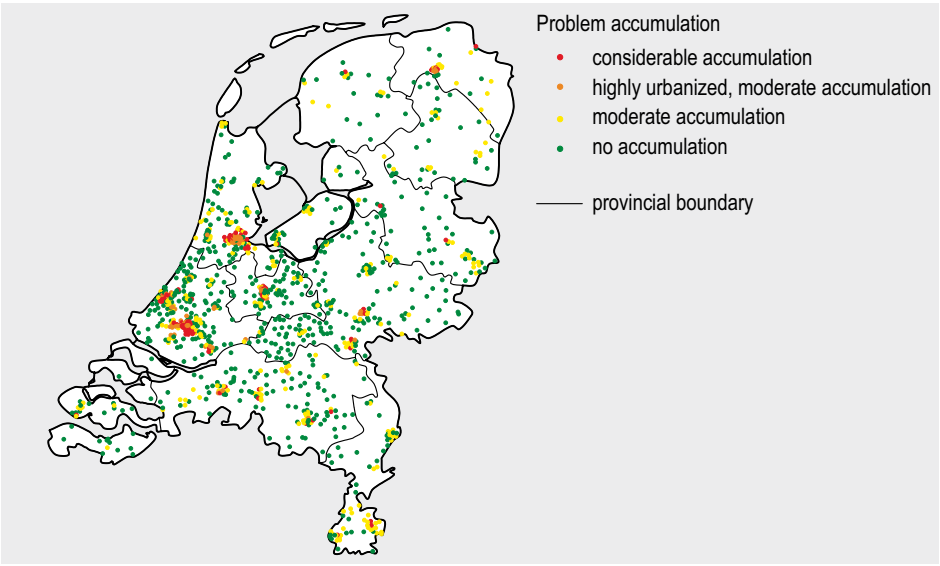

Figure 3.19: Map showing the accumulated prevalence of adverse natural environmental, physical environmental, socio-economic environmental, circumstantial, lifestyle and health factors in four-digit ZIP zones (ZIP areas for which data were not available have been omitted).

3.2.3 Tackling health deprivation

Socio-economic health inequalities on the political agenda since 1986

The government has a duty to promote the health of all citizens. In 1986, the Ministry of Health, Welfare and Sport (VWS) produced a policy document entitled Nota 2000, in which the government explicitly addressed socio-economic health inequalities for the first time. This led to the organization of a national conference on socio-economic health inequalities in 1987, and thus to the first research programme focusing on this issue. This five-year programme produced scientific evidence of the existence in the Netherlands of socio-economic inequalities in nearly all the health indicators considered. A second research programme was started in 1994, with the purpose of evaluating how effective various forms of intervention were in reducing socio-economic health inequalities.

Objectives defined, but few concrete plans

In 2003, the Dutch government formulated an objective for the reduction of socio-economic health inequalities, with the aim of reducing the twelve-year deficit in the healthy life expectancy of people of low socio-economic status by at least 25% by 2020 (VWS, 2003a). In the same year, however, the Court of Audit concluded that the government had at that point developed insufficient plans to actually reduce socio-economic health inequalities (Tweede Kamer, 2003). In 2006, the Court of Audit again urged the Ministry of VWS to specify what is to be done with a view to realizing the objectives, and what results may be expected (Tweede Kamer, 2006b).

Box text 3.15: The neighbourhood-level accumulation of adverse factors: a cluster analysis.

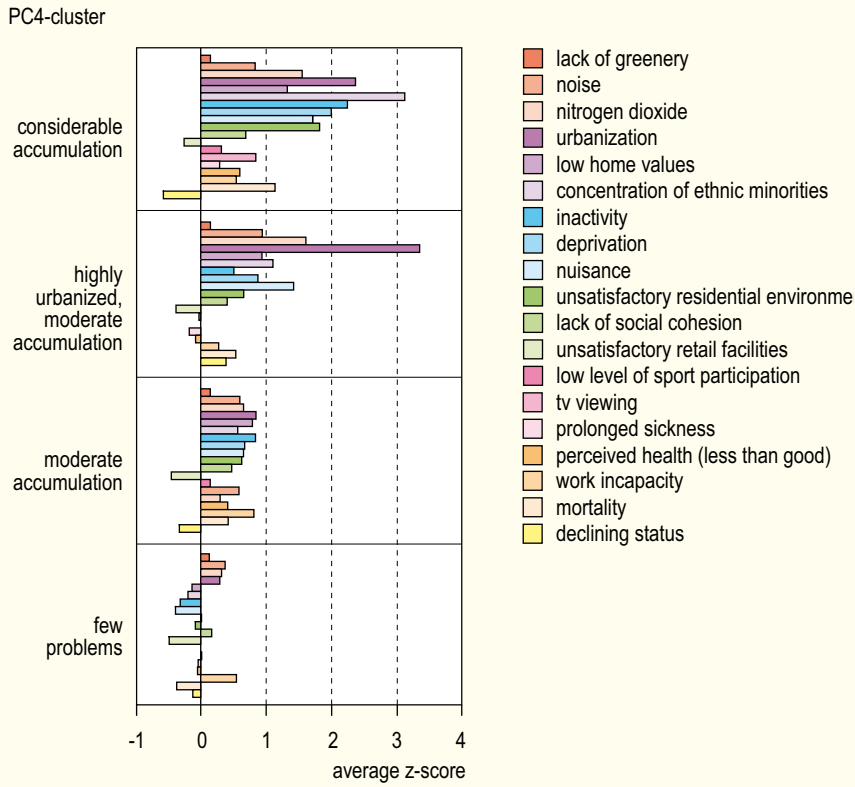

Figure 3.20: Results of a cluster analysis of postcode zones: average standardized scores for the natural, physical and socio-economic environments, living conditions, lifestyle and health per cluster (4), n=1,112).

To shed more light on the accumulation of adverse factors in certain neighbourhoods, a neighbourhood-level cluster analysis has been performed. (In this context, a neighbourhood is taken to be a four-digit postcode, or PC-4, zone.) The exercise involved studying data from various sources concerning the social and physical environment, lifestyle, socio-economic characteristics and health to establish links. The cluster analysis distinguished areas that, on the basis of the variables utilized, appeared to be very similar to one another. In the first analysis, two clusters of postcode zones were identified: one cluster consisting of zones characterized by some degree of problem accumulation, and one characterized by little or no problem accumulation. The 'with-accumulation' zones were then re-analysed in the same way, leading to subdivision into three clusters. Not all the data sources contained information about all PC-4 zones (zip code zones) in the Netherlands. By the combination of sources, some 1,112 zones were ultimately identified, for which full data sets were available. The zip code zones that had to be omitted from the analysis were predominantly those with small populations.

Figure 3.20 shows the four groups of postcode zones (clusters), with the average scores for the various variables. The first three clusters consist of zones characterized by some degree of problem accumulation. The zones in question had below-average (i.e. negative) scores for almost all the indicators. The fourth cluster consists of zones that scored relatively well on all indicators: zones with a high level of wellbeing and few problems.

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Detailed classification of the clusters:

1 This cluster contains the postcode zones in which the accumulation of problems is most serious. In the zones concerned, adverse factors of all categories are present: the average health status of the local residents is poor, the quality of both the living environment and the physical environmental is poor and there is a concentration of socio-economic deprivation.
2 The second cluster is characterized by a high degree of urbanization and moderate accumulation of problems of other categories.
3 The third cluster is also characterized by moderate accumulation of problems in the various categories, but in combination with a slightly higher level of occupational disability.
4 The fourth cluster contains postcode zones with a high level of wellbeing, a good health situation and a favourable social and physical environment.

Other notable findings include:

- The amount of greenery in the immediate environment does not contribute significantly to the differences between postcode zones.
- The main contributors to inter-zone differences are urbanization and socio-economic factors.
- Significant levels of work incapacity are often found in both 'healthy' and 'unhealthy' postcode zones.
- Average levels of sport participation and TV viewing tend to be clustered in much the same way as problems in other fields.

Neighbourhood-based approach to tackling health deprivation

Various approaches may be taken to framing interventions and policy aimed at promoting the health of vulnerable groups: one may focus, for example, on reducing socio-economic deprivation, on tackling intermediate factors in the relationship between socio-economic status/ethnicity and health (such as lifestyle and the physical and social environment), or on improving health care. All these approaches depend on input from and collaboration between various policy sectors, at both the local and national levels: health deprivation is a cross-sectoral problem that requires a cross-sectoral or integrated response. Because problems tend to accumulate in certain areas, the deprived neighbourhood would appear to be a good setting for addressing health deprivation (see *subsection 2.3.3* for details of the neighbourhood-based approach). However, it is important to recognize that the reduction of health inequalities is ultimately best served by policies such as the Major Cities Policy that seek to reduce deprivation in general.

Addressing health deprivation through the Major Cities Policy

One important tool for the reduction of health differences between socio-economic groups and neighbourhoods is the Major Cities Policy, which contains various measures that impact on this issue. Through the Major Cities Policy, for example, the country's main urban authorities have since 2005 been working to reduce weight problems among the young (people up to the age of nineteen). Other initiatives include programmes aimed at changing the habits of vulnerable groups, such as diet and exercise schemes and policies aimed at 'action neighbourhoods' (BZK, 2005). Many of the activities provided for in the Major Cities Policy focus on (people living in) deprived areas, with less-educated people and the ethnic minorities among the key target groups (VWS, 2004a).

Accessibility of care is an important objective

The other primary objective of policies concerned with the ethnic minorities is to ensure the accessibility of health care. In addition, information about ethnic minority clients is being distributed to care providers, and information about health care provision is being communicated to prospective care users within the ethnic minority communities (VWS, 2005d). Of significance in this context is the finding that, although differences in care consumption are to a large extent attributable to differences in health status, there is reason to believe that under-consumption may be occurring in certain fields. Furthermore, while information on the volume of care consumption is available, little or nothing is known about any differences that may exist in the quality of care received by the various socio-economic and ethnic groups.

Despite policy initiatives, health inequalities are not declining

Despite efforts to reduce of health deprivation, health inequalities between socio-economic groups did not decrease in the period 1990 to 2003. For the future, it is important not only to continue monitoring inequalities and making good gaps in knowledge, but also to develop and implement policies aimed at the reduction of health inequality. Furthermore, although we have highlighted areas where scope for improvement exists, it is clear that bringing improvement about will not be easy. Because of the accumulation of adverse factors, policy must be directed not only at behaviour patterns, but also at the context in which health inequalities arise.

3.3 The Netherlands' vulnerability to infectious disease

Infectious disease is once more high on the agenda

Infectious disease has to a large extent been suppressed in the Netherlands by increasing prosperity, good infrastructure (such as water supply systems and sewers), the high level of development and efficient care and preventive programmes (such as the National Vaccination Programme). However, the emergence of diseases such as SARS, BSE and avian influenza has brought infectious disease back into the spotlight. The level of public concern owes much to the relatively unpredictable nature of epidemics and the social disruption they have the potential to cause.

Global and national/regional threats

The Netherlands has to face the threat of infectious disease at various levels. At the global level, there are threats from, for example, avian influenza and other zoonoses (diseases that are transmissible from animals to humans), and potentially from bioterrorism. Other worldwide threats include the growing prevalence of sexually transmitted diseases and the increasing resistance of micro-organisms to antibiotics, as seen in MRSA and multidrug-resistant tuberculosis. At the national/regional level, the Netherlands is vulnerable to vaccine-related infectious diseases. Certain parts of the Netherlands, where there are clusters of unvaccinated people (the 'bible belt'), are vulnerable to epidemics of diseases such as poliomyelitis, rubella and measles.

Various factors increase vulnerability

A number of factors influence the development of an infectious disease outbreak into an epidemic. One of the most important factors is the ease with which the pathogen can be transmitted directly from person to person. In addition, the more infectious the disease is in the period before it is likely to be diagnosed, the more likely an epidemic becomes. The likelihood of an epidemic is also increased significantly if prevention and control measures depend upon prolonged commitment and vigilance from patients, health workers and the authorities.

Government: preparing for the predictable, alert to the unpredictable

Experts and government agencies are aware of the factors that make the Netherlands vulnerable to infectious disease. Nevertheless, events can sometimes take an unexpected turn. The developments involving SARS, for example, have illustrated how an infectious disease can cause worldwide problems, containable only at considerable effort. Therefore, as well as being ready for the predictable, it is very important to be alert to the unpredictable. To this end, the RIVM has set up an early warning forum, in which sudden increases in infectious diseases can be discussed. A strong and flexible response system and effective cooperation and information exchange between experts in the Netherlands and other countries are essential in this regard.

Outbreaks of infectious disease are usually unexpected and often lead to public and political disquiet. The economic and social consequences can sometimes be very con-

siderable, as with SARS and the anthrax letters circulated in the USA at the start of the decade. Thorough preparation can help to minimize the impact and consequences of infectious disease. Government bodies need to be given proper notice of infectious disease threats in good time if they are to respond efficiently with appropriate control and prevention measures.

Infectious disease has to a considerable extent been suppressed in the Netherlands. A number of factors have been influential in this context, including the steady prosperity growth seen over the last century and a half, the good infrastructure (e.g. water supply systems and sewers) and the high level of development. Efficient health care and preventive programmes, such as the National Vaccination Programme, have also contributed. Nevertheless, after a period in which it was largely disregarded, infectious disease is once more the centre of attention. The avian influenza problems of 2003, the rise in sexually transmitted disease and the outbreak of rubella in 2004/2005 illustrate that the Netherlands remains vulnerable to infectious disease.

The Netherlands is confronted by infectious disease threats at various levels: the global level, the national level and the regional level. The level at which the threat or vulnerability exists has implications for the scale of the response: global threats naturally demand a global response, while outbreaks that are confined to the Netherlands necessitate national or regional action.

Using this two-level split as a basis, in the following subsections we provide a brief overview of infectious disease epidemics in the last five years (2000 to 2005) and the associated threats to Dutch public health. The emphasis in this context is on infectious diseases that are transmissible from human to human. Infectious diseases of this kind are more difficult to control, and have more serious consequences for society than infectious diseases communicated by, for example, food or water. In compiling this overview, we have drawn upon the information published in the relevant volumes of the Infectieziekten Bulletin (Infectious Disease Bulletin), published by the RIVM's Centre for Infectious Disease Control, in collaboration with the MHSs, the Dutch Association for Medical Microbiology, the Infectious Disease Society, the National Infectious Disease Control Coordination Structure and the Health Care Inspectorate (www.infectieziektenbulletin.nl).

3.3.1 The Netherlands in a global setting

The main global threat seen in the last few years has been avian influenza. However, other zoonoses (infectious diseases transmissible from animal to human), such as SARS and new-variant Creutzfeldt-Jakob disease, contracted from cattle with BSE, have caused considerable unease around the world in recent times. On the following pages, we look at the zoonoses avian influenza and SARS.

In addition to avian influenza and other zoonoses, the Netherlands is threatened by other infectious diseases occurring around the world and possibly able to reach us either by natural spread or by malicious propagation. One possibility is a bioterrorist attack, involving the intentional distribution of micro-pathogens such as the anthrax bacterium or the smallpox virus. Another worrying global development is the increasing resistance of micro-organisms to antibiotics. This problem is illustrated below by sketching the situation with MRSA and multidrug-resistant tuberculosis. Finally, the present rise in sexually transmitted diseases is also part of a global phenomenon involving changing moral values and sex tourism.

Zoonoses

The most important risk factors in relation to the emergence of zoonoses around the world are the disturbance of ecosystems, economic development and the cultivation of virgin land, particularly former forest land (which can bring people into contact with new animal reservoirs or vectors), demographic developments (population growth, urbanization and population ageing, bringing heightened susceptibility to infection), changing behaviour (increasing air travel, greater sexual promiscuity and new dietary patterns), climate change (which influences the spread of pathogens and vectors), technological advances (e.g. in the bio-industry and medicine), the global transportation of living livestock, and certain geopolitical developments ('failing states', famine, war, lack of investment in public health care).

Contact between humans and microbes is the key with all infectious diseases, but viruses that are transmissible from human to human, such as the corona virus that causes SARS and the influenza virus, pose the greatest risk (see *box texts 3.16* and *3.17*).

Bioterrorism

In recent years, considerable attention has been given to the use of micro-organisms as biological weapons (bioterrorism). History tells us that the use of biological agents as weapons was already well established before the concept of pathogenic micro-organisms became understood (see *table 3.9*). Agents that might be used in this way include (pneumonic) plague, smallpox, anthrax, tularaemia and viral hemorrhagic fevers, such as Ebola and Lassa fever. Furthermore, the malicious infection of plants and animals could cause considerable economic hardship and disruption. Biological weapons could in principle cause death and destruction, but whether it will ever be possible to kill people on a large scale by this means remains unclear. However, for terrorists that does not necessarily matter: the panic and social disruption that biological weapons can create may themselves serve as sufficient motivation.

The attacks on the Twin Towers in September 2001, the distribution of anthrax spores by post in the USA, and the war in Iraq have pushed bioterrorism high up the agenda, even in the Netherlands. Smallpox and anthrax have attracted particular attention in recent years. In the Netherlands, a preliminary study has been set up to investigate the scope for so-called syndrome surveillance: the (electronic) monitoring of data to

Box text 3.16: SARS.

High population density, intensive contact with animals and frequent travel were major contributory factors in the SARS epidemic of 2003. The first cases of the 'mysterious form of pneumonia' subsequently classified as SARS were reported in November 2002 in the southern Chinese province of Guangdong. In 2003, the epidemic took on a new dimension, when ten guests at a hotel in Hong Kong were infected, before moving on to trigger local epidemics in Toronto, Singapore and Hanoi. Eventually, the illness spread to nearly thirty countries, where more than eight thousand people contracted the disease, resulting in approximately eight hundred deaths. The economic and social consequences were considerable. The global cost, mainly in the form of reduced investment in Asia and reduced air travel (due partly to a decline in tourism), was estimated at between 33 and 140 billion dollars.

The cause of the illness is infection by a corona virus not known before 2003. After an incubation period of two to ten days, infected individuals develop fever, headaches and muscle pain and often diarrhoea. Most go on to develop pneumonia within a further few days, necessitating ventilation in some cases. The disease leads to death mainly among elderly patients. The exact origin of the SARS virus is still not known, but it almost certainly came from an animal reservoir.

SARS did not reach the Netherlands. Nevertheless, protocols and contingency plans were drawn up in preparation for a possible outbreak.

Information about the SARS epidemic was communicated to the public and to health workers using the media and the internet in new ways. Under the supervision of the WHO, researchers and medical practitioners treating SARS patients exchanged data, so that scientists all over the world were able to help look for the cause and develop treatment strategies. By similar channels travel restrictions and other control measures were introduced. Eventually, the epidemic's spread was halted by the combination of communication via modern media, high-grade research and measures known to be effective since the middle ages: the isolation of patients and quarantining of possibly infected individuals.

facilitate the effective early detection of rises in the prevalence of unusual infectious diseases due to natural or malicious causes.

Table 3.9: Historical examples of the use of biological weapons (Source: Lewis, 2001).

When?	What?
1346	During the siege of the city of Kaffa, in modern Ukraine, the Tartars catapulted the bodies of people who had died of Bubonic plague over the city walls in order to establish the disease among the defenders, thus facilitating their victory.
1763	In Pennsylvania, the commander of the British forces, Lord Amhurst, suggested giving the handkerchiefs and bed sheets of smallpox patients as 'good will' gifts to Indians in order to cause a smallpox epidemic among them.
WO-I	German secret agents attempted to infect beef cattle and the horses of allied forces with anthrax and glanders.
WO-II	Japan conducted extensive research into biological warfare. Thousands of prisoners were used as guinea pigs to test the lethality of various micro-organisms, including anthrax, cholera, typhoid and Bubonic plague. Drinking water and food in enemy areas were also contaminated.
1984	In Oregon, followers of the Indian guru Bagwan Shree Rajneesh contaminated salad in salad bars with *Salmonella* to prevent people from voting in a forthcoming election. As a consequence, more than 750 people fell ill.
1995	The Aum Shinrikyo sect released Sarin gas in Tokyo's underground system, killing twelve people. It emerged that the sect had made several earlier attempts to disperse botulinus toxin and anthrax in Tokyo.
2001	In the USA, anthrax spores are distributed by post. Twenty-two people were ultimately infected, of whom five lost their lives.

Box text 3.17: Avian influenza.

Since December 2003, various countries have witnessed outbreaks of avian influenza in poultry and other birds, caused by the dangerous H5N1 subtype of the avian influenza-A virus. The outbreaks in poultry very probably resulted from infection by migrating waterfowl. Contact with the virus leads to high levels of mortality among chickens, ducks and turkeys. The infection is occasionally observed in mammals, such as tigers and cats. A number of outbreaks have occurred in Europe. Furthermore, the avian influenza-A virus can be transmitted from birds to humans. Worldwide, more than two hundred human cases have been reported, and approximately half of them ended in fatality.

The most serious threat posed by this avian influenza epidemic is not occasional deaths of the kind so far seen, but the possibility that the virus will adapt to the human host, enabling person-to-person transmission. A virus that had mutated in this way would quickly be able to spread around the world. The consequences of such a pandemic could be very grave. It is estimated that, even in the most favourable scenario, an avian flu pandemic could kill between two and 7.4 million people; in less favourable scenarios, the number could be even greater. The social and economic consequences could be even more disastrous.

Considerable effort is being made to develop a vaccine against the H5N1 virus, but it is not presently possible to predict when it will be widely available. In order to nevertheless be ready for a influenza pandemic, the Dutch government decided in 2005 to build up a stock of five million doses antiviral agent. In addition, contingency plans are under development, setting out what should be done in the event of a pandemic. It is hoped that these measures would help to minimize the death toll and the social disruption caused by any future pandemic.

In 2003, the Netherlands was affected by an extensive avian influenza epidemic. This episode also involved an influenza A-virus, but of the subtype H7N7. Despite control measures, such as the slaughter of livestock on farms adjacent to those with infected birds, the disease spread rapidly to poultry farms in various parts of the Netherlands. More than 250 farms reported infections and more than 25 million animals were slaughtered. In some cases, the virus was passed on to humans. In 336 cases, the infection caused conjunctivitis (eye inflammation), and in eighty-five individuals it induced flu-like symptoms. One vet died from pneumonia caused by influenza A H7N7. The epidemic continued for three months.

The characteristics of anthrax and smallpox, and the way that the Netherlands is countering these threats, are described in *box texts 3.18* and *3.19*.

Antibiotic resistance

Another worldwide threat of a very different order is posed by the increasing resistance of micro-organisms to antibiotic agents. Under pressure exerted by widespread antibiotic use, micro-organisms can develop resistance to one or more of these agents. If these resistant micro-organisms spread, a problematic situation arises. Infections caused by resistant micro-organisms are more difficult to treat. Furthermore, resistance can be transferred from one type of micro-organism to another, leading to the emergence of still more therapy-resistant infectious diseases.

The primary concern is resistant micro-organisms capable of spreading in the hospital environment or in the general population, such as methicillin-resistant *Staphylococcus aureus* (MRSA), the multidrug-resistant tuberculosis bacterium, *Acinetobacter baumannii* and micro-organisms that produce extended-spectrum beta-lactamase (ESBL), a substance that renders penicillin and its derivatives ineffective.

Box text 3.18: Anthrax.

Anthrax is an infectious disease caused by the bacterium *Bacillus anthracis*. The bacterium creates spores that can survive in the ground for decades. In humans, the disease can take three forms. In order of increasing seriousness, these are:

1. Cutaneous or skin anthrax: infection via broken skin leads to the development of an ulcer with a black crust.

2. Gastrointestinal anthrax: consumption of spore-contaminated food can lead to a fatal gastrointestinal infection.

3. Inhalation anthrax: the inhalation of spores leads to serious and usually fatal pneumonia.

In October 2001, anthrax spores were maliciously distributed by post in the USA. The strain used proved to originate from one of the laboratories in that country where research into B. anthracis is conducted. The events in America prompted the Netherlands' National Infectious Disease Control Coordination Structure to rewrite its protocol on *B. anthracis*. The protocol now includes a section setting out how suspect post should be dealt with in the Netherlands, the diagnosis procedure and what should be done with people who have been exposed to anthrax. In autumn 2001, a total of 858 letters and packages were examined for anthrax spores. Although the numbers have since declined, suspect packages have continued to be submitted for testing; up to 1 January 2006, the total number of items involved was 1,335. However, no post contaminated with anthrax spores has so far been found either in the Netherlands or elsewhere in Europe.

Box text 3.19: Smallpox.

Smallpox is a highly contagious viral illness, which killed countless millions of people in the last millennium alone.

This disease is characterised by vesicles on the skin and mucous membranes. Human-to-human transmission of the virus is usually via the respiratory tract, from where infected droplets are expelled by coughing. However, infection can also result from contact with puss from vesicles or with vesicle crusts. Following a series of successful vaccination campaigns, smallpox was eventually eradicated in 1977.

The human smallpox virus is preserved in just two laboratories in the world, one in the USA, the other in Soviet Union. Some commentators have expressed fears that, with the collapse of the Soviet Union, the virus could fall into the hands of a terrorist organization and be used for bioterrorism.

In the Netherlands, concerns about the possible reintroduction of smallpox have led to various precautionary measures being taken. In October 2001, the Minister of Health, Welfare and Sport ordered the production of sufficient cowpox vaccine to enable the vaccination of the entire Dutch population. In addition, contingency plans have been developed. Fortunately, it has not (so far) proved necessary to put the plans into action.

The Netherlands' policy for the control of antibiotic resistance has two elements:

- The limitation of antibiotic use: Antibiotic use in the Netherlands is low in comparison with many other European countries.
- The isolation and treatment of carriers: The Netherlands has a strict isolation policy, especially in relation to people infected with MRSA.

Partly because of the consistent application of this policy, antibiotic resistance is not a very great problem in the Netherlands (see *table 3.10*). In many other countries, however, the situation is less reassuring. Furthermore, the great increase in travel makes the importation of resistant micro-organisms more likely.

Table 3.10: Extent of the antibiotic resistance in various types of micro-organisms in the Netherlands.

Micro-organism	(Estimated) prevalence
Methicillin-resistant *Staphylococcus aureus* (MRSA)	1-2% of all *Staphylococcus aureus* isolates
Multidrug-resistant *Mycobacterium* tuberculosis	Approximately 1% of all isolates submitted to the RIVM
Acinetobacter baumannii	Causes occasional outbreaks, precise extent not known
ESBL-producing micro-organisms	Prevalence of ESBL-producing *E. coli* and *Klebsiella* isolates less than 1%

The risk of resistant pathogens spreading is greatest in a hospital environment, for various reasons, including the vulnerability of the patient population and the performance of surgical procedures. However, in recent years, infections involving resistant micro-organisms have become increasingly frequent in the community, among people to whom no obvious risk factors apply (community-acquired MRSA, resistant *E. coli*). *Box texts 3.20* and *3.21* describe the position with regard to two important resistant micro-organisms: MRSA and multidrug-resistant tuberculosis. Infections involving these pathogens are difficult to treat and there is a real risk of spread, both in the hospital population and in the wider community.

Over-use of antibiotics can not only lead to the development of resistant micro-organisms, but can also interfere with the normal intestinal flora, giving pathogenic micro-organisms more chance of becoming established. One of the organisms that sometimes benefits in this way is *Clostridium difficile*, one of the major causes of diarrhoea in hospital patients (see *box text 3.22*).

Sexually transmitted diseases

In recent years, sexually transmitted diseases (STDs) have been on the increase in the Netherlands, as in other Western European countries. The rise in common STDs, such as chlamydia, gonorrhoea, syphilis and HIV infections is indicative of an increase in unsafe sexual behaviour in the general population and among homosexual men in particular. However, the rising apparent incidence is also partly attributable to active testing and improved registration.

STDs are increasingly common in both the heterosexual and homosexual populations, but especially among homosexual and bisexual men. A number of years ago, a new, relatively unknown STD started appearing in the latter group: rectal Lymphogranuloma venereum (LGV; see *box text 3.23*). In addition to homosexual and bisexual men, people under the age of twenty-five form a risk group where gonorrhoea and chlamydia are concerned. Two thirds of all chlamydia infections, for example, are found among women in this age group, and 32% among young men (see also *box text 3.24*).

The increasing incidence of sexually transmitted diseases may be indicative of a rise in unsafe sexual behaviour. Another worrying development is the increasing frequency with which HIV infection is found in conjunction with other STDs, since it facilitates

Box text 3.20: MRSA.

MRSA is a major cause of infection both in hospitals and in the community. MRSA infections have been reported all over the world. In Europe, a clear north-south gradient is apparent, with the prevalence of infections lowest in the north. The percentage of *S. Aureus* strains isolated in the Netherlands that prove to be MRSA is relatively low, but gradually increasing.

The strains that cause MRSA infection outside hospitals, known as community-acquired MRSA (CA-MRSA), have genes for the Panton-Valentine leukocidin (PVL) toxin and cause serious skin infections and sometimes a fatal pneumonia in otherwise healthy and often young people. The prevalence of CA-MRSA appears to be rising around the world. In the Netherlands, approximately 10% of the MRSA isolates submitted to the RIVM prove to be positive for the PVL genes; some of these are CA-MRSA.

Following the discovery that several members of two families of pig farmers were infected with MRSA, the RIVM and the Food and Consumer Product Safety Authority investigated the occurrence of MRSA in pigs. Approximately 40% of 540 randomly selected porkers were found to be carrying a 'non-classifiable' form of MRSA. Furthermore, when a group of twenty-six pig farmers at a regional meeting were tested, six of them were found to be carrying the bacterium. The implications of these findings have yet to be investigated.

Both community-acquired and hospital-acquired MRSA presently remains treatable. However, MRSA infections would become untreatable if the pathogen assumed resistance-plasmids from vancomycin-resistant enterococci (vancomycin-resistant *Staphylococcus aureus*, VRSA). Such enterococci are a normal component of the intestinal flora of humans and animals. Vancomycin-resistant enterococci (VRE) are low-virulence bacteria, but are insensitive to many antibiotics. Globally, VRSA is a very minor problem and has yet to be detected in the Netherlands.

Box text 3.21: Multidrug-resistant tuberculosis (MDR-TB).

In recent years, the incidence of tuberculosis (TB) has been reasonably stable in the Netherlands: about 1,400 cases a year are reported. Most of these cases involve people arriving in the country from abroad. Thus, TB is increasingly an imported disease. The tuberculosis bacterium is described as multidrug-resistant if it is insensitive to two or more types of medication. People with MDR-TB are less likely to recover from infection. On average, the treatment of MDR-TB takes one and a half to two years and is extremely complex and expensive.

MDR-TB is a serious problem mainly in Eastern European countries and in the former Soviet Union, where tuberculosis patients are ten times as likely to have a multidrug-resistant infection as those elsewhere. In the Netherlands, MDR-TB is presently a minor problem (see *table 3.10*). The country's first outbreak of the multidrug-resistant form of the disease occurred in 2004: an Eastern European tuberculosis patient infected nine other people, two of whom developed pulmonary tuberculosis.

Box text 3.22: Clostridium difficile.

In various countries (USA, Canada and the UK), an increase has been observed since 2002 in the number of hospital patients suffering *Clostridium difficile* infections with serious outcomes. The *Clostridium difficile* bacterium can cause diarrhoea and serious intestinal inflammations. A type of *C. difficile* rarely seen prior to 2002 and known as type 027 often appears to be the cause. Infection with this type leads to serious illness and also appears to respond less well to the usual treatment.

Outbreaks of hospital-acquired infection caused by *C. difficile* are difficult to control and necessitate numerous countermeasures. In 2005, type 027 was also discovered in a number of Dutch hospitals, leading to the introduction of special surveillance measures and the formulation of control guidelines.

the transmission of HIV. It is in the interest of public health to try to prevent the further spread of STDs and HIV by more intensive preventive programmes aimed at specific

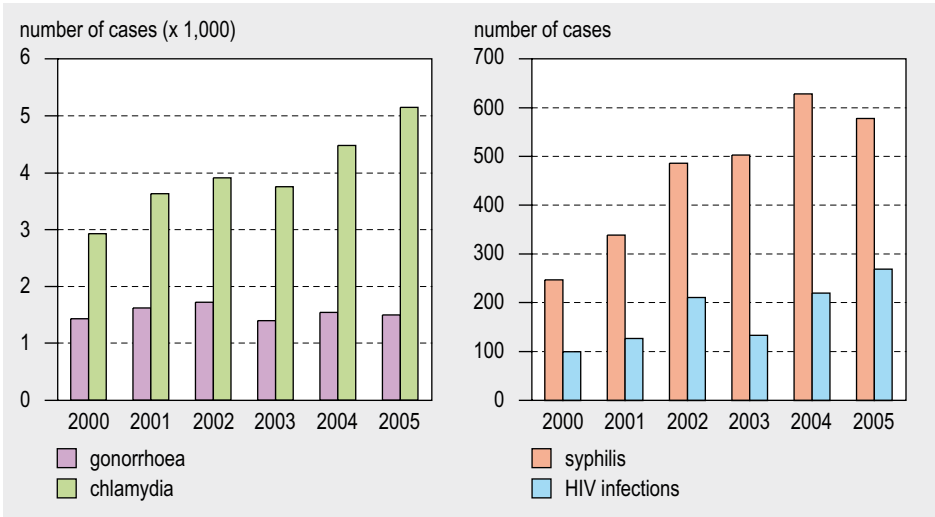

Figure 3.21: Chlamydia, gonorrhoea, syphilis and HIV infection case number trends between 2000 and 2005 (Source: RIVM STD Registry, 2000-2002, STD Monitoring Station 2003-2005).

risk groups and geared to the promotion of safe sex and the early detection and treatment of STDs. In 2004, a national programme of screening pregnant women for HIV was introduced with a view to reducing the likelihood of mothers passing the infection on to their children. The Ministry of Health, Welfare and Sport has also invested in expansion of the supplementary curative STD control system, so that by 2006 there was a national network of STD centres. There are also plans to make STD prevention more ef-

Box text 3.23: LGV.

In 2003, a previously little-known STD called rectal Lymphogranuloma venereum (LGV) was first observed in men with homosexual contacts. Most homosexual and bisexual men found to have LGV infections were also HIV-positive. The patients reported having had unprotected sexual relations, usually with casual partners, in other countries, such as Germany, the UK, Belgium and France.

Cases of rectal LGV were also reported in the USA and Canada. The outbreak of rectal LGV led to intensive surveillance and control measures, including information campaigns and action to warn the partners of infected men. By 1 January 2006, 178 cases of rectal LGV had been reported and it appeared that the epidemic had peaked. Nevertheless, cases are still being detected in considerable numbers in neighbouring countries, so it is important to remain alert in relation to this new illness.

Box text 3.24: Chlamydia.

Chlamydia is the most frequently diagnosed STD in the Netherlands. Many infections don't lead to symptoms of illness, but transmission to sexual partners is nevertheless possible in such subclinical cases. In the longer term, complications can arise, such as reduced fertility or even infertility in women.

Chlamydia is found with approximately equal frequency in women and men. However, it is more common in certain ethnic groups. About two thirds of women diagnosed with chlamydia are less than twenty-five years old. Selective screening of sexually active people aged fifteen to twenty-nine is shortly to be started in urban areas.

fective. National prevention programmes have been developed for specific risk groups and one organization has been made responsible for each programme. STI-AIDS Netherlands has the task of coordinating the prevention programmes. Also, since the start of 2006, the RIVM's Centre for Infectious Disease Control has assumed responsibility for national supervision of the STD control activities. It is hoped that these measures will together halt the advance of STDs.

3.3.2 Threats specific to the Netherlands

The National Vaccination Programme (Dutch initials: RVP) was set up in 1957, with the aim of ensuring the systematic vaccination of all children in the Netherlands under the age of ten. The illnesses against which children are vaccinated are: diphtheria, whooping cough, tetanus and poliomyelitis anterior acuta (DTP-polio), Haemophilus influenzae type b (Hib), mumps, measles and rubella (MMR), infection by meningococci of the sero-group C (Men C), hepatitis B (Hep B) and pneumococci (since April 2006). Hepatitis B immunization was added to the RVP in 2003 for a small group of children whose parents originate in a country where hepatitis B is endemic or whose mothers are known to be hepatitis B carriers.

Despite the RVP, the Netherlands remains vulnerable to vaccine-related infectious diseases. Participation in the National Vaccination Programme is voluntary, with the result that the vaccination rate is determined largely by the willingness of parents to allow their children to be vaccinated. Certain groups within society are opposed to participation in the RVP. The main such group consists of people who have religious objections to vaccination. In the Netherlands' so-called 'bible belt' (a band running across the country from the southwest to the north-east; see also *figure 3.22*) there are clusters of fundamental Christians, many of who decline vaccination. Numbering an estimated 300,000, this group is relatively small, but because its members live in close-knit, geographically coherent communities, unvaccinated individuals do not benefit from what is known as 'herd immunity'. As a result, the communities in question are vulnerable to new epidemics, in particular epidemics of poliomyelitis (see *box text 3.25*), rubella (see *box text 3.26*) and measles. Policy toward this group involves the provision of objective, balanced information on the RVP and the illnesses against which protection is provided, combined with vigilance for the possible outbreak of the infectious diseases concerned.

In addition to those who decline vaccination for religious reasons, there are also people who doubt the value of vaccination, or are concerned about possible side effects. Non-religious objectors tend to be scattered through the general community, and consequently the risk of an epidemic stemming from this group is small because of the protective effect of herd immunity. On the other hand, there is a proportion of the public that would like to see vaccination provided for a wider range of infectious diseases. Hence, in recent times, public and political pressure has led to the introduction

Box text 3.25: Poliomyelitis.

The WHO has declared Europe polio-free since 2002. Nevertheless, a watchful policy is advisable. In 2001, a poliomyelitis epidemic began in Nigeria, which spread to various countries in Africa and further afield (Indonesia, Yemen). Seats of the disease still remain in India, Pakistan and Afghanistan as well. Poliomyelitis has, however, been eradicated from North and South America.

Unvaccinated people in the Netherlands could possibly be at risk from the introduction of poliomyelitis by travellers or immigrants from countries where poliomyelitis remains a problem. However, the spread can sometimes be in the opposite direction: during the poliomyelitis epidemic of 1992, the virus was carried from the Netherlands to unvaccinated people of Dutch origin and similar faith living in Canada.

Box text 3.26: Rubella.

In the latter part of 2004, a rubella epidemic surfaced among unvaccinated fundamental Christians (see *figure 3.22*). The epidemic began in Twente, and spread through parts of the Netherlands with a low vaccination level and thus to Canada. In response to the epidemic, fundamental Christian women were offered vaccination. A total of 387 cases were confirmed by laboratory tests, twenty-nine involving pregnant women (in the period September 2004 to 13 September 2005).

The actual number of rubella infections will in fact have been much higher, because lab tests were performed in only a minority of cases. If a pregnant woman contracts the illness in the first half of her term, her newborn baby is liable to suffer congenital rubella syndrome. This syndrome may be associated with various abnormalities, including deafness, heart abnormalities and development problems. In February 2006, fifteen infants were known to have congenital rubella infections; nine of them also had physical abnormalities.

of acellular whooping cough vaccination and meningococci C vaccination. Criticism of state vaccinations programmes is also seen in other western countries.

Increasing and retaining the support of parents is one of the biggest challenges facing the RVP. The vaccination rate in the Netherlands is above 95%. To maintain this high level of vaccination, the government is committed to providing good, objective information about the RVP (see also the National Vaccination Programme website, www.rivm.nl/rvp/).

3.3.3 Prepared for the predictable, alert to the unpredictable

From the examples given above, it is possible to draw conclusions about the Netherlands' vulnerability to epidemics. Outbreaks of infectious disease are normally unexpected, but not always unpredictable. The occurrence of the five epidemics, and the problems associated with their control, were to some extent predictable, and to some extent unpredictable. Considering only the predictable aspects, the following points are worth noting.

1 All five epidemics involved diseases that are transmissible from human to human, with the exception of anthrax. This is no coincidence. Interpersonal contact is unavoidable. Epidemics that involve human-to-human transmission are the most difficult to tackle, because countermeasures always depend on the cooperation of, and

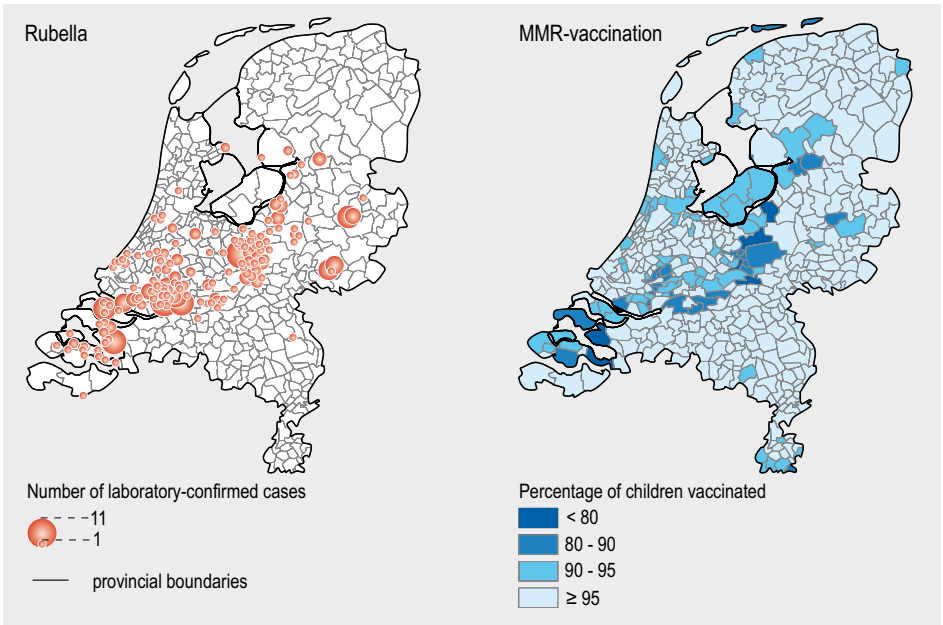

Figure 3.22: The spread of rubella in the Netherlands in 2004/2005 and the vaccination rate on 1-1-2004 (Source: National Atlas of Public Health).

sometimes the willingness to make behavioural changes of, certain groups of people. In theory, food-borne infections or infections resulting from bioterrorism could cause serious epidemics, even if no human-to-human transmission is involved. History shows that, for example, pathogens spread via water and air can also lead to widespread epidemics (as with cholera).

2 Another common feature of all five epidemics described above, is the difficulty of diagnosing infection in all carriers: smallpox can be confused with chickenpox, making it possible for the carrier to pass the infection on to others before the disease is recognizably manifest; influenza is contagious even at the stage where it is typically indistinguishable from a common cold; poliomyelitis is usually asymptomatic; HIV is contagious for a long time during the AIDS incubation period; and MRSA infections often have no discernible symptoms.

3 Almost all epidemics originate abroad. The Netherlands is an open society with extensive contacts with the rest of the world. Consequently, illnesses that are not present in the Netherlands can be introduced unexpectedly from elsewhere.

4 Some epidemics are associated with specific forms of hazardous behaviour, such as unsafe sex and the refusal of vaccination. Groups that engage in such hazardous forms of behaviour are also vulnerable to other infections. Epidemics of measles and rubella have occurred among people who refuse vaccination, and epidemics of other STDs have been reported in homosexual and bisexual men. Other groups that are at significantly elevated risk of infections of various types include people with

impaired resistance (e.g. cancer patients and the very elderly) and hospital personnel.

5 The Netherlands is vulnerable to epidemics of diseases whose prevention depends on the long-term commitment of large numbers of people or on large-scale control measures.

Experts and government agencies are aware of the factors that make the Netherlands vulnerable to infectious disease. Nevertheless, events can sometimes take an unexpected turn. The developments involving SARS, for example, have illustrated how a zoonose can cause worldwide problems, containable only at considerable effort. Therefore, as well as being ready for the predictable, it is very important to be alert to the unpredictable. To this end, the RIVM has set up an early warning forum, in which sudden increases in infectious diseases can be discussed. A strong and flexible response system and effective cooperation and information exchange between experts in the Netherlands and other countries are essential in this regard. On the international stage, organizations such as the World Health Organization (WHO) and the recently created European Centre for Disease Prevention and Control (ECDC) are important players in the field of infectious disease control. At the national level, the establishment of the Centre for Infectious Disease Control represents an important step forwards in the ongoing efforts to optimize the prevention and control of infectious diseases.

3.4 Public health in the European context

Netherlands ranks a fair average within the EU-25

The Netherlands does relatively well where a number of indicators concerning avoidable mortality and morbidity – cardiac disease, suicide, road traffic accidents and AIDS – are concerned. In addition, the Netherlands scores well on a number of important health determinants and preventive interventions: physical activity, overweight among young people, problematic drug use, alcohol consumption, the use of contraceptives by young people, and perceived social support. The areas in which the nation could do better are smoking, binge drinking by young people and breastfeeding. Comparing trends in the Netherlands with those elsewhere, the trend in lung cancer among women is particularly poor. Average female life expectancy is rising again, but not as quickly as can be observed for most other countries.

From a comparison based on thirty-seven indicators within the broader domains of health status, health determinants and prevention/care, it becomes clear that the Netherlands ranks a fair average within the EU-25. When the indicator scores are placed in three bands, the Netherlands is in the lowest band where seven indicators are concerned, in the middle band for a further eight indicators, and in the top band for twenty-two indicators.

Dutch public health policy has more scope to learn from best practices in other countries

In various countries, a move towards a more rational, evidence-based public health policy can be observed. This requires a good information basis (monitoring), clear prioritization and planning, intensive collaboration among actors in the field and effective stewardship. It also implies that policy, programmes and interventions are evaluated and tested against predetermined criteria to determine their effectiveness and cost-effectiveness. In this field, the Netherlands can learn a lot from best practice in other countries.

Compared with the Netherlands, several other countries address socio-economic health inequalities more explicitly and more systematically, and use integrated health policy on a more systematic basis.

Again compared to other countries, health promotion and prevention is a relatively separate health system compartment in the Netherlands. This can have a negative effect on the implementation of public health policy and preventive initiatives within the health care system. Given the recent health system reforms, the question emerges whether these reforms will reinforce the already large gap between prevention and care/cure. Will the new system support or frustrate our public health ambitions?

European Union has an impact on Dutch public health and health care

European regulation and policy do impact on public health and health care in the Netherlands. Many of these, however, originate from policy sectors other than health, such as the internal market and social security. A 'healthy' relationship with Brussels therefore requires a broad view across a range of policy areas. Through the European social agenda, the European Commission and the member states pursue common objectives

on the quality, accessibility and financial sustainability of health care and longterm care. The Dutch care sector should become actively involved in this process.
Participating in European networks and projects enables the Netherlands to keep up with innovative thinking, methods and best practices developed in other member states. This is beneficial to public health and health care in the Netherlands, particularly where European initiatives reinforce Dutch policy priorities. Stakeholders from within the Dutch health sector could seize more European opportunities. Both stakeholders and government could contribute to this, with the latter primarily in a facilitative role. A national fund to support participation in European projects could be helpful in this respect.
A relatively small country, the Netherlands should become more intensely involved in Brussels and its health agenda. Close collaboration and exchange of 'European experience' between national government and national public health sector organisations are clear prerequisites for optimal grip on the European policy development and implementation cycle.

3.4.1 A comparative assessment of the health situation in the Netherlands

The traffic-light rating system
One of the key findings of the 2002 PHSF was that the Netherlands was slipping to an average position in the European 'health league'. This conclusion was based mainly on the lack of improvement in female life expectancy and the poor position with regard to perinatal mortality. An average position was considered disappointing, because not long before the health situation in the Netherlands had been significantly better than in most European countries.

So, how is the Netherlands doing now? Has the nation continued to slide down the health league? How does the Netherlands compare now that the EU has been enlarged to twenty-five states? In the previous chapters, international comparisons have been made at certain points. In this subsection, we summarize the Netherlands' position in the context of the EU-25, as measured using a series of indicators. The indicators in question have been selected from the European Community Health Indicators shortlist (Kramers & The ECHI team, 2005), on the basis of the size of the health problem to which they relate, the extent to which it can be influenced by policy, and the availability of data. This set can thus be considered as a series of indicators of the Netherlands' performance within the EU on a number of key public health matters. We make no pretence as to the completeness of the picture presented here; in the fields of prevention and health care in particular, the selection of indicators is limited.

In relation to each indicator, performance is rated using a 'traffic light' system: the twenty-five EU member states (or a smaller number in some cases) are ranked from 'worst' to 'best' and the ranking list is then divided into three groups of equal size. The

countries in the worst tertile (third) are given a red 'light', those in the middle tertile an amber, and those in the best tertile a green. In the overview tables (*tables 3.11* and *3.12*) one can see from the 'traffic lights' how the Netherlands performed compared to the rest of the EU states in relation to the various indicators. The traffic light ranking system gives a general impression of the health situation in the Netherlands in an international context. The data on which the tables are based and the origins of these data are given in detail in *appendix 5*. In the appendix, a table is presented for each indicator, listing the five best and the five worst countries, as well as the averages for the fifteen old EU member states (EU-15), the twenty-five current members states (EU-25) and the Netherlands.

Where relevant, separate scores are given for men and women, or for young people. A degree of uncertainty is associated with most statistics. Hence, one should not attach too much importance to minor quantitative differences, or to rankings based upon such differences.

One of the criteria applied when selecting indicators for use in this comparison was the availability of data. For a number of countries, no recent data were available. Because certain factors, such as the smoking rate, can be subject to rapid change, we have not presented any data relating to years prior to 2000. As a result, Belgium, for example, is often not included in the ranking because in many cases the most recent Belgian data relate to 1997. Only in relation to overweight have data that predate 2000 been included.

The 'traffic lights' reflect the situation in each country at a particular moment in time; no account is taken of trends over time or of differences within countries. The trends in various indicators in the Netherlands were described in *chapter 2*, but in the present context we are concerned mainly with how the trends in this country compare with those in other countries. The 'traffic light' tables include occasional notes regarding relevant trends, particularly where the Dutch trend is significantly more positive or negative than those in other countries. In addition, a number of relevant trends are described in a little more detail in the body text.

The current picture: the Netherlands ranks a fair average within the EU-25

Looking at the overview tables (*tables 3.11* and *3.12*), the Netherlands generally emerges as ranking a fair average within the EU-25. The Netherlands is in the lowest band where seven indicators are concerned, in the middle band for a further eight indicators, and in the top band for twenty-two indicators.

Table 3.11: Health status indicators (Source: see appendix 5).

Rating	Indicator
	• The *incidence of lung cancer* is higher only in Hungary, Denmark, the UK, the Czech Republic and Italy. • *Mortality attributable to lung cancer* is higher only in Hungary, Poland and Denmark. • The *incidence of breast cancer* is higher only in Denmark and Sweden. • *Mortality attributable to breast cancer* is higher only in Denmark.
	• *Total mortality* • *Total cancer mortality* • *Life expectancy at birth (women); trend: slight rise, less than in many other countries* • *Infant mortality* • *Serious ADL impairment (activities of daily life)* • *Incidence of AIDS*
	• The *life expectancy* of Dutch *men* is just high enough to get the Netherlands into the best eight in the EU. • *Healthy life expectancy* is higher only in Sweden, Italy, Spain, France, Germany, Luxemburg and Austria. • *Mortality attributable to coronary heart disease* is lower only in France, Portugal, Spain, Italy and Luxembourg. • *Mortality attributable to stroke* is lower only in France. • *Suicide* is less common only in Greece, Italy, Portugal, the UK, Spain and Malta. • *Mortality attributable to road traffic accidents* is also low in Malta, the UK and Sweden. • *Mortality attributable to chronic liver disease* is lowest in the Netherlands and Malta. • The *incidence of cervical cancer* is lower only in Cyprus, Finland and Malta • Personal *health* is *perceived to be good* by more people only in Ireland, Germany, Cyprus and Denmark

Can we draw any generalised conclusions from this very varied picture? The average Dutch person considers him/herself quite healthy. Mortality attributable to cardiovascular disease is relatively low, while the cancer mortality situation is mixed: the incidence of and mortality attributable to breast and lung cancer are high, but the survival rates for these forms of cancer are good. Female life expectancy is actually below the EU-25 average, while the Netherlands makes the top eight for male life expectancy. The Netherlands is also in the top eight countries for healthy life expectancy (both men and women, based on WHO calculations).

It is not easy to describe the lifestyle of the Dutch population with a single term or traffic-light rating. Although overweight is a considerable problem for Dutch public health, the situation in other countries appears to be even worse. The relatively low levels of alcohol consumption in the Netherlands may be the reason for the favourable level of mortality attributable to chronic liver disease. However, young people in the Netherlands are on a par with those in countries such as Ireland and the UK when it comes to binge drinking. Although the smoking rate in the Netherlands has fallen since 1990, the international statistics show that there remains scope for improvement (particularly where female smoking is concerned; see *subsection 2.2.2*). When it comes

Table 3.12: Indicators of health determinants and prevention/health care (Source: see appendix 5).

Rating	Indicator
	• The *percentage of infants still being breastfed at the age of six months* is lower only in the UK; trend: rising, but less quickly than in many other countries. • The *smoking rate* is higher only in Greece, Germany, Hungary, Poland and Luxemburg. • *Alcohol consumption among the young* (binge drinking) is higher only in Ireland.
	• *Smoking among the young:* fifteen and sixteen-year-olds who have smoked in the last thirty days. • *Relative five-year cancer survival rate*
	• *Adult obesity* is less common only in Italy and Estonia. Where moderate overweight is concerned, the situation in the Netherlands is less favourable, and the nation is on the borderline between green and amber. • Where *overweight among young people* is concerned, the Netherlands is in the best five, along with Denmark, the Czech Republic, Germany and Slovakia. • *Alcohol consumption per head* (estimated from sales data and other statistics) is lower only in Malta, Sweden, Poland, Italy and Greece. • *Problematic drug use* by adults is lower only in Poland, Greece and Germany. • Where *physical activity* (number of days of moderate activity in the last week) is concerned, the Netherlands is among the leaders. • The Netherlands is also among the leaders when it comes to the percentage of fifteen-year-olds *who used contraception* during their last sexual contact. • Similarly, the Netherlands does well in a comparison of fourteen countries in terms of the *perceived level of social support*. • The Netherlands is among the five countries with the best *relative five-year survival rates for breast cancer, lung cancer and cervical cancer.* • *Antibiotic resistance* (MRSA) is less common in the Netherlands and Sweden than anywhere else in the EU. • The Netherlands' *vaccination rate for measles* is high, but broadly comparable with the rates in Hungary, Latvia, Slovakia, Lithuania, Poland, Spain, Finland and the Czech Republic. • The percentage of women participating in *breast cancer screening* is high in the Netherlands, putting the country on a par with Austria, Portugal and Luxemburg.

to the percentage of babies being breastfed, the Netherlands also compares badly with other countries. These data are broadly consistent with the comparison based on the numbers of DALYs lost due to various risk factors (exercise, smoking, alcohol consumption and overweight), despite the different calculation method used (see *subsection 2.2.3*).

The few comparable data available on prevention and care paint a positive picture of the Netherlands. The survival rates for several important cancers are good, as are levels of participation in prevention programmes. The problem of antibiotic resistance (as reflected in the MRSA rate) is considerably less serious in the Netherlands than in the countries of southern Europe (see also *subsection 3.3*).

Dutch trends are generally consistent with Europe

If one studies *table 2.7* in *subsection 2.1.2*, one sees that, in the Netherlands, lung cancer is one of the diseases that is increasing most rapidly among women, in terms of both incidence and mortality. A similar increase is seen in most other EU member states, but elsewhere it is less pronounced. Female mortality attributable to lung cancer is rapidly approaching the level seen in the UK, where the rise has in fact slowed and more recently a slight downward trend has been established. The pattern in the UK – and also in Denmark – reflects the fact that the number of female smokers began to fall sooner (and in Denmark more quickly) than in the Netherlands.

Although the situation with regard to male lung cancer remains fairly poor in the Netherlands, this disease has been declining relatively quickly in terms of both incidence and mortality. This trend mirrors that in other EU member states. Male smoking rates have also been falling in most EU countries since the early 1980s, although it is not the case that the rates have been falling consistently everywhere. The one exception is Sweden, which now has a considerable lead on the rest of Europe.

Another fact that appears from *table 2.7* in *subsection 2.1.2* is that, in the Netherlands, breast cancer has one of the fastest-rising incidence rates of any major illnesses. This upward trend is consistent with the situation in most other EU member states. Mortality attributable to breast cancer is, however, falling in the Netherlands: although more women are developing the disease, still more are surviving. Most EU member states are witnessing a similar decline in mortality, after a period in the late 1980s and early 1990s when the rate went up. Only in Sweden has breast cancer mortality been going down consistently already since the 1970s, even though the country has one of Europe's highest incidence levels. Breastfeeding is known to help protect against breast cancer (Collaborative Group on Hormonal Factors in Breast Cancer, 2002). Although the percentages of Dutch children still being breastfed after three and six months went up between 1997 and 2004, the figures remain poor by international standards. Countries such as Latvia and the Czech Republic achieved much larger rises in the same period.

Moving on to indicators for which the Netherlands gets 'amber light' and for which trend data are available, the standout feature is the very small rise in female life expectancy. The lack of real progress in this field was highlighted in the last PHSF, and again we see a situation where numerous other EU member states are moving ahead faster than the Netherlands. The trend in Dutch male life expectancy is in line with the EU-15 average (see also *subsection 2.1.3*). Total mortality and total cancer mortality – two more indicators for which the Netherlands gets amber lights – display similar downward trends in the Netherlands and in many other countries.

The Netherlands' rates of mortality attributable to coronary heart disease and stroke are already among the lowest in Europe. Nevertheless, in mortality terms, these are two of the fastest-declining diseases among both Dutch men and Dutch women (see *table 2.7* in *subsection 2.1.2*). In other countries too, rates of mortality attributable to

coronary heart disease and stroke are falling. Internationally, the mortality figures are becoming more uniform and are approaching the low level already established in the Netherlands. The number of AIDS diagnoses began to fall in Western Europe in about 1994 and has now stabilized in most countries. Between 1994 and 2003, the largest falls in incidence – more than 80% – were reported in Denmark, France, Germany, Ireland, Spain and the Netherlands. In Finland and Luxemburg the falls were smaller, about 40%. The only exception to this trend has been Portugal, where the incidence continued to rise until 1996, and a slight downturn was not established until 2000. The lack of progress in Portugal is connected mainly with the habits of intravenous drug users (Tamsma, 2005).

Other indicators on which the Netherlands performs well, and in relation to which trends are in line with those in other countries are suicide, cervical cancer incidence and the measles vaccination rate. Mortality attributable to chronic liver disease continues to fall in most countries, but remains at a constant low level in the Netherlands. In this context, the large number of binge drinkers among the young is a cause of concern, although alcohol consumption per head and the number of heavy alcohol users among men in the Netherlands has been falling slightly (see *subsection 2.2.2* and *subsection 3.1.3*).

Will the Netherlands maintain its position?
Looking at the snapshot provided by our thirty-seven indicators, the Netherlands compares reasonably well with regard to causes of death and illnesses that can be influenced by policy (cardiac disease, suicide, road traffic accidents, AIDS), and with regard to important health determinants and preventive interventions means (physical activity, overweight among the young, problematic drug use, alcohol consumption per head, contraception use by young people, and perceived social support). The areas in which the nation could do better are smoking, binge drinking by young people and breastfeeding. Insofar as trends in the Netherlands can be compared with those elsewhere, the situation in the Netherlands is generally in line with the picture in neighbouring countries. However, there are a number of fields in which the Netherlands does not compare well. These are the relatively rapid rise in lung cancer among women and the relatively slow rise either in female life expectancy and in breastfeeding rates.

3.4.2 Public health policy in other countries

Most countries willing to take inspiration from each other
To answer the question what the Netherlands may learn from public health policies in other countries we have summarized a number of comparative policy reviews. Most of these studies compare western, English-speaking countries, but also Scandinavian countries and some autonomous regions that develop public health policies independently (such as Quebec, Scotland and Wales). The most important of these studies were: McKee et al., 2004, Crombie et al., 2003, Allin et al., 2004 and Jourdain-Menninger &

Box text 3.27: Public health: 'What's in a name?'

In this subsection, even in the original Dutch-language version of the text, use is made of the English phrase 'public health', because of its value in the context of international comparison. The term equates to what is variously referred to in the Netherlands as preventie (prevention), openbare gezondheidszorg (public health care), collectieve gezondheidszorg (collective health care), or publieke gezondheid (public health). A well-known and still widely used definition of public health was put forward in 1920 by the US author Winslow (Winslow, 1920):

Public health is the science and the art of preventing disease, prolonging life, and promoting physical health and efficiency through organized community efforts for the sanitation of the environment, the control of community infections, the education of the individual in principles of personal hygiene, the organization of medical and nursing service for the early diagnosis and preventive treatment of disease, and the development of the social machinery which will ensure to every individual a standard of living adequate for the maintenance of health; organizing these benefits in such fashion as to enable every citizen to realize his birthright of health and longevity.

Lignot-Leloup, 2003. In these reports the WHOs Health for All (HFA) approach (WHO, 1979), the Canadian 'Lalonde Report' (Lalonde, 1974) and the 'Ottawa Charter' (Conference on Health Promotion, 1986) are generally mentioned as important sources of inspiration. One conclusion that can immediately be drawn is that various European countries habitually refer to policies in other countries in order to inform their public health policies. In Finland, the WHO's Health For All approach serves as a blueprint for national health policy, and the country submits its public health policies to the WHO for evaluation (Drewes, 2005).

For our analysis of public health policy in other countries, we have opted to broadly follow the sequence that one would expect in a rational policy cycle. Thus, we start by looking at the international context and inspiration sources for public health policy, before looking at the preparation, implementation and evaluation of public health policy. In the latter context, account is taken of issues relating to political integration and to the particular characteristics of national health systems. We make use of the English term 'public health', as opposed to, for example, prevention (see *box text 3.27*). Thus, in this subsection, the health care system is largely outside the scope of our discussion.

It is more or less generally accepted that health is a fundamental human right, and that equality of opportunity should therefore be sought for all groups in the field of health, for example by paying adequate attention to health protection and health promotion. It follows that there should be not only equal access to health care, but also equal access to social facilities, to education and to an environment that is conducive to health.

Partly under the influence of the international sources of inspiration referred to above, the emphasis of public health policy has in the last few decades shifted towards influencing unhealthy lifestyle factors. In addition, many countries have now established large-scale screening programmes (e.g. for breast and cervical cancer, and for antena-

tal and postnatal problems). Public health policies aiming at infectious diseases have recently been intensified in a lot of countries, in response to new threats, such as BSE, SARS, avian influenza and the possibility of bioterrorism. Many such threats relate to globalisation and to the associated increased migration of people and transportation of animals and food all over the world (see also *subsection 3.3* on the Netherlands' vulnerability to infectious disease).

Politics important in defining principles, but often impeding continuity

The effective implementation of public health policy is influenced by political and structural parameters. For instance, the priority attached to socio-economic health inequalities is politically determined. In the Netherlands and the UK, it is apparent that changes of government and thus in the prevailing political ideology have led to significant policy shifts in this area. Such changes can thus compromise the continuity and effectiveness of policy initiatives. It is therefore desirable to have broad political consensus within a country with regard to the public health policy to be pursued. The Irish government has accordingly sought to secure agreement among all political parties. In Sweden, too, all major political parties support the national public health policy. The Netherlands may benefit from looking at these examples.

In many countries, lifestyle factors are currently central in their public health policies. However, differences in political outlook lead to considerable differences in the extent to which countries emphasize personal responsibility for healthy behaviour, as opposed to the role and responsibility of the state. In Denmark, for example, great emphasis is placed on personal responsibility, while in Sweden much more attention is given to the responsibility of the state to bring about the necessary structural changes for optimizing living conditions and thus to promote health. The Swedes explicitly reject the notion of blaming the victim. Norway takes a third path, prioritising the empowerment of individuals and looking to actively create opportunities for people to take responsibility for their own health. British policy is designed to encourage people, communities and government to work together to persuade people to make positive lifestyle choices and to improve living conditions.

Many of the comparisons in this subsection involve countries with state-funded ('Beveridge') health systems. By contrast, the Dutch system is, or was, a Social Health Insurance (SHI) system ('Bismarck'). Some studies (Allin et al., 2004; Drewes, 2005) have pointed out that, in SHI countries, there tends to be a relatively strict separation between public health and health care. The implementation of preventive initiatives within the health care sector can be particularly problematic under such circumstances. A number of SHI countries have recently been compared (McKee et al., 2004) with a view to shedding light on how effectively such systems deliver care and preventive action and on the nature of the problems that can arise (*box text 3.28*).

One interesting example of a preventive initiative within the health care system is the provision of medication to support people who wish to give up smoking in Quebec. Another successful venture has been the integration of social and medical facilities in

Box text 3.28: Collective intervention in SHI systems: what works where?

In Social Health Insurance (SHI) systems ('Bismarck' systems, such as that in the Netherlands), collective activities such as vaccination and screening may be organized according to three models (McKee et al., 2004), which differ in terms of the actual positioning of the activities:

1 Outside the health insurer-care provider relationship. In this model, the activities are usually undertaken by a public health organization.
2 Within the health insurer-care provider relationship. Activities are undertaken by private doctors, under some form of supervision by a public health organization.
3 In the context of other organizational arrangements, under which health insurers, care providers and public health organizations work with others, who are responsible for implementation.

Screening (for breast and cervical cancer) is often provided within the mainstream health care delivery system. In SHI systems, the reach of such activities (the participation levels achieved) is sometimes variable or unknown, for example because the health insurers do not monitor coverage or because the services are not systematically organized. To get around precisely this kind of problem, a new national breast cancer-screening programme has been set up in Germany. In Austria and Belgium, the coverage of cervical cancer screening is unclear, although it is routinely provided in the Austrian system. In Belgium, screening is performed by private doctors and paid for by the municipal authorities. In Switzerland, regional differences in the organization of cervical cancer screening result in participation levels that vary from one part of the country to another. Similarly, vaccination is not centrally organized in most SHI systems (e.g. Belgium and Switzerland).

In SHI systems, the uniform coverage of prevention programmes depends on health insurers (funding), public health organizations (programme implementation) and care providers (screening and follow-up) working together effectively. In the context of such collaboration, public health organizations need to provide public health skills and public communication, the health insurers the financial contribution, and care providers the expertise and technology (McKee et al., 2004).

the UK. However, although various proposals have been made, neither Quebec nor the UK has succeeded in establishing a preventive consultation system within the primary care sector. In Denmark, by contrast, such consultations are now considered routine.

Is policy making sufficiently based on facts and analyses?

Public health policy is almost always an expression of the wish to address the 'most important' health problems. In this regard, the selection criteria are, first of all, the size of the problem and the extent to which it is preventable; however, considerations such as whether the problem has recently increased or generates particular public concern also play a role. Inequalities in the distribution of ill health across the population and ill health in specific groups often become policy focuses as well. Finland, Quebec and the UK all devote considerable attention to social inequalities and social exclusion, and, like Sweden, strive for coherent social and health policies.

Only a few countries (Norway, Sweden and Japan) identify quality of life as a first priority. More and more countries are recognizing the importance of good mental health and identify depression, suicide, alcohol problems and violence as key areas for public health policy. Recently, obesity and the associated issues of physical activity, diet and diabetes have started to feature prominently on the policy agenda in many countries. Meanwhile, smoking will remain a major policy object.

Different countries face different health challenges, for instance because of historic differences in diet. Such differences are sometimes shaped by geographical and climatic factors, as with the differences between Mediterranean and central European diets (Allin et al., 2004). Alcohol consumption patterns may also differ markedly from country to country.

Health monitoring and the use of scientific evidence are in most countries important elements of the policy cycle. When constructing their health policies, many countries draw upon national health reports, such as our own PHSF. In some countries (Sweden), parliamentary discussion of the national health report is a formal stage in the policy cycle. A number of countries (such as Denmark and Norway) explicitly justify their policies by comparisons with other countries. The 'traffic light' ratings presented in *subsection 3.4.1* is an example of such a systematic comparison.

By no means all countries maintain a comparable or comprehensive national health information system. The Scandinavian countries, for example, have numerous registers for specific diseases and are able to cross-link their data. Often, however, national data collection systems make little provision for the recording of information on health determinants, which is so important for policy making. It is worth noting that a good national information base is not only very valuable for the prioritization of policy, but also for its evaluation.

Along with data from monitoring, information about the effectiveness of interventions or policies is important. Such information is often collected and published by national institutes and by various international organizations. Among the most prominent international organizations active in this field are the WHO (Health Evidence Network), the OECD, the EU Public Health Programme (see also *subsection 3.4.3*) and various NGOs. The European Science Advice Network for Health (EuSANH), whose creation has been promoted by the Health Council of the Netherlands, may also come to play a role in this regard. The information generated by these international networks should be put to a more systematic use for health policy development in the Netherlands.

Around the world, varying use is made of analyses of the possible costs of and returns from public health interventions. It is not uncommon for policy documents to state that substantial financial benefits may be expected from a new policy through, for instance, the avoidance of health care expenditure or other social costs. However, it is not always necessary or logical to suppose that preventive interventions should have economic benefits as well as health benefits. Nevertheless, cost-benefit analyses or cost-effectiveness analyses are used in many countries to justify the large-scale implementation of certain interventions. Such analyses enable comparison of the various preventive care schemes to which resources are or may be devoted. Almost everywhere, expenditure on public health and preventive action is only a small percentage of the total health care budget (*subsection 2.3.5*).

Despite all the emphasis on evidence and the semblance of rationality in policy development (Allin et al., 2004), in daily practice the use of scientific evidence and rationalism only play minor roles. National policy documents and policy descriptions often fail to make it clear to what extent resources are actually devoted to scientifically identified priorities, or whether proposed new activities are organized at all (McKee, personal communication). If policy priorities are not linked to concrete timetables or concrete, measurable goals, and if sufficient resources are not devoted to them, there is a danger that they are just paying lip service to a better future. In many of the countries studied, it is not clear why certain topics are included on the policy agenda, while others are not.

Implementation of public health policy: cooperation and stewardship required

In Europe, one finds centralized, decentralized and hybrid models for the organization and stewardship of public health. Trends towards centralization and regionalization are liable to alternate over time. Decentralization can be of particular importance, because it embraces an essential factor for the success of public health: local implementation in the places where people live and work. Japan was one of the first countries to delegate responsibility for the implementation of public health policy to local communities. However, central coordination and especially central stewardship are always required as well (Crombie et al., 2003; WHO, 2000a). This point is emphasized by the situation in the USA, where the fragmentation of responsibilities across various government bodies and numerous other parties has been identified as a serious threat to effective policy (Boufford & Lee, 1994). In the Netherlands too, a fragmented approach has been traditionally present, partly because of compartmentalization along religious and political lines, and this has tended to compromise effectiveness and efficiency (Mackenbach, 2003; Mackenbach, 2006c).

One of the main reasons why a clear stewardship is desirable for public health policy implementation is that inter-sectoral activities can make a major contribution to health. In countries such as Sweden and Finland, public health policy is the responsibility of a ministry that covers both public health and social affairs. Not surprisingly, social policy and public health policy are closely integrated in both countries. Finland has an even more comprehensive commitment to integrated health policy, with various other sectors being involved. Ownership of integrated policy can also be shared with other ministries. In a few countries, it has been suggested that there should be a senior public health official in each of the ministries involved. Ireland has adopted a different approach, based on integrated policies for all sectors, not only health.

The multi-sectoral nature of public health implies that close cooperation is necessary among various tiers of government and with numerous parties both in the public health field and in other fields. Consequently, some countries have been experimenting with a systematic nationally coordinated approach, as seen in the national programmes referred to earlier. One example is Australia's National Public Health Partnership (National Public Health Partnership, 2006). The Partnership identifies priorities for strategic and integrated action; the current priorities are healthy bodyweight, infec-

tious disease control, environment and health, accident prevention, public health and children, information provision and workforce development and planning.

Good central stewardship depends on the existence of a good underlying legislative framework. In most countries, public health policy is based on a public health act or on similar health-specific legislation. In a number of countries (France, Denmark), new public health legislation has recently been introduced or is currently under discussion.

Evaluation of public health policy and the use of quantitative targets

Little evaluation of larger national public health programmes is currently undertaken. Except, that is, in Finland, where the well-known Karelia Project was evaluated and where national screening programmes are linked to an evaluation system. Finland also submits its national policies to WHO for evaluation. In Australia, the road safety programme has been evaluated and cost-effectiveness analyses of cancer screening and smoking prevention have been undertaken.

Health targets are sometimes used as evaluation tools. Such targets are typically quantitative outcomes associated with more general policy objectives. One of the key points made in the reports summarized here is that the formulation of health targets is by no means always accompanied by implementation of the policies necessary to realize these targets. Although policy documents often stress the need for policy evaluation, such evaluation is rarely undertaken in actual practice.

Not everyone is equally supportive of the use of targets in health policy making. It is not always clear who should be held responsible for the (non-) realization of a target and politicians sometimes see the definition of targets as ‘political suicide’. Furthermore, many objectives can only be realized in the long term, and are therefore of little interest to politicians looking for quick results. Nevertheless, there are a lot of countries where targets are health in all politics, at both the national and regional levels. In the USA, the information base is closely linked to the national targets (Healthy People 2010) and a national indicator set, so that progress towards the various targets can be constantly monitored. France’s new public health act specifies the health indicators to be used for health monitoring. In the Netherlands, targets have been set in the field of road safety, demonstrating that the approach can work in this country. It would seem a natural progression to now explore the possibility of using targets in other public health fields.

Lessons for the Netherlands

The Netherlands can learn from what happens elsewhere in the fields of collaboration, research, policy evaluation and the long-term stewardship of public health. The latter is important in order to offset the effects of a changing political situation and conflicting interests.

In various countries, there is increasing emphasis on the development of rational, evidence-based public health policy. The trend in these countries is towards broad, systematic approaches, organized on an integrated basis and often linked to a coherent set of health targets. In this way, clear, widely supported ownership of public health problems is sought, with prominent stewardship and good communication. International policy comparisons show that a number of elements are important: (1) effective and sustainably funded monitoring of health and associated factors; (2) sufficient policy-oriented research; (3) clear, inspiring stewardship of public health; (4) the effective organization of and intensive collaboration among stakeholders; (5) an effective system of integrated health policy, or collaboration with other sectors, and (6) the evaluation of established policy and programmes, involving international policy comparisons.

An effective public health policy can be compromised by conflicts of interest. It is clear, for example, that opposition from the tobacco industry to the imposition of controls on the sale and advertising of tobacco products has been an obstacle to effective public health policy in many countries. In the USA, lobbying by the manufacturers of alcohol, firearms, pesticides and other toxic compounds is liable to frustrate efforts to pursue effective public health policies in these areas (Joel Coye et al., 1994). Furthermore, various government bodies do not always pull in the same direction. Through separate agencies, for example, the EU both subsidizes tobacco cultivation and seeks to discourage smoking. It can also be argued that a government that derives income from taxes on the sales of tobacco and alcohol has a similar internal conflict of interests. Finally, poor collaboration between government departments can be a negative influence as well.

The Netherlands can learn from experience gained elsewhere by making more systematic use of the summary reports on effective forms of intervention regularly published by national governments and international organizations. In addition, various other countries give more explicit and methodical attention to socio-economic health inequalities and to inter-sectoral policy making than the Netherlands.

It is clear that the nature of a country's health care system may influence the quality of public health policy and its implementation. This not only relates to the accessibility of care and cure, but also to access to preventive action within the health care system. It is therefore important for the Netherlands to quickly determine the extent to which recent changes in the health care system will have a positive or negative effect on the implementation of preventive and public health policies. This should be a prominent feature of the research agenda.

3.4.3 How significant is Brussels for the Netherlands?

What is the EU's involvement in public health and health care, and what are the implications for the Netherlands?

The Netherlands is a member of the European Union. This has implications for Dutch public health and health care. From a national point of view, the way this happens may not always seem logical as the EU does have some competencies in the field of public health, but the bulk of European regulations that impact on the health sector originate from other policy domains. A broad analysis of Brussels' influence on public health and health care in the Netherlands thus needs to take the EU competencies in other policy areas into account and requires interlinkages between policy areas covered by different ministries.

In this subsection, we outline the EU's competencies in the field of public health and summarize developments in a number of other European policy areas that resonate in the field of health and (especially) health care. We also look at the impact of these dossiers at national level. Following on from that, we will discuss what issues could be particularly relevant if our country is to optimally accommodate for EU obligations and opportunities, given the specific responsibilities of government and stakeholders in the field of public health and health care.

EU has both direct and indirect influence as a 'fourth tier of government'

The European Union is a supranational entity. This implies that member states have handed over some of their sovereign powers to the independent institutions of the EU. When considering the influence of the EU, one must distinguish between policy areas in which the EU has explicit legislative powers, and areas in which member states are autonomous. In areas of the first type, the EU may be regarded as a fourth tier of government; in addition to and above the national, provincial and municipal tiers.

In the field of public health, the EU does have competencies, but these are fairly limited. Within the European Commission, public health is the responsibility of the Directorate General for Health and Consumer Affairs (DG SANCO). Responsibility for the organization and funding of health care, however, remains entirely with the individual member states: the EU has no direct competence in this field. Nevertheless, the EU has developed a great deal of legislation and policy in fields such as the internal market and social protection, which has a bearing on other sectors, including (health) care (see below).

In principle, member states' health ministries and DG SANCO have no say in the development of and decision-making regarding policy aimed at strengthening the European internal market or socio-economic cohesion, even though the consequences of such policy do impact on their policy field. In principle, member states could address this imbalance, for example by deciding to attribute more specific competencies in the field of health to the EU. While there has been no support for such a move until now,

health ministers have agreed on the benefit of closer cooperation and the exchange of experiences in the field of health and long-term care.

What are the EU's competencies in the field of public health?
The competencies of the Union are defined in the primary legal basis of the EU: its treaties. The EU's competencies in the field of public health are set out in Article 152 of the Treaty of Amsterdam (European Council, 1997), which contains the following text:

'A high level of human health protection shall be ensured in the definition and implementation of all Community policies and activities. ... Community action, which shall complement national policies, shall be directed towards improving public health, preventing human illness and diseases, and obviating sources of danger to human health. Such action shall cover the fight against the major health scourges, by promoting research into their causes, their transmission and their prevention, as well as health information and education.'

Article 152 also explicitly states that 'Community action in the field of public health shall fully respect the responsibilities of the Member States for the organization and delivery of health services and medical care.'

In other words, the EU has a remit to improve public health through research and prevention, and has an overall obligation to ensure the health of its citizens is not endangered. To a considerable extent, the health protection competencies are a response to the upheaval caused by the health hazards of dioxin-containing chicken meat, and BSE-contaminated beef in the 1990s. In those days, the EU's competence under the Treaty of Maastricht was limited to promoting collaboration between member states. The food safety scares of the late twentieth century prompted member states to give the EU more competencies when the European Treaty was next amended (i.e. in Amsterdam, 1997), particularly in the field of health protection. Food safety has since become an important focus area for the European Commission. At the national level, these developments have been mirrored by creation of the Food and Consumer Product Safety Authority. At around the same time, the Directorate of Food, Health Protection and Prevention was established within the Ministry of Health, Welfare and Sport.

In the text of the European Constitution as ratified by various other member states – but rejected by the Dutch citizens in a referendum in May 2005 – the content of Article 152 remains the same. However, the EU's mandate would be strengthened by Article 3.1 stating that 'The Union's aim is to promote peace, its values and the well-being of its peoples' (European Council, 2004). Furthermore, the Charter of Fundamental Rights of the EU asserts that every European citizen is entitled to access to preventive and medical care.

In addition to Article 152, secondary legislation and regulations relating to public health has also been developed. The most prominent binding measures concern the following issues:

- Tackling infectious diseases and health threats. A number of decisions form the basis for a community network for epidemiological surveillance and the control of communicable disease, as well as the reporting of communicable disease information to that network. In addition, agreement has been reached as to the specific diseases this network is to focus on, and on case definitions of those diseases. There are also regulations on the European system for early warning and on measures for the prevention and control of communicable disease. Surveillance of and action to tackle health threats are increasingly becoming European matters, which is also reflected in the numerous European networks and initiatives that have been set up in this area.
- The creation of a European Centre for Disease Prevention and Control (ECDC), primarily to support efforts to tackle infectious disease and health threats. The centre has its own budget and is intended to pool health knowledge and expertise within Europe. The centre's tasks are also legally defined, mainly with a view to clear demarcation between Europe's responsibilities and the national responsibilities of member states. Its tasks are: epidemiological surveillance and the establishment of laboratories; early warning and response; the provision of scientific advice; and support and development of activities to enhance preparedness for new health threats.
- Curbing the use of tobacco. Article 152 does not provide for harmonization. The legislation developed to curb tobacco use is therefore based primarily on the EU's competencies relating to the internal market (more particularly Article 95). This has resulted in directives on the manufacturing, presentation and sale of tobacco products, tobacco advertising on television, advertising and sponsorship of tobacco products, and tobacco duties. Based on the EU's social competencies, a directive on health and safety at work also enables the entitlement to a smoke-free workplace. In addition, three non-binding recommendations have been drawn up regarding the prevention of alcohol and drug use, and banning smoking in places open to the public.
- Protecting citizens' against adverse health effects of medical treatments or procedures. The Union has approved a series of measures intended to protect the public against hazards associated with certain medical treatments and procedures, or to ensure the quality of processes involving the donation of blood, blood products and human tissues and cells. Agreements have also been reached regarding orphan drugs.

Insofar as the legislation and regulations described above are binding, all member states are obliged to comply with them. Binding European legislation has to be transferred into national legislation and regulations. Dutch laws that are in fact national versions of European legal provisions include the Medicines Act, the Blood Supply Act, the Tobacco Act, and the Environmentally Hazardous Substances Act. This explains why member states sometimes concern themselves to a considerable extent with the details of European regulations. Member states are also obliged to participate in the various European networks for infectious disease control.

Public health: competencies translated into action

Based on its competencies, the Union can formulate 'common policy'. Common policy is then translated into action using the EU's financial resources, such as structural funds and specific programmes. Whereas member states are obliged to implement EU legislation and regulation, EU funds and programmes provide them with opportunities but participation is not obligatory.

The European Community's present health strategy and the associated community action programme for public health covering the years 2003 to 2008 (EC, 2003a) builds upon the competencies of the EU outlined above. Hence, the most important elements of Article 152 are clearly reflected in the action programme's three general objectives:

- To improve information and knowledge for the development of public health.
- To enhance the capability of responding rapidly and in a coordinated fashion to threats to health.
- To promote health and prevent disease through addressing health determinants across all policies and activities.

The European action programme is to promote collaboration between member states. It is also to contribute to a high level of health protection and to tackling health inequalities. As article 152 states that community action should supplement national policy measures, European funding is not meant as an alternative for national action or to compensate for shortcomings in national public health programmes. Also, participants are expected to bear some of the cost themselves (in principle at least 40%). An overall budget of approximately 350 million euros is available for the programme.

The programme supports a wide variety of projects. The Commission increasingly prefers to fund large projects that bring together partners from many different countries. More and more often, these type of projects are led by European umbrella or network organizations. Important topics addressed through the programme include mental health, obesity, health inequalities, and the further development of health indicators. As a result of the rulings of the European Court (see below), the programme is also concerned with the exchange of information on health care systems, cross-border care, patient mobility, and performance indicators.

In 2005, the Commission presented new plans through a combined strategy for health and consumer protection (EC, 2005a). The programme that is to be linked to this new strategy will succeed the existing programme in 2007. The actual timetable, however, depends on how soon the European Council and European Parliament are able to agree on the objectives and the budget. The Commission intends the new strategy to build on the achievements of the old programme. The three overall objectives of the present programme are to be reinforced by extra support for efficient responses to health threats, and by the prevention of diseases and injuries.

A new strand in the proposed programme is to focus on the promotion of cooperation and synergies between health systems. This would be a logical step following activities in the area of, for example, cross-border care, that were funded on a more ad-hoc basis under the 2003-2008 programme. When the plans for the programme will be implemented, this will be the first time that consistent, prominent provision is made for activities in the area of health care systems. The main focus will be on developments resulting from the European internal market and European social policy (see below). Through this new strand, the programme is likely to appeal to a new group of participants: organizations and actors involved in health care, health policy and health management. In the Netherlands, these sectors have not yet been very visible as participants in the European public health programme.

While EU legislation and regulations bring about obligations for member states, participation in programmes is a voluntary matter. Apart from the (obligatory) Dutch input into the various infectious disease networks, the public health programme is often perceived as an opportunity for various organizations in the field of public health. An opportunity they can seize or ignore as they see fit.

Governmental actors provide information about the opportunities available through the action programme. However, there is no specific policy to encourage participation in EU programmes, or to provide additional financial support, not even for activities that could add value to national policy priorities. Through the programme committee, government representatives are involved in decisions as regard the programme work plans. They are therefore in a position to timely point when and where the Dutch public health sector may benefit from participation in the action programme. Often, the administrative burden and the need for co-funding are obstacles to participate in a programme (Tamsma & De Boer, 2001; ZonMw, 2006a).

With the programme funding fewer, but larger projects, participation may become relatively more important. These large projects and networks are increasingly growing into fora that develop visions, methodology and benchmarks, and gather 'good practices' building on the input from participants from a large number of member states. In that sense, European projects are excellent frameworks to stay in touch with innovative developments. In addition, the Commission is not seldom inspired by project results when drawing up new plans. Previous project networks often serve as starting point for partnerships that develop new projects. Non-participation could thus lead to loosing touch with leading developments in the long run.

Health and long-term care: what is the influence of the European internal market and the social agenda?

Earlier in this chapter, we made the point that 'strong' European policy fields, such as the internal market and social affairs, can impact on the health care sector. The EU is first and foremost an economic union, albeit one that is explicitly based on social principles. Hence, over the years, more and more legislation has been developed with a view to promoting the development of the European internal market and consolidat-

ing the EU as a world trade power. Such legislation is of relatively great importance for and within the EU.

One of the principles underpinning the European internal market is that, within the EU's boundaries, there has to be free movement of people, goods, services and capital. Translated to the care sector, this implies the free movement of professionals, patients, technology, drugs, medical devices, health care, health insurance services, and investment in (health care) facilities, including hospitals.

A fully functioning market also requires agreement about the various elements that together form the market. This has led to EU regulation on matters such as competition, product definitions and certification. Portfolios that are clearly linked to public health and health care include:

- Patient mobility and cross-border care.
- Mutual recognition of professional qualifications.
- The quality and composition of medications.
- The quality of blood, blood products and tissues.

The legal developments surrounding patient mobility and cross-border care are described in more detail in *box text 3.29*.

At the European Council of Lisbon in 2000, EU government leaders decided that Europe should strive to be the strongest knowledge economy in the world. Calls were also made for the reform of social security systems, so that the citizens of an aging Europe could continue to rely on the availability of sufficient good quality services in the future. The realization of these objectives depended partly on action in policy fields that lay largely outside the competencies of the EU, such as employment and social protection. To enable member states to work together in pursuit of this European ambition, the Open Method of Coordination (OMC) was developed (see *box text 3.30*).

Under the supervision of the Directorate General for Employment, Social Affairs and Equal Opportunities (DG EMPL), this method has since been implemented to support collaboration in the fields of employment, pensions, and social inlusion/fight against poverty.The level of DG EMPL's involvement tends to vary from one policy area to another, with the OMC on employment being the most structured process.

The European collaborative process in the field of social inclusion and the fight against poverty has implications for (health) care at the national level. One of the common objectives is that people should have adequate access to 'social protection services', a phrase that across Europe is broadly interpreted to include health care. In this context, for example, member states are required to provide information on the length of their waiting lists (EC, 2000). This process also offers scope for tackling socio-economical health determinants and for improving access to health care services (Stegeman & Costongs, 2003). Individual member states differ in the prioritization of the way they address the common objectives (Tamsma & Berman, 2004). For the time being, the

Box text 3.29: The European internal market, patient mobility and cross-border care.

In a series of judgements, the European Court of Justice has ruled that health care may be regarded as an economic activity and is therefore subject to the rules of the internal market (Van der Mei, 2003). European citizens therefore do not require prior permission from their health care purchaser/insurer for the reimbursement of costs incurred for outpatient health care services received abroad. The European Court has also acknowledged that it is important for member states to maintain a control over the costs of their national health care systems. Hence, coverage of costs is therefore based on the rules that apply in the patient's country of origin. For inpatient care, prior permission must be obtained. Health insurers may, however, only refuse permission if (according to current medical insights) similar or equally effective treatment is available in good time in the country of origin.

These judgements gave the member states' health ministers food for thought. A high-level reflection process was initiated under the auspices of DG SANCO, resulting in a series of recommendations (EC, 2003a) on the following themes:

- European cooperation to enable better use of the available resources.
- Information requirements for patients, professionals and policy makers.
- Access to and quality of care.
- Reconciling national health policy with European obligations.
- Health related issues and the Union's cohesion and structural funds: investing in health and the health infrastructure.

In addition, a permanent consultative body was established, with responsibility for taking up the recommendations: the High Level Group on Health Services and Medical Care. This group thus became the first structural EU forum for health ministers to discuss health care and health care systems.

Meanwhile, DG Internal Market, responsible for development of the internal market policy, interpreted the Court judgements as an indication that clearer and simpler legislation was needed. Consequently, they presented a draft directive dealing with the provision of a wide range of services – including health care – on the internal market (EC, 2004a). Better known informally as the 'Bolkestein Directive', this document was intended to remove as many barriers as possible to the free movement of services between the member states.

The proposed Bolkestein Directive was met by a mixed response from member states, European politicians, and actors in the field. One of the questions was whether services with a social objective (including health care) should be included in the scope of any new directive. Objections were also made to the 'country of origin' principle, under which a service provider would only be obliged to comply with the rules applying in the their own country of origin. In spring 2006, both the European Parliament as the European Council concluded the draft needed to be modified to address these concerns. To provide greater clarity with regard to social and health services in the absence of a more general new legislative framework, it is expected the Commission will propose two separate directives before the end of 2006. Hence, the possibility of a European health services directive is not the unthinkable option it once was.

Netherlands puts emphasis on social support for groups at particular high risk of social exclusion (e.g. drug addicts, homeless people or people with long-term mental health problems).

Positive experiences in working with the OMC led member states to welcome the idea to also apply this collaborative mechanism to health care and long-term care for the elderly. Three common objectives were proposed to guide this process: accessibility, quality and financial sustainability (EC, 2001). Member states have since provided the Commission with information on how these objectives can be realized at national level and the problems they encounter in trying to achieve this; on their key challenges at national level, on future and pending health system reforms; and on their medium-

Box text 3.30: The Open Method of Coordination.

The Open Method of Coordination is a structured form of cooperation between member states, with the following features:

- Agreeing common objectives at the European level.
- Establishing common indicators and benchmarks as a means of measuring progress and comparing best practices.
- The formulation of more specific objectives based on the common objectives, and of time lines for realization of these objectives.
- Translating the common objectives into member states' national action plans, describing how the European objectives are to be realized at the national level.
- The exchange of best practices.
- Periodic monitoring, evaluation and peer review to facilitate multilateral learning processes among member states.
- National progress reporting.

The process is subject to ongoing development through continuous dialogue between the European Commission and the member states; the European Parliament is not involved. It is, however, explicitly agreed that member states are to involve stakeholders in the development and implementation of national action plans.

The term 'open' does not relate to the flexibility of the process itself, but to the way in which member states are free to individually decide:

- How the European objectives can best be applied to and realized within the national setting.
- How 'best practices' should be assessed and implemented within the national setting.
- How stakeholder organizations and representatives best be involved in the process.

term policy priorities(EC, 2003b; EC, 2004b; EC, 2005b). Throughout the process, a significant role is attributed to the indicators that will be chosen to measure progress.

The collaborative process in the field of health and long-term care is expected to be developed as the 'lightest' of the current OMC processes. The administrative side of the process will be mainstreamed into the ongoing OMC processes on social inclusion and pensions (EC, 2006). Already, the OMC's common objectives are reflected in national policy tools, including the Dutch Health Care Performance Report (Westert & Verkleij, 2006). It is to be expected that exchange of information between EU member states as regards national health care systems and system reforms will become more commonplace. In addition, the OMC process will offer opportunities for cross-national learning and inspiration to improve national systems.

'Brussels' will, therefore increasingly observe member states' efforts at national level and therefore also aquire insight in the strengths and weaknesses of the Dutch health care system. Europe will watch with interest how key elements of our new system, such as social safeguards and private finance, will contribute to the realization of quality, acces and financial sustainability objectives.

Opportunities: the European Framework Programme for Research and Development

Europe's Framework Programmes for Research and Development also support research efforts in the field of health and health care. These programmes therefore also offer opportunities for Dutch research and development institutes. The financial means available for the EU research budget are considerable: it is the next largest budget after agriculture and the structural funds.

The sixth Framework Programme, which expires at the end of 2006, took on board the objectives of the EU's Lisbon agenda. It puts particular emphasis on the promotion of highly advanced technological research to support development of the knowlegde-based economy. Within the health strand of the programme, priority areas included biotechnology and gene technology, e-health, and food safety.

In the new, seventh Framework Programme (to run from 2007 to 2013), health is one of the nine priority themes (EC, 2005b). Within that theme, 'optimizing the delivery of health care to European citizens' stands out as a new priority. Other issues addressed by the new programme include health promotion and disease prevention, tackling health determinants, mental health, child health, and health of the aging population. The new programme will allow for more resources being made available to support policy-driven research.

Dutch perspectives on the winding road to Brussels and back

From the above, it will be clear the EU does impact on public health and health care in the Netherlands both by imposing legal obligations and by offering a wide range of opportunities. Insight into these is essential if public health and health care in the Netherlands are to benefit fully from them. In other words: one needs to understand 'Brussels' if one is to build on it and grasp its opportunities. For Dutch stakeholders and organisations in the field of public health and health care, the experience gained through participating in EU-wide activities and networks will be beneficial if they aspire to influence European agenda's. That way, they could contribute to the thinking about future EU policy and programmes that are (more) reflective of our national priorities and interests.

In the Netherlands, central government has opted to increasingly withdraw its direct involvement from the public health and – particularly – health care stage. This decision could negatively impact on 'our' input in Brussels, or on the degree to which of the public health and health care sector can become involved in European projects and networks. In several other EU countries, aspects of the organization of the public health and health care system (such as the provision of hospital care or health care purchasing) may be the responsibility of government, while in our country these are placed outside government. Other statutory responsibilities, for instance in the field of public health have been decentralised to local authority level. When the Social Support Act comes into force in 2007, the central government will also hand over responsibility for various services in this area. Within the context of the EU's policy development and decision making structure, this implies that the foreign counterparts of Dutch health insurers, health care providers, and health promotion experts may be represented at government level in Brussels. They are thus likely to have better direct access to the European Council's discussion fora and decision making mechanisms than their Dutch colleagues. At the same time, these governmental organisations can also benefit from participation in the EU's action programmes.

In the Netherlands, there is a considerable gap between input to the EU decision-making process (by national government via the Council) and the consequences of these decisions in practice at national level. Similarly, practical experience with the implementation of EU programmes and EU policy decisions may not resonate in the position taken by the Dutch government within Council frameworks. If the government and stakeholders aspire to have more impact on the EU policy development and implementation cycle, it is essential they cooperate closely and exchange information and experience.

Given their prominent role in our health system, it is important that Dutch organisations and actors in the field of public health and health care are well represented in EU networks and European projects. National research and development institutes can play a key role here, operating as the linch pin between European innovation and local implementation.

These national knowledge institutes may then be expected to disseminate the expertise gained through European activities for the benefit of the local actors in the field. This should not be limited to the outcomes of specific projects they themselves participate in, but also include information of best and innovative practices available across Europe. Over the years, European action and research programmes have generated a huge body of knowledge and innovative experience, which could be better disseminated and used nationally.

The international focus of national research and development institutes should be recognised more explicitly by national government. The establishment of a national 'European Incentive Fund' could be helpful here, as could be the inclusion of an overall allowance for European network activities in the core funding of national knowledge institutes. Another option would be to set up a European expertise dissemination centre, via which the various national knowledge institutes could collaborate to inform the public health and health care sector at local level.

To sum up: Brussels may seem relatively far away for the Dutch public health and health care sector, partly be a consequence of the delegation of responsibilities by central government. Within the 'Brussels dynamics', the fact that our national government has placed itself at a greater distance from public health and health care practice may carry a risk. As the 'largest small member state' in an expanding group that now includes twenty-five countries, the Netherlands is no longer automatically in a strong position. Thus, the Netherlands needs to 'get smart' to protect and advance its interests. In view of the responsibilities of government vis a vis other actors in the Dutch health system, this requires close cooperation between the various parties concerned, as well as a more active European participation by organisations in the field of public health and health care.

3.5 Public health forecasts

Population ageing will mean a big rise in diseases of old age
One of the main factors likely to shape future developments in health and care is the demographic make-up of the population. In 2010, the first of the 'baby boomers' will reach the age of sixty-five. Thereafter, the average age of the population will continue to rise, until it peaks in about 2040. Over the next twenty years, this phenomenon will result in increases of 40 or 50% in some of the chronic illnesses associated with old age.

Leading to much higher care expenditure
Demographic developments alone may be expected to necessitate a rise in the health care budget, from a little over EUR 57 billion in 2003 to nearly EUR 70 billion by 2025. Of the increase, just less than five billion will result from population growth and ten billion from changes in the make-up of the population (primarily population ageing). These forecasts take no account of the impact of medical advances or increasing care expectations – factors which to date have had a larger impact than the demographic developments.

Health promotion can have a major impact on the disease burden associated with chronic diseases by 2025
Continued government commitment to health promotion over the years ahead can considerably mitigate the increasing prevalence of chronic diseases, such as diabetes, cardiovascular disease and lung cancer.

In this subsection, we turn our attention forward. First, we a make projection of the future pattern of illness and of expenditure on health care, the latter using demographic prognoses and assuming the present distribution of illnesses and care expenditure by age and sex (*subsection 3.5.1*). Thereafter, we consider the future health landscape in relation to two scenarios: the Competitive World scenario and the Caring Region scenario (*subsection 3.5.2*). A number of case studies are presented to illustrate the various developments in prevention and care that might be expected under these contrasting scenarios. In *subsection 3.5.3*, we identify the main opportunities, risks and socio-political dilemmas likely to characterize the future under each scenario.

3.5.1 Demographic projections

Population growth will slow, while population ageing continues until peaking in the middle of the century
The growth of and changes to the make-up of the population (population ageing) have major implications for public health. According to the Statistics Netherlands' population prognosis for 2004 to 2050 (median variant), average life expectancy in the Netherlands will continue rising, from 76.9 to 79.6 years for men and from 81.4 to 82.6

years for women (De Jong, 2005a). Thus, the differential between male and female life expectancy will fall from 4.5 to three years. Population growth, by contrast, will slow considerably. It will be about 2030 before the Dutch population reaches seventeen million. This sluggish growth is foreseen mainly because net migration is likely to be negative for some years. Statistics Netherlands does, however, anticipate a recovery of labour migration as the economy becomes more buoyant, resulting in positive net migration by 2010. Subsequently, from about 2035, the population is expected to start contracting, as population ageing results in higher levels of mortality, while birth rates remain steady (Statistics Netherlands assumes roughly 1.75 children per woman). At a certain point, the positive net migration will no longer be sufficient to compensate for increasing mortality. Because of the 'baby boom' after the Second World War, the percentage of the population represented by the over-sixty-fives will rise sharply after 2010, from its present level of about 14% to a peak of about 24% in 2040. After 2025, the percentage of very old people (over-eighties) in the population will also go up considerably, from today's 3% to nearly 8% by 2050.

Sharp increase of diseases of old age, due to population ageing

Table 3.13 shows the forecast changes in the prevalence of the twenty most common PHSF diseases likely to result from the demographic developments expected in the period to 2025. In addition to the increases driven by growth of approximately 6.5% in the population volume – all other things being equal, a bigger population means more sick people – the projection shows very strong rises driven by population ageing. The biggest rises in prevalence are seen in the illnesses associated with old age, such as heart failure (40% population ageing-driven increase), dementia (38%) and stroke (37%). Conversely, the disorders that mainly affect younger people, such as asthma and mental disabilities, become less prominent.

Leading to substantial growth in care expenditure

Figure 3.23 shows a demographic projection of the future cost of care provision. The estimates are based on the costs attributable to different age groups of the two sexes in 2003 (see *subsection 2.5*), combined with the Statistics Netherlands' population prognosis (median variant). From the graph, it is apparent that demographic developments alone will push care costs up from more than 57 billion in 2003 to nearly seventy billion by 2025. Most of this demography-driven growth will result from population ageing.

The projection assumes that care consumption will be influenced only by changes in the size and make-up of the population. In reality, however, consumption is subject to many other influences. In our examination of health in relation to life pattern, we highlighted the particular influence of the high average level of care consumption in the last year of life (see *subsection 3.1*). Increasing life expectancy has the effect of deferring the high final-year care costs. When the projections are corrected to allow for this effect, the growth in care costs works out a little smaller.

Table 3.13: Overall prevalences of the main chronic disorders in 2003 and 2025 (estimated on the basis of the Statistics Netherlands median-variant population prognosis).

	2003 (x 1,000)	2025 (x 1,000)	Total increase (%)	Increase attributable to demographic change (%)
Heart failure	179	263	47	40
Dementia	102	148	45	38
Stroke	229	329	44	37
Visual impairments	543	779	43	37
Coronary heart disease	676	959	42	36
COPD	316	438	39	32
Arthrosis	682	929	36	30
Osteoporosis	156	212	36	29
Age/noise-induced hearing loss	534	723	35	29
Diabetes mellitus	609	807	33	26
Breast cancer	78	95	22	16
Rheumatoid arthritis	148	180	22	15
Contact eczema	802	865	8	1
Depression	364	389	7	0
Inflammatory bowel disease	90	96	7	1
Neck and back problems	1,613	1,720	7	0
Anxiety disorders	132	138	5	-2
Asthma	520	530	2	-5
Constitutional eczema	260	260	0	-6
Mental disability (minor+serious)	103	99	-4	-10

However, other factors are likely to increase per capita care consumption. These factors include epidemiological changes and, especially, developments in the care supply. In *subsection 3.6*, we highlight the considerable role played by medical technology, service level extension and the labour-intensive nature of care provision, leading to disproportionate growth in the price of care. Historical analyses show that such factors have in the past exerted more influence on the cost of care provision than demographic developments (see *subsection 2.5*). At the same time, changes in care consumption are difficult to predict. Much depends not only on the technologies that come onto the market, but also on developments in what society views as an appropriate level of health care.

3.5.2 Two scenarios for the future

Scenario-based forward analysis is an alternative to forecasting based on the projection of current trends. The method involves considering the implications of contrasting possible patterns of development. These patterns of development, or scenarios, need to be internally consistent and should embody neither wishful thinking nor an unrealistically pessimistic view of the future. The use of strongly contrasting scenarios can

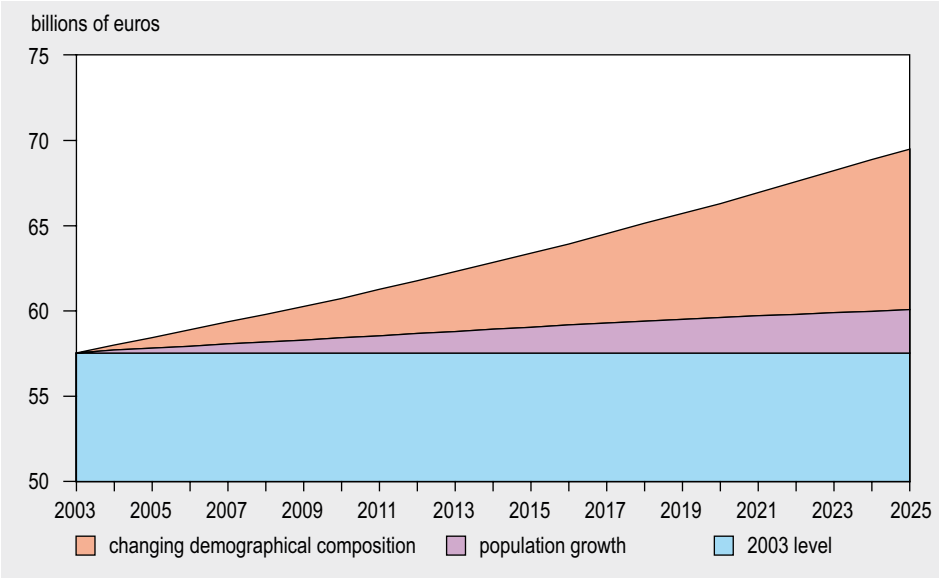

Figure 3.23: Demographically driven growth in the cost of care provision (in billions of euros, at 2003 prices) (Source: De Jong, 2005a; Kommer et al., 2006).

illuminate possible dilemmas and trade-offs, as well as the implications of political and policy options. Scenario-based forward analysis is not therefore forecasting, because the object is not to predict the probable direction of events, which in most cases will lie somewhere between the extremes of reasonable expectation represented by the scenarios.

Various bodies, including the Netherlands Bureau for Economic Policy Analysis (Dutch initials: CPB) and the Netherlands Environmental Assessment Agency (MNP), have recently developed scenarios for the future (De Mooij & Tang, 2003; Huizinga & Smid, 2004; Bos et al., 2004b; De Jong & Hilderink, 2004; RIVM-MNP, 2004a). The scenario studies in question revolve around two key uncertainties: the extent to which countries will prove willing and able to work together, and the demarcation that will emerge between public and private responsibilities (in particular the degree of state control). These two uncertainties form the axes of a 'field of probability', which may be divided into four quadrants defined by different combinations of positions on the axes; thus we have four scenarios for the direction of future developments.

Two scenarios for the future: Competitive World and Caring Region

In our Competitive World scenario, the emphasis is on the market and on globalisation; in the Caring Region scenario, the state retains a major role and society is more inward looking. Thus, our scenarios equate to the two most contrasting scenarios of the four developed by the CPB and MNP. *Box text 3.31* contrasts the two scenarios, first from the viewpoint of someone living in each of our theoretical future worlds, and then from a more public health-oriented viewpoint. Both scenarios generate opportunities and threats for public health, health inequality and care, and what constitutes

Box text 3.31: Description of the two scenarios.

An outline of the Competitive World
"Provided our economy is healthy, everything will be fine here and in other parts of the world, including poorer parts of the world. We therefore have to make sure that we continue to grow, to perform, to make rapid progress and generally to do things better. Competition between nations, people and businesses can only be a good thing; it pushes up quality and efficiency and keeps prices down. It also offers more scope for personal development. Performing well and earning money are important. We want luxury, comfort and stimulation in our working and private lives. We want to live in a world that offers us opportunity and challenge. State involvement in our lives should be kept to the minimum. Furthermore, greater efficiency implies a compact state, more privatisation and less support. We are individually responsible for looking after ourselves, standing up for ourselves, and organizing our own affairs" (Global Market scenario, RIVM-MNP, 2004a).

This scenario assumes high economic growth. Prosperity consequently increases at all levels of society. However, the gap between rich and poor remains or increases. Those higher up the socio-economic ladder enjoy healthier lifestyles, as those on lower incomes are less inclined to buy relatively expensive healthy food. This scenario also assumes rapid technological development, resulting in important medical breakthroughs. Despite the high cost of health care, it remains affordable because of the strong economic growth: health is for sale, but bought principally by those with most disposable income. Improvements in health care take place, partly because the government wishes older people to stay in work longer (based on the Global Economy scenario, De Jong & Hilderink, 2004).

An outline of the Caring Region
"We want to restore the 'human dimension' to our lives. We may be concerned about the wider world and Europe, but as individuals we have little influence over remote events. Our priority is therefore ensuring that all is well in our lives and in our immediate social setting. We take an interest in the people around us. The state is more closely involved in people's lives, and local government is particularly prominent. Everything doesn't always have to be bigger, better, faster and more challenging. We show concern for one another and voluntary work is important as a means of meeting various care-related needs. We are prepared to express our concerns to people whose actions affect us; there is more social control. We need a sense of community; we take the initiative in caring for others and enhancing the quality of the environment in which we live. We should stop living in isolation from those around us, and should be prepared to do things for others without expecting something in return. We need to regain mutual trust" (RIVM-MNP, 2004a).

In the Caring Region scenario, economic growth is modest. However, there is greater solidarity between more and less affluent groups within society. This results in, amongst other things, a flow of financial capacity across generations and between working and non-working people. Hence, prosperity does increase in low socio-economic groups. The negative effect of lower economic growth on life expectancy is off set by greater equality and healthier living. The economic circumstances mean that less money is available to invest in medical technology. The strong state is very active in the field of prevention. Everyone has access to health care, but the less favourable economic climate means that such care is of a more basic nature ('not everything that can be done must be done') (based on the Regional Communities scenario, De Jong & Hilderink, 2004).

good health and care in each scenario naturally depends partly on the political climate and the options taken.

Diseases and afflictions under the two scenarios

In order to estimate the health implications of the two scenarios, a number of demographic assumptions have to be made (in this regard, we follow De Jong & Hilderink, 2004). For the Competitive World scenario (comparable with the Global Economy and Global Market scenarios developed by the Statistics Netherlands and MNP), strong population growth is assumed, to about 18.5 million by 2025. The principal driver of this

growth is positive net migration. Under this scenario, life expectancy in 2025 is 79.5 years for men and 82.5 years for women. Under the Caring Region scenario (comparable with the Regional Communities and Regional Collaboration scenarios), the population stabilizes between 2010 and 2025, at approximately 16.5 million. Life expectancy is somewhat lower than under the first scenario, at 78 years for men and 81.1 years for women. Under the Competitive World scenario, immigration remains high (fuelled mainly by an influx of well educated young people from Asia and Africa), but under the Caring Region scenario, the population-boosting effect of migration soon declines. Most of the migration that does occur is secondary migration (family reunification and formation). Consequently, the age profile of the Competitive World population is more balanced; by contrast, the profile of the Caring Region population has a narrow base. Where both scenarios are concerned, the changes are accentuated as one moves towards 2050 (see *figure 3.24*).

Table 3.14 lists the estimated increases in the prevalences of 2003's twenty most common PHSF-illnesses, based on the demographic prognoses for the Competitive World and Caring Region scenarios; the increase in prevalence attributable to population growth is more or less the same as the population growth itself (13.4 and 1.4%, respectively) and has therefore been discounted. The increase attributable to the changing population profile (particularly population ageing) is greater under the Caring Region scenario than under the Competitive World scenario, but population ageing is an important factor in both scenarios. This is reflected in the quite marked changes seen in the prevalence of diseases associated with old age, such as stroke, dementia and heart failure (all rising by about 40%). The influence of other factors, such as migration, is relatively small, since the population of 2025 is to a large extent here already. That goes some way to explaining why the two scenarios are associated with broadly similar prevalence changes. The lack of contrast is also due to the fact that we are concerned here only with the demography-driven differences between the scenarios, not with developments attributable to socio-economic status, medical technology or other factors.

Our two visions of the future differ not only in demographic terms, but also in other respects relevant to public health, such as lifestyle. *Box text 3.32* outlines the pattern of three key risk factors – diet, physical activity and overweight – for each of the scenarios. The Competitive World scenario is associated with the continued growth of weight problems. Both 'healthy' and 'unhealthy' products will remain in ample supply, but only the higher SES-groups will be able to afford the 'healthy' products. Consumption of convenience foods will also increase and it is debatable whether people will find time in their busy lives to walk or cycle. The Caring Region scenario supposes less choice, but the consumption of fruit and vegetables will increase, partly because of governmental preventive action. More attention will also be given to physical activity. The net effect is likely to be an approximate stabilization in the prevalence of overweight. Under the Caring Region scenario, the government will intensify its efforts to deter tobacco use, employing a mix of measures, such as higher duties, smoking bans, the dissemination of information through the mass-media, advertising and sale restrictions, and support

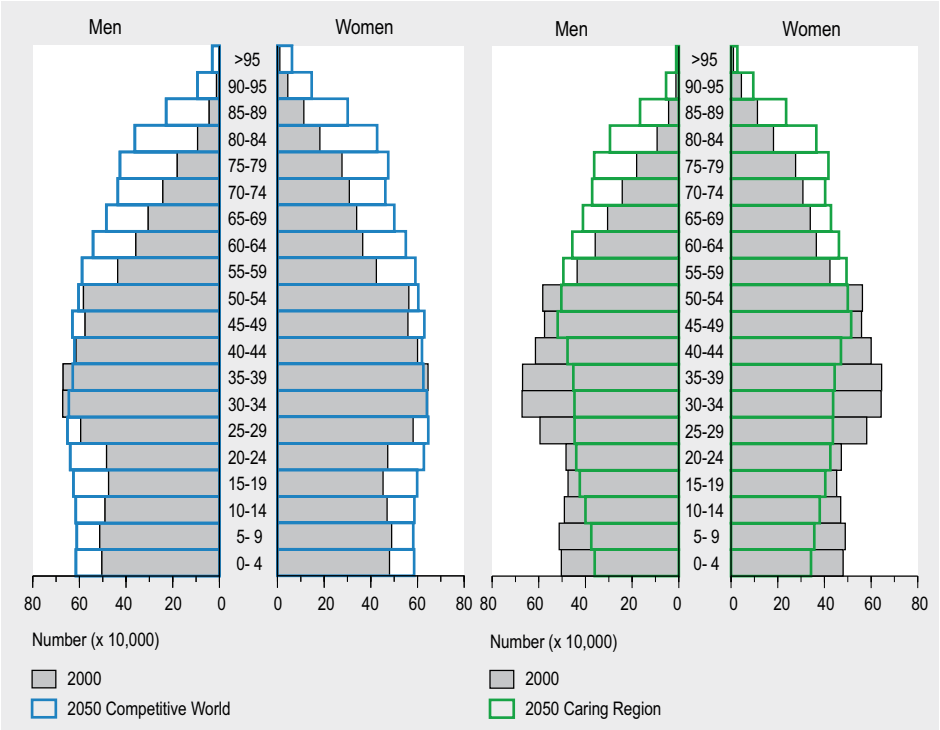

Figure 3.24: Age-related breakdown of the Dutch population in 2000 and in 2050 under the Competitive World and Caring Region scenarios (De Jong & Hilderink, 2004).

Table 3.14: Relative change of disease prevalence up to 2025 attributable to changes in risk factor prevalence, for each of two scenarios.

	Competitive World (%)	Caring Region (%)
Heart failure	41	42
Dementia	40	40
Stroke	37	40
Visual impairments	36	40
Coronary heart disease	35	39
COPD	32	36
Arthrosis	28	33
Osteoporosis	27	32
Age/noise-induced hearing loss	29	32
Diabetes mellitus	25	30
Breast cancer	14	20
Rheumatoid arthritis	14	19
Contact eczema	2	4
Depression	1	4
Inflammatory bowel disease	1	4
Neck and back problems	0	4
Anxiety disorders	-2	2
Asthma	-2	-3
Constitutional eczema	-3	-8
Mental disability (minor+serious)	-8	-8

for people who wish to give up (Feenstra et al., 2006a). As a result, the smoking rate is expected to fall to about 17% by 2025. Under the Competitive World scenario, there is less state interference and the smoking rate stabilizes at about the present level; thus, the assumption is that 25% of the population will be smokers by 2025.

Using the RIVM's Chronic Disease Model (Bemelmans et al., 2004; Feenstra et al., 2006a), we have estimated the influence that the risk factor patterns assumed for the two scenarios will have on health. The model also takes account of the existing trends in the prevalence of chronic disease, by building transition chances into the calculation. *Table 3.15* lists the increases in the prevalence of a number of common chronic diseases between 2003 and 2025, over and above any increases attributable to demographic developments or epidemiological trends.

Table 3.15: Prevalence increases attributable to changes in risk factors up to 2025, for each of two scenarios.

	Competitive World (%)	Caring Region (%)
Heart Failure	3	1
Dementia	-3	3
Stroke	7	-6
Coronary heart disease	8	-6
COPD	-5	-4
Arthrosis [a]	8	2
Osteoporosis	-2	1
Diabetes mellitus	17	1
Breast cancer	5	1
Neck and back problems	3	1
Asthma	0	0
Lung cancer	5	-15

[a] Corrected for double counting of arthritis to various joints, on the basis of the estimated occurrence of double counting in 2003 (roughly 10%).

The Chronic Disease Model analyses indicate that the more favourable assumptions regarding smoking, diet and the prevalence of overweight made for the Caring Region scenario are associated with a considerable reduction in the burden of cardiovascular disease and lung cancer by 2025. By contrast, under the Competitive World scenario, the burden of diabetes, cardiovascular disease and arthritis increases, over and above the rises likely to result from demographic developments. Thus, the continued governmental health promotion efforts that characterize the Caring Region scenario do appear to yield considerable health benefit. Notably, however, diseases associated with old age, such as dementia and osteoporosis, increase more sharply under this scenario, as a result of the disease substitution effect described earlier.

Two scenarios; two case studies

To further illustrate the implications of the two contrasting scenarios for public health, the future of one preventive activity and one field of care under each scenario is outlined below.

Box text 3.32: Developments in determinants under the two scenarios (estimated on the basis of consultation with experts).

The Competive World scenario

Diet
Important developments in the field of food supply lead to a wider choice of both 'healthy' and 'unhealthy' foods. 'Unhealthy' products are available to all; 'healthy' products, however, attract higher prices and are therefore bought mainly by the higher SES-groups. This results in a net rise in energy intake, greater saturated fat consumption, and a further fall in the consumption of fruit and vegetables (distributed across the SES and age groups in all cases). Little improvement in trans-fat intake is expected; nor is any rise in fish consumption foreseen. The model estimates assume the following averages: saturated fats and trans-fats 15.6% and 0.79% of energy intake, respectively; fruit and vegetables 87 and 82 grams per day, respectively, and fish consumption twice a month.

Physical activity
Like the food industry, the physical recreation and media industries will offer increased choice. The greater range of physical recreational options might be expected to encourage people to take more exercise. However, in a pressurized Competitive World, the consumer will probably exercise only briefly and make extensive use of labour-saving devices. People are unlikely to make the time to travel on foot or by bike.

Overweight
Because of the relatively high-energy intake and the fall in overall energy use, weight problems will increase. There will be considerable differences between low and high SES-groups in terms of the prevalence of overweight and obesity. The model estimates assume the following averages: by 2025, more than 31% of the population will be moderately overweight and approximately 25% will be obese.

The Caring Region scenario

Diet
There is less choice of 'unhealthy' products, and labelling provides greater clarity regarding the food value of products on sale. Lower prosperity levels mean that the supply is geared more to the 'ordinary person', with more standard and safe products in particular. Fewer people are inclined to make 'unhealthy' dietary choices. The net result is no substantial change in energy intake or trans-fatty acid intake, while the intake of saturated fatty acids continues to decline. Consumption of fish and of vegetables especially recovers somewhat. The model estimates assume the following averages: saturated fats and trans-fats 12.8% and 0.85% of energy intake, respectively; fruit and vegetables 136 and 117 grams per day, respectively, and fish consumption 2.5 times per month.

Physical activity
A lot of emphasis is placed on physical education in schools, but the resources to fund such activities are relatively scarce. In contrast to the Competitive World scenario, schools do not compete with each other in terms of the physical education options they offer. People are aware of the importance of exercise, and more try to incorporate physical activity into account their daily lives. The net result is little or no further decline in physical activity.

Overweight
Energy intake remains constant, while energy use remains about the same or falls a little, certainly by less than in the Competitive World. The prevalence of overweight consequently stabilizes or increases slightly. The model estimates assume the following averages: by 2025, 35% of the population will be moderately overweight and 11% of the population will be obese.

Case study: early detection of health problems by genetic risk profiling

If the scope for early detection is fully utilized, many of us will have to learn to live with the knowledge that we are at increased risk of illness. Various ethic issues are relevant in this context. In a competitive environment, the emphasis will be on personal responsibility in this area of life, but there will be a risk of stigmatisation and more serious health problems among the less well off. Under the Caring Region scenario, the government will put considerable effort into the primary and secondary prevention of disease among people with a genetically elevated risk profile. However, tests will not be freely available and there will be a greater time lag between the discovery of a new

mutation and updating of the screening profile. By way of illustration, screening for coronary heart disease is considered in more detail in *box text 3.33*.

Case study: mental disorders
In the future, will people be well balanced and enjoy good mental health? Or will anxiety and depression increase? Who will treat people with mental disorders, and how will society respond to them? In this field, too, developments will be strongly dependent on the context. Under the Competitive World scenario, everyone will be expected to fend for him or herself in society. Mental disorders will not be accepted, and treatment will to a greater or lesser extent be provided 'outside the community', with the primary aim of rapid rehabilitation. Under the Caring Region scenario, psychosocial problems will be regarded as part and parcel of life, and care providers will treat them accordingly. In contrast to the situation in the Competitive World, talking problems through will be an important feature on the (often long) road to recovery (see *box text 3.34*).

3.5.3 Dilemmas

Diseases of old age will increase sharply
The most prominent conclusion of our forward analyses is that conditions associated with old age will be a lot more commonplace in 2025, necessitating much higher spending on (long-term) care. The main reason for this development will be population ageing. The increasing burden of such disorders is inevitable, regardless of whether the Competitive World scenario or the Caring Region scenario prevails. The reason being that the numerically large generation whose members will soon be growing old at the same time, is already present within the population. In the period up to 2025, the anticipated shifts in migration and fertility will have little influence on disease burden. However, the scenario analyses do suggest that putting more effort into health promotion can help to mitigate the increase in disease burden associated with chronic disorders.

Leading on from the scenario analysis, below we outline the implications of the two contrasting scenarios for two public health domains and consider the opportunities and risks for these domains under each scenario. Thereafter, we consider the social and political dilemmas in each domain.

Behaviour and health protection
Under the Competitive World scenario, public health improves in utilitarian terms: the health of the average person is better. From an egalitarian perspective, however, the public health situation under the Caring Region is preferable, because there is less difference between the health of the rich and that of the poor. The first scenario involves the promotion of health mainly by emphasizing personal responsibility for healthy behaviour, sometimes linked to personal health risk profiles. Responsibility for health protection lies mainly with other parties, recognizing the problem-solving ca-

Box text 3.33: Screening for coronary heart disease under two scenarios.

The Competive World scenario

Screening and testing
The state does not make genetic risk profiling for CHD available to the public. The private individual has to find his or her own way through the maze of service providers and products, deciding between a full and a partial profile, between services that do and do not include professional guidance, between testing with and without a preventive/therapy report, and so on. Screening clinics are established and foreign service providers produce Dutch-language advertising and information. Pharmaceutical businesses own or co-own genetic databanks (Melchior, 2006), enabling them to offer screening to high-risk families. Concern to avoid future damage claims leads providers to test not only for genetic variants closely associated with disease, but also for those with a weak or suspected association (Hamsten & Eriksson, 2003). The carriers of genetic variants are not systematically informed about other diseases from which they are also at heightened risk. So, for example, the carriers of the APOE e4 variant are not always told that they are at increased risk of developing Alzheimer's disease (Talmud & Humphries, 2002; Slooter et al., 2004).

Guidance and prevention
Through GPs and specialist private initiatives, various guidance services are available, including lifestyle advice, regular checkups, functional foods and preventive medication. Certain nutraceuticals can modulate the genetic and protein expression. Supermarkets stock special selections of foods for people with or at risk of developing CHD (RMO, 2004). There is little supervision of the safety of health-promoting products or of the reliability of health claims. Cholesterol inhibitors are now available over the counter (M'charek & Willems, 2005).

Insurance
Health risks have to be borne partly by the individual. It is standard practice for people at genetically elevated risk of CHD to be denied supplementary health insurance or charged special premiums. Health insurers oblige the children of carriers to undergo testing (Eaton, 2005). People at genetically elevated risk of CHD who do not follow lifestyle advice (e.g. not smoking, taking exercise, watching their weight) may be denied supplementary health insurance and prevented from working as, for example, a pilot or surgeon (Tuffs, 2005).

Rights and obligations
There are certain genetic mutations that are associated not only with an elevated risk of CHD during life, but also with an elevated risk of recidivism following dotter treatment or stent insertion (Petrovic & Peterlin, 2005). Carriers of these mutations who are overweight, do not get enough exercise or persist in smoking are required to pay dotter treatment or stent insertion themselves. CHD patients file claims against carers who failed to offer them genetic risk profiling in the past.

The Caring Region scenario

Screening and testing
The government offers a package of genetic tests to high-risk families in order to provide them with information about the CHD risks they face. Only those genetic variations known to have a close association with the development of CHD in later life are tested for. There is a significant time lag between the discovery of a new genetic variation and its inclusion in the screening profile (RMO, 2004). Little genetic risk profiling is provided outside the mainstream care system. Kits that can be used at home to test for genetically elevated risk of CHD are not permitted on the European market. Nevertheless, it is possible to order test kits or arrange tests with foreignservice providers via the internet; such practices are not legal, but are difficult to prevent. When genetic variants are discovered that are associated with elevated CHD risk, the genetic variations that offer protection against atherosclerosis (MA A1 antitrypsin deficiency, APOE e2) are also highlighted (Talmud & Humphries, 2002; Slooter et al., 2004).

Guidance and prevention
The government puts a lot of effort into primary and secondary prevention of CHD in people who are at genetically elevated risk. A guidance programme is organized, which is intended to encourage such people to lead healthy lifestyles. However, financial assistance is not available to, for example, enable them to buy special foods or join sports clubs. On the other hand, no sanctions are taken against people who do not follow medical advice. All people who are at genetically elevated risk are entitled to insurance-funded medication, provided it has been scientifically shown to be beneficial.

Insurance
Health risks are covered on a collective basis. Individuals at genetically elevated risk of CHD are

continuation box text

protected by the state against social exclusion, e.g. in the form of denial of insurance or discrimination by employers. People who are at genetically elevated risk of CHD do not have to pay more for basic health insurance than other people.

Rights and obligations
People who are at genetically elevated risk of CHD form associations to protect their interests. These associations provide sound information about lifestyle foods and advise people who are considering testing. People who are at genetically elevated risk of CHD remain entitled to insurance-funded

Box text 3.34: Psychiatric care under two scenarios (based on consultation with experts).

The Competive World scenario

Norms and acceptance
In the Competitive World, good mental health is the norm and a precondition for participation in society. Anyone who, for whatever reason, is not in the best mental state is liable to feel ashamed. Openly admitting to depression is a sign of weakness and likely to harm one's promotion opportunities.

Social setting and referral
In the strongly individualistic society, people with mental problems are liable to find others uninterested in them. The usual response is to recommend seeking professional help. Anyone taking this advice is likely to go to the doctor with the practical aim of being restored to health and reintegrated into work as soon as possible. In the secondary mental health care sector too, the emphasis will be on treatable disorders: depression, anxiety and burnout.

Medication or counselling
All professional carers label mental problems on the basis of the psychological diagnosis (the DSM). Furthermore, problems are divorced from their context and individualized. The number of psychiatric disorders in the DSM increases, and the criteria are broadened. The range of disorders for which many medicines are indicated is widened, and new psychoactive drugs come onto the market. There is a pill for every problem. Hyperactive children, for example, are given Ritalin so that their education is not impaired.

The employer
Employers make help available to their own employees through supplementary occupational care packages. There are no waiting times at occupational health clinics, where the care is highly protocolled and aimed primarily at workplace reintegration (which is ultimately what the employer is paying for).

The Caring Region scenario

Norms and acceptance
Under the Caring Region scenario, psychosocial problems are regarded as part and parcel of life – something that can affect anyone. Furthermore, it is recognized that such problems usually have demonstrable environmental causes, such as bereavement, physical illness, relationship problems, housing, conflicts at work, or a combination of these factors. Within this context, a person's mental problems seem quite understandable.

Social setting and referral
Psychosocial problems are, as far as possible, identified and resolved within their social setting by the people concerned. If that does not prove possible, the assistance of a primary carer, such as a youth health worker, GP or occupational doctor, is sought. Where appropriate, such a carer will refer the patient to someone else in the primary sector. The secondary mental health sector concerns itself mainly with caring for people with schizophrenia, borderline or bipolar disorder.

Medication or counselling
Within the primary care sector, people are reluctant to medicalise everyday problems. Problems are viewed in their context. Care consists mainly of counselling: talking to the patient and to the people around him/her. Thus, the parents of a hyperactive child are given video home training, or a form of family therapy together with the child.

The employer
Stressed or depressive employees are provided with, for example, problem-solving therapy, which involves patient and carer analysing and resolving the patient's practical problems. Because of the contextual approach used, this form of care is necessarily almost non-protocolized.

pabilities of local governments, employers, organizations and individual citizens (limited community reparability). In addition, the cost of and returns on health protection measures are examined more critically; more health benefit is sought for less money. Under the Caring Region scenario, behaviour and health promotion are shaped more by governmental bodies and social institutions, and the individual's role is not stressed. Under this scenario, (central) government retains firm control of health protection in order to uphold the universal egalitarian right to protection. The higher cost of this approach is a more or less regarded as efficient investment.

The main public health concern associated with the Competitive World scenario is the deprivation of vulnerable groups, resulting from the emphasis on personal responsibility and cost-effectiveness. However, personal responsibility, like individual freedom of choice, is a moot concept for some groups, partly because of the considerable influence of the social and physical environment and partly because of the intrinsic personal characteristics of the people concerned. This scenario can also lead to inequalities being disregarded if measures aimed at other groups are more cost-effective. The main drawback of the Caring Region scenario is that the scope for improving health would not be fully utilized, due to less emphasis on medical technology and the pursuit of a quality of life in which also a suboptimal health status is regarded as 'normal'. Under this scenario, expenditure on health protection may rise substantially, certainly if the number of risks and exposure to them increases and at the same time the objective is to minimize or even nullify risk for all.

One dilemma is therefore how best to promote health, both in overall terms and in terms of its distribution, and with a view to attaining what level of health. Another dilemma concerns the demand for health as a utilitarian commodity (see also *subsection 3.6*). The perception of health as a requirement for competitive participation has policy implications that differ from those associated with the perception of health as a quality of life in a society in which people with less (health) 'capital' can also participate.

Health care

Under the Competitive World scenario, market forces and freedom of choice lead to an ample supply of high-quality, innovative medical care. The emphasis is more on curative care than supportive care, because the former facilitates the return of people to the (wealth-generating) labour process and is therefore economically advantageous. Long-term care takes the form of luxury care packages for those people who can afford it. Collectively funded supportive care homes exist only for less well-off older people in need of considerable care. For the wealthy, there is also ready access to specialist clinical care concerned with the (appearance and functionality of the) 'designer body': modification of the body in line with the preferences and requirements of the competitive environment. Psychological care focuses mainly on the more easily treatable disorders, with a view to expediting a return to the labour process. In a Competitive World with high economic growth, there is more scope for investing in care. The Caring Region scenario, by contrast, is associated with lower economic growth and less use of medico-technological innovations; the emphasis is more on the 'designer soci-

ety' and thus on adapting the environment to the needs and expectations of healthy and less healthy people. While technologically less innovative, care is equally available to all. In the Caring Region, the Exceptional Medical Expenses Act remains in existence, albeit in a somewhat pared-down form; much long-term care is provided by lay carers and by voluntary organizations. Care for people with mental disorders is provided on a 'holistic' basis as far as possible, and practitioners seek to avoid medicalizing everyday problems.

In the Competitive World, there is a risk that the overall cost of providing care will get out of hand, as assertive and affluent people purchase high volumes of expensive care. This vision of the future is also associated with potential inequalities in access to care. Under the Caring Region scenario, there is also a danger of costs running out of control, because of the need to make care of a consistent quality available to all. Even if the latter danger is averted, society is potentially faced with care that is suboptimal in medico-technological terms and with a shortage of suitably qualified care practitioners. Under both scenarios, there is increased demand for long-term care, mainly for groups of people with chronic and complex care needs. Such people typically have lower disposable incomes, and are less able to provide for themselves. In the Competitive World, therefore, these vulnerable groups may not receive appropriate care. Problems of this nature are less likely in the Caring Region, although labour shortages and the overburdening of lay carers may also compromise the quality of the care provision. The provision of psychological care in the Competitive World results in the medicalization of a large group of people, while the Caring Region scenario brings a danger of people being mollycoddled; either development could result in many people effectively being written off.

Not surprisingly, therefore, one key dilemma concerns cost and accessibility: who bears the cost, should the sums involved be regarded as costs, or as investments that bring returns (see also *subsection 3.6*), and should bearing the cost of care be linked to (the right of) access to care? This dilemma touches on the fundamental question of what the purpose of health care and public health policy actually is; is the object to look after the individual and his or her health, or should the emphasis be on health as a social phenomenon, on the pursuit of equal health for all? The current debate on solidarity and its significance and sustainability exemplify the thorny nature of this issue. The question of purpose can also be raised in relation to long-term care: does society have an obligation to provide supportive care in its broad sense, or is the obligation of state and community limited to the maintenance of health, with other facets of care (quality of life, housing, social inclusion, etc.) left up to the autonomous individual? The steady erosion of the distinction between supportive care homes and nursing homes is indicative of the form that this dilemma has taken within the field. Another point of debate is how one can maximize the possibility of care increasing autonomy and personal responsibility, rather than diminishing them. Is the latter object best served by seeking to expedite and maximize inclusion in the labour process, or by promoting alternative perceptions of participation and normality? The recent public and political debates concerning the work incapacity benefit system, reintegration into work and

the (re-) assessment work incapacity benefit claimants are all topical manifestations of this dilemma.

Whether a society strives more for the things that characterize the Competitive World scenario, or those that characterize the Caring Region scenario, depends on political thinking and priorities, in the context of and in response to external developments. As our illustrations show, the views that prevail within our future society and government with regard to the key uncertainties will have a major bearing on determinants, prevention and care. For example, there is considerable difference between the scenarios in terms of the functions of prevention and care in relation to the economy and society, and therefore in terms of the way prevention and care are organized and funded. Hence, the political and policy decisions made now will to a significant extent determine whether the short-term and long-term public health situation in the Netherlands tends more towards the competitive model or the caring model.

3.6 Health and care as contributors to prosperity

Greater prosperity means better public health
Wealth leads to better living conditions and thus to better public health. Prosperity also influences education and health care, which are in turn beneficial to health. As prosperity levels rise, the finance base for treatment increases and service levels rise within the health care system. Historical analyses have shown that these mechanisms lead to increased life expectancy. However, the undoubted health benefits come at a price. Over an extended period, health expenditure has risen by an annual average of two percentage points more than the rate of economic growth. So far, this has not inhibited private consumption or detected from other public services. As long as economic growth is sufficient, health care and private consumption can increase together – certainly while public expenditure is declining as a percentage of GDP, as it has been over recent decades in the Netherlands.

Better public health means greater prosperity
Health increases the amount of human capital in circulation, thus contributing to labour productivity and to economic growth. Quite apart from that, people regard health as a major, valuable commodity. In economic terms, therefore, health is not only a production factor, but also a source of wealth, which may be likened to other sources, such as private consumption. A comparative study of health and private consumption as sources of prosperity in the USA has suggested that improving population health and increasing private consumption generated roughly similar amounts of wealth in the twentieth century.

The return on health care is considerable
The prosperity generated by health appears to exceed the cost of health care by a wide margin. However that is only half the picture, because health and health care have a value that is not purely economic. They are core values of a civilized society.

Health and care as contributors to prosperity
Why does nearly everyone regard the growth of the IT sector as a good thing, but the growth of the care sector as a problem? In October 2005, US health economist David Cutler put this question in his Tinbergen Lecture, thus fuelling the debate on health expenditure (Cutler, 2005). It is a debate in which many people, governments and organizations are participating; a debate that encompasses many points of view and still more questions. What is the relationship between prosperity and health? To what extent can the cost of care provision rise before it becomes problematic, and what do we get in return for all that money? What is the return on health care?

In this subsection, we consider health and health care from an economic perspective. The various issues are outlined by reference to a number of recent publications. We start by examining the relationship between prosperity and health: how economic growth influences public health, the size of the care sector and the overall cost of care

provision. In this context, we also consider whether it is problematic if the care sector continues to account for an ever-larger percentage of GDP.

The second part of this subsection is devoted to the inverse relationship: the influence of health on prosperity. To this end, prosperity is expressed in the economic terms of production and consumption. In other words, health plays an important role in both the creation and the enjoyment of prosperity.

The various aspects of the relationship between health and prosperity are brought together in the final part of the subsection, when we seek to quantify the return on health care. A number of other aspects of health and care that are not readily apparent from an economic perspective are also highlighted.

3.6.1 Prosperity as a contributor to health

Economic growth leads to better public health

The twentieth century has brought prosperity and health to many countries around the world. In Europe, the western and northern countries in particular witnessed enormous economic growth together with equally considerable declines in mortality (Janssen et al., 2006). As early as the 1970s, McKeown suggested that there was probably a causal relationship between these developments, whereby economic growth led to increased life expectancy (McKeown, 1976). This hypothesis set countless researchers thinking. The conclusions of the plethora of publications that followed may be summarized as follows (Marmot, 2002). First, there is a direct relationship between prosperity and public health. Economic growth improves the material living conditions that are necessary for survival in a biological sense. Second, there is an indirect relationship, which concerns the way people function socially. Also of relevance in this regard is the scope that people have to influence their lives for the better by, amongst other things, pursuing a healthy lifestyle. Education plays an important role in this context. Third, there is an indirect relationship, in which health care is the intermediary. Prosperity facilitates higher-quality health care and the development of new medical technologies, which lead to increased life expectancy (see *subsection 2.4*).

Economic growth also leads to expansion of the health care sector

From a macro-economic viewpoint, the size of the care sector can be explained entirely by the level of national income – certainly in all wealthy countries (Gerdtham & Jonsson, 2000). Of course, demographic, epidemiological and technological developments have an important influence on care consumption, but it is growth in national income that enables the care sector to expand. The rate of such expansion is not limited to the rate of growth in general prosperity. In all OECD countries, health care has on average profited more from rising prosperity than other industries. The US health economist David Cutler has calculated that, in the OECD zone between 1960 and 1995, health expenditure rose by an annual average of two percentage points more than GDP (Cutler, 2002). For the Netherlands, the CPB has indicated that the differential was not quite

as great (1.7 percentage points), but the differential for the period 2008 to 2011 is expected to rise to 2.2 percentage points (Douven et al., 2006). The consequence of the care sector growing more rapidly than GDP is that, in the Netherlands as in all wealthy countries, the care quote (health care expenditure as a percentage of GDP) continues to rise year on year (see *chapter 2*, *figure 2.23*).

Rising care quote is a structural phenomenon

Why does the health care quote keep rising? Detailed analysis of cost developments in the care sector shows that the rise is not purely the result of demographic and epidemiological change. Two other factors have a profound influence on the cost of care provision. First, technological development brings new, better and usually more expensive therapies onto the market, which generally not only meet an existing need, but also generate additional demand for care (Weisbrod, 1991; Cutler, 1996; Van Oers, 2002). For convenience, we include under the heading of technological development all expansions in care in the form of quality improvements and raised service levels, such as transition to single-bed rooms and small groups in nursing homes and other long-term care establishments.

The second factor has to do with price development. The price of care appears to be rising more quickly than the price of GDP. Economists refer to this as a terms-of-trade loss. According to the CPB, the terms-of-trade loss (i.e. the differential between health sector inflation and general inflation) for the period 1972 to 2003 was 1.2 percentage points (Douven et al., 2006). Part of the reason for this differential is the high price of new medical technologies. For the most part, however, it is a structural phenomenon that was first described by the US economist William Baumol and has since become known as 'Baumol's disease' (Baumol, 1993; Lindbeck, 2005). The crux of Baumol's theory is that in labour-intensive sectors, such as education, health care and personal service provision, there is less scope for automation. Consequently, labour productivity in these sectors is structurally inferior to that in manufacturing industry and other sectors where automation is possible. Because wages follow general trends, care becomes increasingly expensive. The CPB anticipates that in the period up to 2011, this phenomenon will push up the overall cost of care provision by 0.8% a year. Thus, Baumol's disease will account for a considerable portion of the forecast additional growth in the cost of care provision, put at 2.2 percentage points in excess of economic growth.

Rising care quote does not preclude private consumption growth

Of course, the size of the health care sector cannot keep increasing indefinitely relative to the national economy. Unlimited growth would eventually lead to a phenomenon known as 'crowding out': expansion to the point where private consumption and spending on other important public services has to diminish (OECD, 2003). Although this problem must be encountered at some point, a little qualification of that observation is in order. As long as economic growth is not entirely absorbed by the care sector, health care quote expansion will be accompanied by increasing scope for spending in other areas (Chernew et al., 2003). *Figure 3.25* shows how this has been the case in the Netherlands over recent decades.

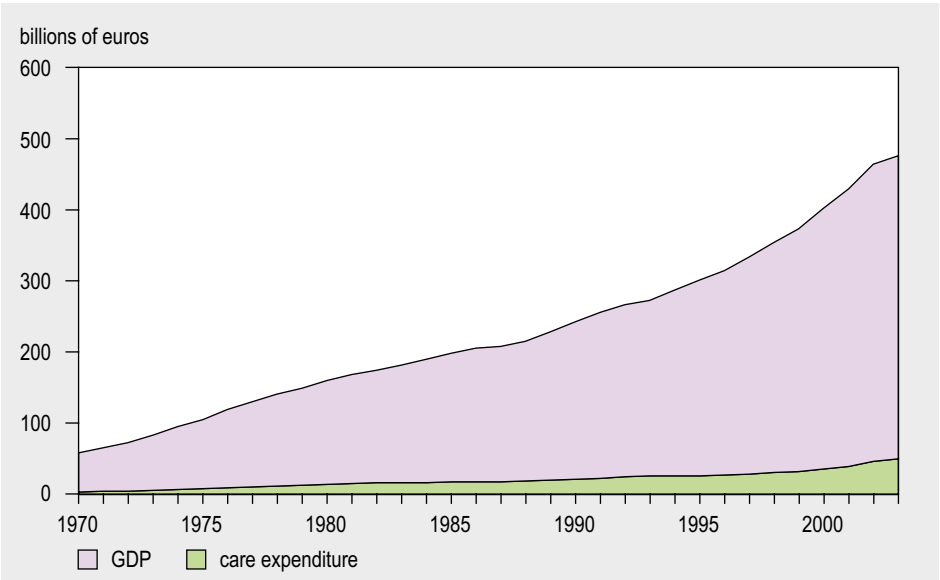

Figure 3.25: Health expenditure and GDP in the Netherlands, 1970-2003, in billions of euros at current prices (Source: Bos, 2006; CPB, 2006).

Public spending has fallen in relation to GDP since 1987

It is also enlightening to study the care quote in relation to other forms of public spending. If certain forms of public spending fall, there is scope for other forms of spending to increase, even without economic growth. *Figure 3.26* shows that, between 1950 and 1985, overall public spending doubled as a percentage of GDP, from 30 to 60%. Since then, the general trend has been downward, albeit with some fluctuations, including a recent upturn. The long-term pattern appears to be closely linked to social security expenditure. By way of comparison, the graph also shows expenditure on education and defence. As a percentage of GDP, education expenditure developed along similar lines to care expenditure in the 1950s and 60s. In the mid-1970s, however, a turning point was reached, partly as a result of the declining percentage of children in the population. Defence expenditure has been gradually falling in relation to GDP, particularly since the fall of East European communism and the end of the 'cold war'.

Can health care continue to grow in the Netherlands?

In view of the developments in GDP and public spending outlined above, is there still adequate scope for health sector growth? Society's future attitude to health, care and prosperity will be decisive in this regard. In *subsection 3.5*, we explored various possible developments in this field through a scenario-based forward analysis. This analysis considered two contrasting scenarios, the Competitive World scenario and the Caring Region scenario. The scope for health sector growth has three main determinants: first, the level of economic growth and future prosperity; second, individual and public spending priorities (private consumption, health care or other public services); third, the cost of the various options. The third determinant is influenced by factors such as labour productivity and development in the various sectors of the economy, as well as

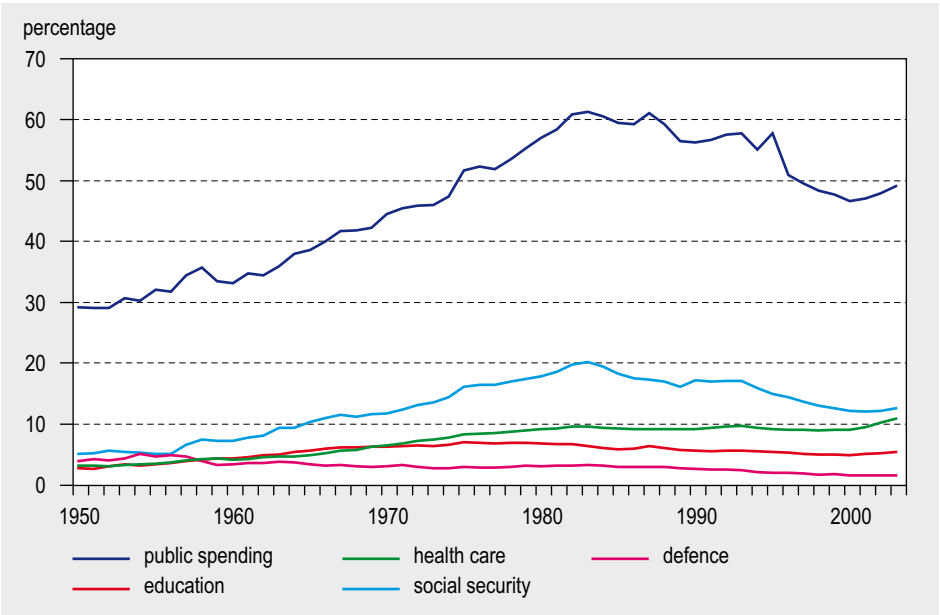

Figure 3.26: Percentages of GDP accounted for by overall public spending, by public spending on social security, education, defence, and by overall (i.e. public and private) health care expenditure, 1950-2003 (Source: Bos, 2006).

the upward pressure of population ageing on social security spending (Van Ewijk et al., 2006).

What is notable about these determinants is that not only do they influence the scope for health sector growth, but also they are themselves heavily influenced by health. This is particularly evident in relation to people's spending priorities, which reflect the value that society attaches to health, relative to private consumption and other public services. However, public health also has a major influence on economic growth and the development of labour productivity. A healthy working population is a precondition for prosperity growth. Health and care generate prosperity. Health is wealth.

3.6.2 Health as a contributor to prosperity

'Investing in Health' was the title of the World Development Report, with which the World Bank placed the significance of public health for the wealth of nations on the international agenda in 1993 (World Bank, 1993). A wide-ranging debate followed the appearance of this report, with particular attention given to the future of developing countries (WHO, 2001a). Because health and prosperity are also considered very important in wealthy countries, in 2005 the European Commission published a report on the contribution of health to the economy in the European Union (Suhrcke et al., 2005). The central theme of this report was an economic appraisal of health, in which two aspects were developed: wealth creation and wealth perception. Thus, in economic

terms, health has the characteristics of both a production factor and a consumable product. Health contributes to the human capital needed by society for the production of material prosperity in the form of goods and services (Grossman, 1972). However, it also makes a direct contribution to human wellbeing. In an economic sense, therefore, health benefit is comparable to the value that people derive from consumer goods.

The improvement of public health generates economic growth

A number of impressive historical studies have been published describing the influence of health on national prosperity. World famous is the work of Nobel price winner Robert Fogel. Fogel estimated that approximately 30% of the UK's income growth between 1780 and 1980 was attributable to improvements in diet and health (Fogel, 1994). On a per capita basis, that equates to annual economic growth of 1.15%. Arora performed a similar analysis for ten countries, including the Netherlands, over the period 1880 to 1992. The conclusion of the analysis was that, in all countries concerned, growth was boosted by improvements in public health (Arora, 2001).

Studies focusing on particular diseases, such as cardiovascular disease, provide further evidence that better health leads to a higher national product (Suhrcke & Urban, 2005). It has even been suggested that every one-year increase in life expectancy generates economic growth of 4% (Suhrcke et al., 2005). However, critics of this theory point out that such endogenic growth is offset by growth in the demand for care, which also results from increased life expectancy (Van Zon & Muysken, 2001). Other critics have warned that one devalues health by regarding it merely as integral to human capital and thus as an instrument of labour productivity and economic growth. Thus, according to one prominent response to the WHO report Macroeconomics and Health, health is also a fundamental human value (Waitzkin, 2003).

Health is valued highly

For most Dutch people, health belongs to the most important things in life. Consequently, they are prepared to pay a lot for anything that yields a lot of health. A new pharmaceutical product is added to the entitlement package, for example, if the cost per additional quality-adjusted life year (QALY) is anything less than 20,000 euros. Opinion differs, however, regarding the appropriateness of this figure and its validity in relation to other health care provisions, particularly in view of the considerable international differences that exist (Brouwer et al., 2006). In Australia, for example, the corresponding figure is 25,000 euros, while in the UK it is 44,000 (Taylor et al., 2004).

Because of these differences, a meta-analysis of willingness-to-pay studies was performed in an effort to determine a 'golden standard' value for a QALY (Hirth et al., 2000). Although no such value could be established, it was demonstrated that, in addition to its economic value as a component of human capital, health had an independent value of at least 100,000 euros per QALY. Hence, the ceilings applied in the context of funding are in fact somewhat low.

Health and consumption made roughly equal contributions to prosperity in the twentieth century

On the basis of these estimates, it is possible to compare the value of health with the value of consumption. This is of interest because both make a contribution to the people's perception of wealth. Before making a comparison, however, the two variables need to be harmonized, since an increase in life expectancy is a whole-life quantity, whereas consumption data are annualized. The US economist Nordhaus developed a harmonization by assigning the economic value of additional life-years to calendar years in the form of what he termed 'health income' (Nordhaus, 2002). He estimated this health income at between 2,600 and 7,600 dollars per person per year, or 75,000 to 162,000 dollars per additional life-year, depending on the discount rate applied. From this starting point, he analysed developments in life expectancy and private consumption in the USA. His general conclusion was that, in the twentieth century, health and consumption had contributed to prosperity in roughly equal measure.

3.6.3 The return on health care

Investment in health care yields a high return

What is the return on health care? To answer this question, it is necessary to bring together the two health-and-wealth factors considered above: the growth in the health expenditure and the growth of prosperity brought about by improved public health. Very little health economic research has yet been done in this field. Nevertheless, Martin McKee did introduce the topic in a background study for the previously cited European Commission report (McKee et al., 2005). By way of an academic exercise, and using Nordhaus's health valuation data (see above), McKee and his team calculated what proportion of the economic growth in five European countries between 1990 and 1998 was attributable to increased life expectancy. Next, they worked out the rise in the cost of care provision and estimated the portion of the improved health that was due to better health care (see also *subsection 2.4.1*). Their results are summarized in *table 3.16*. Per capita wealth rose in all the countries studied, both as a result of higher GDP and as a result of improved health. In Sweden, health improvement and economic growth were found to have made similar contributions to prosperity. In the other countries, the influence of GDP growth was somewhat greater in relative terms.

In all the countries, the health expenditure increased, but to a lesser degree than the prosperity growth made possible by improved health. Indeed, the contribution to prosperity made by that part of improved health attributable to better health care exceeded on its own significantly the rise of expenditure. In other words, all countries received a positive return on their investment in health, varying from just under 50% for France to more than 250% for Spain and Sweden. As the authors commented, this a magnitude of return 'is not matched easily by other types of investment.' Impressive though these figures are, McKee's team regard them as underestimates, because they reflect only the return in terms of increased life expectancy and not in terms of, for ex-

ample, improved quality of life; nor do they take account of the influence of improved health on economic growth.

Table 3.16: The return on health care in five European countries, 1990-1998, in US dollars (Source: McKee et al., 2005).

	UK	Sweden	France	Italy	Spain
Growth in care expenditure	630	395	676	403	506
Growth in prosperity					
- GDP growth	6,000	4,810	5,200	5,420	5,180
- Economic value of improved health	4,108	4,732	3,302	4,992	4,498
- Portion of same attributable to better health care	1,561	1,478	996	1,325	1,780
Net earnings from care expenditure [a]	931	1,083	320	922	1,274
Return care expenditure [b]	148%	274%	47%	229%	252%

[a] Economic value of improved health – growth in care expenditure.
[b] Net earnings from care expenditure / growth in care expenditure.

Efficiency remains important

Sizeable though the return on health care is, efforts to increase the efficiency and quality of care remain very important. In his Tinbergen lecture, Cutler warned about the dangers of wastage: 'we pay equally for wasteful care as for valuable care, so that we get a good amount of each' (Cutler, 2005). Furthermore, even when the return on health expenditure is high, one must always seek ways of improving allocative efficiency. Economic evaluations can be helpful in this regard. However, it is important that analyses of cost-effectiveness are performed on a more integrated basis (Feenstra et al., 2006b), and that account is taken of aspects other than health benefit and cost, because health and health care are more than aspects of wealth.

Health and health care have a broader meaning

In this subsection, we have examined health and care from an economic perspective. Wealth is health, health is wealth and the return on health care is considerable. However, from an economic viewpoint, certain important aspects of health and care cannot easily be observed. The quality of life is not defined solely by prosperity. For many people, health is the most important thing in life. The value of health cannot therefore be adequately expressed in monetary terms. Hence, the health care sector is much more than an industry in which scarce resources are invested in order to generate health income. In a civilized society, the health care sector is primarily a vehicle for making sense of and learning to cope with life, suffering and death. It is a meeting place for all human and social values. The quality of society is not therefore defined merely by economic growth and prosperity generated by better health. Matters of distribution and justice are of great social importance. Is every QALY of equal value, for example? Should no distinction be made on the basis of age, seriousness of disease or other justice-related considerations? How should we view population ageing and old age, and what is the status of, for example, care that is not intended to lead to cure?

What position do society and policy afford to vulnerable groups with serious health disadvantages? To whom do we collectively extend solidarity, and what financial limit do we place on that solidarity?

The answers to these questions will differ from one society to another. In a competitive world, different choices will be made to those made in a caring society. Indeed, such diversity is desirable if the social aspects of health and care are taken seriously. Yet, in whichever direction society might develop, investing in health and health care will always yield a high return – and not only an economic return. As Martin McKee said recently: 'Investing in health will generally make the world a better place' (McKee, 2006).

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Data sources

AVO. Amenities and services utilization survey (SCP).

CBS Bevolkingsprognose. Population prognosis (Statistics Netherlands).

CBS Doodsorzakenstatistiek. Mortality Statistics (Statistics Netherlands).

CBS StatLine. Statline is the electronic database of Statistics Netherlands.

CFI. Education data (Ministry of Education, Culture and Science)

CMR-Nijmegen e.o.. Continuous Morbidity Registration Nijmegen (UMC St. Radboud, Department of General Practice, Nijmegen).

Consument en Veiligheid. Blijf Staan project in verzorgingshuizen 2004-2006 (Consumer Safety Institute).

Doetinchem. Doetinchem cohort study (RIVM).

EARSS. European Antimicrobial Resistance Surveillance System.

EPIC. European Prospective Investigation into Cancer and Nutrition.

ESPAD. The European School Survey Project on Alcohol and Other Drugs.

Eurostat. Database of the Europesean Union (Queen Tree, formerly New Cronos).

HBSC. Health Behaviour in School-aged Children study, 2004 (WHO Regional Office for Europe).

IOTF Prevalence Data. (International Obesity TaskForce).

LIS. Injury Surveillance System (Consumer Safety Institute).

Milieu- en Natuurcompendium. (MNP, Statistics Netherlands & WUR).

MORGEN. Monitoring Project on Risk Factors for Chronic Diseases (RIVM).

NKR. Dutch Cancer Registration (VIKC).

OII. Elderly People in Institutions survey (SCP).

Peilstation HVZ. Monitoring project on cardiovascular diseases (RIVM).

POLS. The Permanent Quality of Life Survey (Health Statistics Netherlands).

Regenboog. Risk Factors and Health in the Netherlands, a Survey by Municipal Public (RIVM).

RNH. Network of Family Practices (Maastricht University, Working group Primary Health Care).

STIVORO. Website STIVORO - professionals.

VCP. National food consumption survey (TNO).

WBO. Housing Demand Survey (Ministry of Housing, Spatial Planning and the Environment).

WHO-HFA. WHO - Health For All database.

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Appendix 2: Glossary of terms and abbreviations

Definitions

Disability-Adjusted Life-Year	An index of the burden of disease in a population (on a time axis); calculated from the number of life-years lost due to premature mortality and the number of years lived with health problems (e.g illness), weighted according to seriousness (illness-year equivalents). This index reflects three important aspects of public health: 'quantity' (length of life) and 'quality' of life, and the number of people affected.
Familial hypercholesterolemia	A hereditary condition characterized by disturbed fat metabolism, as a result of which excess cholesterol is not sufficiently metabolised by the liver. This leads to a substantially raised serum cholesterol level.
Healthy life expectancy	The expected average number of life years that a person spends 'in good health'. This health index combines the length and quality of life in one single figure. Dependent of the definition of 'health' there are three types of healthy life expectancy: life expectancy in perceived good health (i.e a state of health described by the person concerned as 'good' or 'very good'), life expectancy without physical disabilities (no auditory, visual, mobility or ADL impairment) and life expectancy in good mental health (i.e a state of health characterized by the absence of feelings of loneliness, restlessness, boredom, depression, or feeling out of sorts).
Incidence	The number of new cases of a certain disease in a well defined period of time (often one year) in a defined population.
Illness-year equivalents	Index of reduced quality of life: the number of years spent living with an illness, weighted according to the severity of that illness. One of the components of a DALY.
In vitro fertilization	Procedure that involves the extraction of egg cells from a woman's ovaries and their fertilization outside the body ('test tube fertilization'), with the intention to subsequent placement in her womb to initiate pregnancy.
Lay care	Informal unpaid care that is given voluntarily.
Life expectancy	The average number of years that a person can expect to live beyond a particular age.
Lost life-years	Number of years that people who have died as a result of a disease would have lived if they had not had the disease in question (e.g the residual part of average life expectancy).
PAR	Population attributive risk. The percentage by which a health problem would decrease if population groups whose health status is poor would be as healthy as the most healthy group; an index of the portion of the disease burden or mortality in the total population attributable to a particular exposure.
Prevalence	The total number of cases of a particular disease during a well defined time period (mostly one year; annual prevalence) or at a certain point in time (point prevalence) in a defined population (often expressed per 100,000). So cases that had developed before the measured period or point in time are also included In the case of chronic diseases the (point) prevalence can be many times the annual incidence.
Primary care	Various forms of care including GP care, dental care, paramedical care, midwifery, general social work and basic psychological help.
QALY	Quality-adjusted life-year. An index of the quality of a life-year (on a time axis); calculated from the residual length of a person's life and his/her quality of life following a medical intervention. QALY counts are estimated expressions of the life-years gained by medical interventions, calculated by multiplying each year by a weighting (or utility) figure, which represents the person's quality of life in that year.

Relative five-year survival	The chance that someone will not die of a particular illness in the five years following it's the diagnosis. This chance is estimated by dividing the observed survival percentages (regardless of the cause of death) in the patient group by the expected survival (based on mortality tables) in a general population group of similar age and gender composition.
Socio-economic status	A person's position in the social hierarchy, as reflected in educational status, income and/or occupation.
Standardization of mortality data	Direct standardization for age involves the application of age-specific mortality data for a given population (the index population) to the age distribution in a selected standard population (e.g. the European standard population). This results in the mortality that would be expected in the standard population if the age-specific index population mortality rates were valid. The same principle is applicable for morbidity data.
Surveillance	A system monitoring the incidence and prevalence of infectious diseases and pathogens. It involves the systematic collection, analysis and interpretation of data, followed by reporting.
Ten-year prevalence	The number of patients who survive till the 1st of January of a particular year after having been diagnosed in one of the preceding ten years. This is a standard indicator in cancer registration.

Abbreviations

A&E	Accident and emergency
ABCD	Amsterdam Born Children and their Development. A long-term, large-scale study of the health of neonates in Amsterdam.
ADL	Activities of daily living
AGS	Adrenogenital syndrome
AIDS	Acquired Immune Deficiency Syndrome
ASP	Antisocial personality disorder
AWBZ	Algemene Wet Bijzondere Ziektekosten (Exceptional Medical Expenses Act)
BKZ	Budgettair Kader Zorg (Health Care Budget of the Ministry)
BMI	Body-mass index (an index of (over)weight in kg/(height in m2))
BSE	Bovine spongiform encephalopathy
BSN	Burger Service Nummer (Citizen Service Number)
CAHPS	Consumer Assessment of Health Plan Survey
CA-MRSA	Community-acquired MRSA
CBS	Centraal Bureau voor de Statistiek (Statistics Netherlands)
CDM	Chronic Disease Model
CHD	Coronary heart disease
CHT	Congenital hypothyroidism
COPD	Chronic Obstructive Pulmonary Disease
CPB	Centraal Planbureau (Netherlands Bureau for Economic Policy Analysis)
DALY	Disability-Adjusted Life-Year
DHW	Drank- en Horecawet (Alcohol and Catering Act)
DM	Diabetes mellitus
DNA	Desoxyribonucleic acid
DTP-polio	Diphtheria, whooping cough, tetanus, poliomyelitis
E&E	Entertainment & Education
ECDC	European Centre for Disease Prevention and Control
ECHI(M)	European Community Health Indicators (and Monitoring)
ECR	Electronic Child Record
EMR	Electronic Medical Record
ESBL	Extended-spectrum beta-lactamase
EU	European Union
EU-15	The fifteen countries that made up the European Union prior to April 2004: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, the Netherlands, Portugal, Spain, Sweden and

	the UK.
EU-25	The twenty-five countries that have made up the European Union since April 2004: Austria, Belgium, Cyprus, the Czech Republic Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, the Netherlands, Poland, Portugal, Slovenia, Slovakia, Spain, Sweden and the UK.
FH	Familial hypercholesterolemia
GBI	Gezondheidsbevorderend instituut (Institute involved in health promotion)
GDP	Gross domestic product
GLOBE	Gezondheid en Leefomstandigheden Bevolking Eindhoven en omstreken (Health and Living Conditions of the Population of the Eindhoven Area)
GP	General Practitioner
HALE	Health-adjusted life expectancy
HCPR	(Dutch) Health Care Performance Report
HCQI	Health Care Quality Indicators (OECD)
HIAP	Health in all policies
Hib	Haemophilus influenza type b
HIV	Human immunodeficiency virus
HPV	Human papilloma virus
ICD	International Classification of Diseases
ICD-9	International Classification of Diseases, ninth revision
IGT	Impaired glucose tolerance
IGZ	Inspectie voor de Gezondheidszorg (Health Care Inspectorate)
IOM	Institute of Medicine
IVF	In vitro fertilization
IYE	Illness-year equivalents
LMR	Landelijke Medische Registratie (National Medical Register, Prismant)
MDR-TB	Multidrug-resistant tuberculosis
MHS	Municipal/Regional Health Service (GGD)
MMR	Mumps, Measles, Rubella
MNP	Milieu- en Natuurplanbureau (Netherlands Environmental Assessment Agency)
MRSA	Methicillin-resistant Staphylococcus aureus
MUA	Major Urban Areas
NEMESIS	Netherlands Mental Health Survey and Incidence Study (Trimbos Institute)
NIGZ	Nationaal Instituut voor Gezondheidsbevordering en Ziektepreventie (National Institute for Health Promotion and Disease Prevention)
NKR	Nederlandse Kanker Registratie (Dutch Cancer Registry)
Orphan drugs	Medication intended for the treatment, diagnosis or prevention of rare diseases.
PC-4	Four-digit postcode (zone)
PE	Physical education
Pharos	Kenniscentrum vluchtelingen en gezondheid (Refugee and Health Knowledge Centre)
PKU	Phenylketonuria
PM-10	Particulates with a diameter of less than 10 µm
POLS	Permanent Onderzoek Leefsituatie (Statistics Netherlands Permanent Survey of Living Conditions)
PPP	Purchasing power parity
PSA	Prostate specific antigen
PTSS	Post-traumatic stress disorder
PVL	Panton-Valentine leukocidin
QALY	Quality-adjusted life-year
RGO	Raad voor Gezondheidsonderzoek (Advisory Council on Health Research)
RI&E	Risk inventory and evaluation
RIAGG	Regionale Instelling voor Ambulante Geestelijke Gezondheidszorg (Regional Institute for Outpatient Mental Health Care)

RIVM	Rijksinstituut voor Volksgezondheid en Milieu (National Institute for Public Health and the Environment)
RSI	Repetitive strain injury
RTA	Road traffic accidents
RVP	Rijksvaccinatieprogramma (National Vaccination Programme)
SA	Salvation Army
SARS	Severe acute respiratory syndrome
Secondary care	Various forms of care, including hospital care and secondary mental health care.
SES	Socio-economic status
SHA	System of Health Accounts
SHI	Social Health Insurance
STD	Sexually transmissible disease
TB	Tuberculosis
UMA	Unaccompanied minor asylum-seeker
UNHCR	United Nations High Commission for Refugees
VNG	Vereniging van Nederlandse Gemeenten (Association of Netherlands Municipalities)
VROM	Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer (Ministry of Housing, Spatial Planning and the Environment)
VRSA	Vancomycin-resistant Staphylococcus aureus
VWS	Ministerie van Volksgezondheid, Welzijn en Sport (Ministry of Public health, Welfare and Sport)
WCPV	Wet Collectieve Preventie Volksgezondheid (Public Health (Preventive Measures) Act)
WHO	World Health Organization
WMO	Wet Maatschappelijke Ondersteuning (Social Support Act)
YHC	Youth health care
YLD	Year(s) lived with disability
ZonMw	The Netherlands Organisation for Health Research and Development
PHSF	Dutch Public Health Status and Forecast Study.
WHO	World Health Organization

Appendix 3: Regional differences in indicators of health, determinants and prevention

Municipal health service name	Life expectancy	Disabilities	MHI	Cancer	Cardiovascular disease	Asthma + COPD	Accidents	Diabetes	Smoking	Heavy drinking	Sufficient exercise	Obesity	Nitrogen	DTP-polio vaccination	Mammography	Influenza vaccination	Stopping smoking	Health score	Determinant score	Prevention score
Drenthe	15	15	5	35	21	25	9	7	17	15	18	36	4	3	17	16	26	18	14	11
IJssel-Vecht	12	12	17	14	9	10	13	16	24	14	17	30	6	29	15	20	28	6	13	24
Twente	36	27	20	31	36	33	19	22	21	33	6	31	5	11	14	23	36	30	15	19
Gelre-IJssel	17	13	9	25	17	36	26	20	10	18	3	17	9	6	11	26	23	24	5	12
Noordwest Veluwe	19	5	1	4	26	7	27	21	7	1	4	2	10	36	35	37	30	9	1	39
Gelderland Midden	25	16	18	19	23	20	7	10	27	10	25	23	14	34	25	29	18	12	16	33
Rivierenland	33	36	13	30	34	35	38	39	15	6	31	39	18	37	3	35	34	37	29	36
Regio Nijmegen	30	28	24	34	27	37	18	13	23	17	20	3	19	4	13	4	5	29	11	1
Flevoland	16	35	15	12	2	29	35	1	3	2	28	15	8	37	22	12	6	19	3	20
Eemland	22	18	23	3	24	28	10	14	30	27	26	6	23	24	38	15	7	14	23	30
Stad Utrecht	35	37	31	37	33	34	23	31	20	26	5	28	36	17	36	24	1	36	30	18
Kop van Noord-Holland	21	26	4	23	18	5	28	15	31	35	1	12	1	20	20	34	17	15	9	29
West-Friesland	10	34	7	16	10	4	17	5	12	36	2	1	7	19	10	31	24	7	4	22
Noord-Kennemerland	6	14	26	7	5	8	39	8	2	19	15	4	11	26	30	18	3	17	2	14
Zuid- en Midden-Kennemerland	14	20	35	29	8	27	20	25	26	20	30	9	20	14	21	17	4	28	22	7
Amsterdam	38	38	38	36	13	22	34	38	33	38	36	26	35	23	37	32	2	38	39	31
Amstelland en de Meerlanden	1	4	2	5	4	6	1	6	19	39	9	22	31	22	31	13	8	1	33	17
Gooi en Vechtstreek	4	3	25	17	11	9	11	9	36	24	13	7	25	33	24	9	27	4	27	25
Den Haag	37	31	33	38	35	38	36	32	35	30	34	19	37	28	32	14	15	39	36	27
Zuid-Holland West	2	10	6	9	1	14	21	36	1	7	7	21	34	15	18	22	19	13	7	16
Midden-Holland	3	1	21	2	6	31	16	3	4	13	12	14	27	25	4	33	25	3	10	26
Rotterdam	34	32	37	26	16	12	1	34	34	11	39	34	38	31	38	30	38	25	37	37
Nieuwe Waterweg Noord	24	9	14	38	32	3	29	4	29	22	38	38	39	10	33	36	22	21	38	34
Zuid-Holland Zuid	18	8	30	13	14	13	37	18	8	8	27	33	28	35	9	28	31	22	19	32
Zuidhollandse Eilanden	9	2	12	20	25	17	8	24	25	4	33	37	17	30	5	2	12	10	31	6
Zeeland	5	7	8	8	22	11	25	11	14	5	11	20	12	37	34	38	20	8	8	38
Eindhoven	29	17	32	32	31	38	33	37	37	21	21	10	32	18	19	21	11	35	32	15
Noord- en Midden-Limburg	28	33	16	1	12	18	24	19	6	34	29	25	24	5	8	19	33	16	26	10
Oostelijk Zuid-Limburg	39	38	34	22	39	30	30	12	38	3	32	35	30	16	6	6	39	34	35	13
Zuidelijk Zuid-Limburg	26	22	36	21	38	23	5	27	22	32	35	18	29	27	7	25	32	31	34	21
Westelijke Mijnstreek	32	19	38	11	37	26	6	35	13	12	37	5	33	21	27	10	37	33	24	28
Provincie Groningen	31	25	29	33	30	19	32	33	38	25	10	32	3	13	26	11	10	32	25	8
Fryslân	20	29	3	10	19	16	31	23	32	23	8	24	2	12	23	38	35	20	12	35
Midden-Nederland	7	11	10	24	7	15	22	2	5	9	16	8	26	32	12	27	16	5	6	23
Zaanstreek/Waterland	11	21	28	6	15	1	4	29	28	28	24	29	13	8	2	7	21	11	28	5
Zuid-Holland Noord	8	6	19	15	3	2	3	17	11	29	22	16	22	9	29	8	13	2	18	9
West-Brabant	23	24	22	28	29	21	12	30	18	16	19	27	21	7	28	1	14	26	21	4
Midden en Noordoost-Brabant	27	30	27	18	20	32	15	28	16	31	14	11	15	1	16	5	9	27	17	2
Zuidoost-Brabant	13	23	11	27	28	24	14	26	9	37	23	13	16	2	1	3	29	23	20	3

Appendix 4: Summary of key epidemiological data

Table A8.1 gives the annual incidences and annual prevalences for the diseases selected for the PHSF. The data originate from GPs' records and other care data registration schemes. Use has been made of data for 2003 or an average for several years. Where no recent data were available, older figures have been used (see notes). The figures have been standardized for the population as it was in 2003.

The incidence data for acute illnesses relate to numbers of cases; therefore a given individual may feature several times. The incidence data for sub-acute and chronic disorders relate to numbers of individuals. Prevalence and incidence figures in excess of 2,500 have been rounded off to the nearest hundred; figures smaller than 2,500 to the nearest ten. For more detailed information concerning the tabulated data, please refer to the National Compass on Public Health (www.nationaalkompas.nl).

The statistics in the table are not directly comparable with those presented in the PHSF 2002. In a number of cases, different sources have been used, or different decisions made regarding the variable to be reported. For the cancers, for example, the ten-year prevalences are reported, whereas in the PHSF 2002, the lifetime prevalences were reported. With regard to trends over time, the reader is referred to the information on the individual illnesses in the Compass, or to *subsection 2.1*, where the most important incidence, prevalence and mortality trends are summarized. In contrast to the PHSF 2002, we have not on this occasion presented a separate table of epidemiological study data. This is partly because no such data are available for most of the PHSF diseases, and partly because those epidemiological study data that are available for individual illness are mostly somewhat dated.

Table A8.1: Annual incidence, annual prevalence (both on the basis of care records), mortality and lost life-years, standardized for the population of the Netherlands in 2003 (absolute numbers); sources as specified in the table.

Disease / affliction (in ICD-9 order)		Incidence	Prevalence	Mortality	Lost life-years
Infectious diseases	men			873	13,114
	women			1,019	12,324
· infectious diseases of the gastrointestinal tract	men	152,600	a	34	423
	women	174,800	a	60	646
· tuberculosis [1]	men	770	a	33	370
	women	550	a	39	560
· meningitis [2]	men	370	a	40	1,340
	women	330	a	43	1,090
· septicaemia [3]	men	1,380	a	444	5,295
	women	1,320	a	482	5,727
· AIDS [4]	men	180	m+w: 2,370	69	2,209
	women	60		18	675
· bacterial STDs [5]	men	3,700	a	0	0
	women	1,960	a	0	0

Disease / affliction (in ICD-9 order)		Incidence	Prevalence	Mortality	Lost life-years
· viral STDs [5]	men	7,700	a	17	313
	women	10,200	a	9	204
Neoplasms [6]	men			21,614	276,284
	women			18,253	284,014
· oesophageal cancer	men	1,020	1,060	971	14,181
	women	420	460	376	5,129
· stomach cancer	men	1,270	2,700	977	12,199
	women	700	1,760	629	8,000
· colorectal cancer	men	5,200	20,200	2,256	28,075
	women	4,700	19,700	2,195	28,306
· lung cancer	men	6,100	10,100	6,156	77,057
	women	2,900	4,400	2,706	50,460
· skin cancer					
- melanoma	men	1,170	7,500	308	6,046
	women	1,700	11,300	240	5,195
- other skin cancers	men	2,210	10,300	41	410
	women	1,680	7,200	27	233
· breast cancer	men			30	362
	women	11,700	77,600	3,361	61,163
· cervical cancer	men				
	women	580	5,400	214	4,311
· prostate cancer	men	7,900	36,900	2,349	19,652
	women				
· non-Hodgkin's lymphomas	men	1,330	5,500	661	9,837
	women	1,120	4,800	578	8,609
Endocrinal, digestive and metabolic disorders	men			1,774	21,698
	women			2,790	26,791
· diabetes mellitus	men	36,300	292,500	1,527	17,253
	women	36,200	316,400	2,264	20,575
Diseases of the blood and the haematopoietic organs	men			172	2,031
	women			317	2,627
Mental disorders	men			1,915	14,246
	women			4,645	28,237
· dementia	men	4,500	29,500	1,909	10,996
	women	10,300	72,100	5,142	28,925
· schizophrenia	men	950	17,600	5	76
	women	900	13,500	9	106
· depression	men	38,400	116,900	4	64
	women	73,600	246,700	13	244
· anxiety disorders	men	16,600	42,200	0	0
	women	32,000	89,400	2	48
· dependency on alcohol or drugs [7]					
- alcohol dependency	men	m+w: 6,700	20,200	568	12,413
	women		6,700	232	5,862
- drug dependency	men	m+w: 5,100	24,200	64	2,475
	women		5,700	17	717
· mental disability	men	b	59,900	16	667
	women	b	43,000	11	446
· mental problems in children and young people	men	c	c	d	d
	women	c	c	d	d

Disease / affliction (in ICD-9 order)		Incidence	Prevalence	Mortality	Lost life-years
Nervous system and senses	men			1,623	22,415
	women			2,055	25,070
· parkinson's disease [8]	men	2,700	12,700	557	3,802
	women	2,300	15,000	541	4,042
· multiple sclerosis	men	330	4,200	75	1,470
	women	1,220	10,800	131	3,142
· epilepsy	men	4,700	34,800	126	3,668
	women	4,500	34,100	123	2,968
· visual impairments					
- age-related macula degeneration	men	1,780	13,900	e	e
	women	2,700	27,000	e	e
- diabetic retinopathy	men	3,500	30,400	e	e
	women	3,000	31,100	e	e
- glaucoma	men	6,500	42,500	e	e
	women	6,600	54,200	e	e
- cataracts	men	22,900	120,900	e	e
	women	37,400	222,800	e	e
· hearing impairments					
- noise and old age-induced hearing impairment	men	25,800	281,700	e	e
	women	25,000	251,900	e	e
- serious hearing impairments in children		b	b	e	e
Cardiovascular disease	men			22,634	241,170
	women			24,308	208,459
· coronary heart disease [9]	men	38,900	409,300	8,897	102,881
	women	28,600	266,200	6,639	61,635
· heart failure	men	16,200	77,200	2,540	19,303
	women	19,200	101,700	3,849	24,317
· stroke [10]	men	15,200	111,100	4,531	42,008
	women	18,500	117,400	7,062	58,929
· abdominal aortic aneurysm [3, 11]	men	3,400	b	624	5,887
	women	550	b	195	1,596
Respiratory disease	men			7,359	58,924
	women			6,883	58,721
· infections of the upper respiratory tract					
- common cold	men	488,600	a	e	e
	women	586,800	a	e	e
- sinusitis	men	131,800	a	e	e
	women	273,000	a	e	e
- tonsillitis	men	113,500	a	e	e
	women	141,600	a	e	e
· lower respiratory tract infections					
- pneumonia	men	66,400	a	2,686	20,289
	women	68,500	a	3,257	22,807
- acute bronchitis/ bronchiolitis	men	256,000	a	13	137
	women	295,500	a	35	310
· influenza [12]	men	81,400	a	55	472
	women	82,200	a	111	891
· asthma	men	52,600	236,800	40	778
	women	64,700	283,000	75	1,161
· COPD	men	17,200	176,500	3,833	30,411
	women	16,400	139,900	2,589	26,256
Digestive disorders	men			2,529	31,655
	women			3,327	33,386
· dental abnormalities	men	b	b	e	e
	women	b	b	e	e

Disease / affliction (in ICD-9 order)		Incidence	Prevalence	Mortality	Lost life-years
· gastric and duodenal ulcers	men	4,300	23,700	148	1,522
	women	3,600	17,200	205	1,819
· inflammatory bowel diseases [13]	men	2,210	43,100	20	221
	women	3,500	46,600	42	539
Illnesses of urinary tract and reproductive organs	men			1,237	9,381
	women			1,754	13,029
· acute urinary tract infections	men	91,500	a	2	7
	women	661,300	a	12	69
Pregnancy, delivery and confinement	men			0	0
	women			8	375
Diseases of the skin and subcutis	men			109	1,135
	women			304	2,118
· constitutional eczema	men	44,400	122,200	e	e
	women	51,200	137,900	e	e
· contact eczema [14]	men	157,300	323,800	e	e
	women	245,800	478,400	e	e
· bed sores	men	b	b	62	437
	women	b	b	217	1,306
Disorders of the musculoskeletal system and connective tissues	men			247	2,577
	women			625	5,738
· rheumatoid arthritis	men	5,300	57,100	32	263
	women	11,500	90,400	126	1,114
· arthrosis [15]	men	25,900	223,000	14	71
	women	66,600	459,100	71	451
· neck and back problems	men	445,700	687,000	18	157
	women	594,300	925,800	29	283
· osteoporosis	men	2,150	17,500	12	64
	women	20,200	138,600	71	358
congenital abnormalities [16]	men			301	18,723
	women			256	15,635
· congenital abnormalities of the central nervous system	men	m+w: 670	19,100	36	2,488
	women		16,700	25	1,908
· congenital abnormalities of the cardiovascular system	men	m+w: 1,100	23,400	103	6,783
	women		23,500	65	4,169
· Down's syndrome	men	m+w: 320	b	49	1,452
	women		b	56	1,808
Perinatal disorders	men			282	21,409
	women			195	15,742
· premature birth [17]	men	m+w:14,200	f	63	4,795
	women		f	58	4,682
· health problems following full-term pregnancies	men	b	f	79	6,013
	women	b	f	59	4,763
Symptoms, signs and ill-defined disorders	men			3,230	47,347
	women			3,894	41,645
Accidental injury and poisoning	men			3,113	87,798
	women			2,291	42,871
· hip fracture [3]	men	4,800	a	g	g
	women	12,600	a	g	g

Disease / affliction (in ICD-9 order)		Incidence	Prevalence	Mortality	Lost life-years
· injuries sustained in:					
- road traffic accidents [18]	men	130,000	a	761	27,591
	women	130,000	a	272	9,867
- occupational accidents [18]	men	110,000	a	80	2,910
	women	50,000	a	3	187
- non-occupational accidents [18]	men	310,000	a	1,022	17,415
	women	420,000	a	1,403	14,406
- sports injuries [18]	men	540,000	a	e	e
	women	240,000	a	e	e
- suicide, attempted suicide and self-mutilation [19]	men	5,000	a	1,016	31,797
	women	9,100	a	484	14,954
- violence [19]	men	27,000	a	129	4,943
	women	10,000	a	73	3,068

- tuberculosis: KNCV National Tuberculosis Register
- meningitis: AMC/RIVM Dutch Reference Laboratory for Bacterial Meningitis
- septicaemia, abdominal aortic aneurysms and hip fractures: Prismant LMR
- bacterial STDs (gonorrhoea, syphilis and infection with *Chlamydia trachomatis*): RIVM STD Monitoring Station
- viral STDs (*herpes genitalis*, hepatitis B and *condylomata acuminata*): RIVM STD Monitoring Station, NIVEL National General Practice Information Network (LINH) for 2004, IGZ/RIVM Osiris
- aids: HIV Monitoring Foundation
- neoplasms: incidence data from the Association of Comprehensive Cancer Centres (VIKC) Dutch Cancer Register (NKR) ten-year prevalence at January 2002 (Amsterdam Integrated Cancer Centre and Southern Integrated Cancer Centre)
- dependency on alcohol or drugs: IVZ Foundation LADIS
- SCP, point prevalence (SCP analysis of data from article: Maas JMAG, Serail S, Janssen AJM. Frequency study of mental disability 1986. Tilburg: IVA, 1988)
- influenza: NIVEL Dutch CMR Survey Stations
- congenital abnormalities: Foundation for Perinatal Data Registration in the Netherlands LVR/LNR
- premature births: Foundation for Perinatal Data Registration in the Netherlands
- accidental injuries: number of medical treatment recipients from SCV OBiN; mortality: Statistics Netherlands unnatural death statistics
- suicide, attempted suicide and self-mutilation, and violence: number of treatment cases in A&E departments, from SCV LIS
- other disorders: GP records. Sources used were NIVEL National General Practice Information Network (LINH) for 2004, St. Radboud UMC Nijmegen CMR for 2000-2004, Transition Project Foundation project data for 2000-2004, the UM RNH for 2001-2004 and the LUMC RUNH-LEO for 2001-2004. Available data sources were investigated for each disease. Where use was made of two or more data sources, the average incidence or prevalence was calculated.
- for schizophrenia: prevalence as determined from GP records plus number of patients admitted to mental hospital. The latter figure was estimated by dividing the number of mental hospital care-days in 2003 where schizophrenia was the primary diagnosis by 365 (source ZORGIS).
- for diseases associated with prolonged nursing home care for a relatively large number of patients, the number of such patients was estimated and added to the number recorded in GP records. On the basis of 2003 data from the National Nursing Home Care Register (LZV) and from the Central Record Office for Exceptional Medical Expenses (CAK), an estimate was made of the number of days that people suffering dementia, Parkinson's disease, multiple sclerosis (MS) or stroke spent in nursing homes. This was done by applying the age and gender-specific diagnosis distributions from the LZV to the CAK data, that did not include any diagnosis information. The number of people involved was estimated by dividing the total number of care-days in 2003 by 365.
- mortality rates and lost life-years: Statistics Netherlands Mortality Statistics, analysed by the RIVM.
- transient disorders and acute injuries for which no prevalence figures are given.
- no definite data available.
- no care record data available. On the basis of other sources, the six-month prevalence of a number of mental problems in children has been estimated. ADHD (young people aged thirteen to seventeen): 12,800; autistic disorders (children and young people up to the age of twenty): 5,000; behavioural disorders (young people aged thirteen to seventeen): 55,000 young people with antisocial behavioural disorder and 6,900 young people with oppositional-defiant behavioural disorder. For more information and sources, see the National Compass on Public Health (www. nationaalkompas.nl).
- no definite data available; also included in other illness groups.
- mortality rate and number of lost life-years are very low or zero.

- not relevant.
- mortality rate unreliable.
- of the incident cases in 2003 4.3% were recidivist.
- incidence relates only to the bacterial form and has been corrected for underreporting.
- incidence reflects the number of hospital admissions where one of the specified diseases is the primary discharge diagnosis.
- annual prevalence in 2003 is the number of cases reported between the start of the AIDS epidemic and the end of 2003, minus the number of fatalities up to the end of 2002.
- the viral STDs included are *herpes genitalis*, hepatitis B and *condylomata acuminate*; the bacterial STDs are infection with *Chlamydia trachomatis*, syphilis and gonorrhoea. Where bacterial STDs are concerned, cases recorded in the LINH have not been counted.
- the prevalence estimated on the basis of the IKA and IKZ data is the ten-year prevalence and reflects the number of people alive on 1 January 2002, in whom the illness was diagnosed in the preceding ten years. In other words, people who have been cured and are no longer under medical supervision are included.
- the prevalence relates to the number of clients in (outpatient) addiction care in 2003. The incidence is the number of new clients, i.e. people who were not previously registered as addicts. The data on drug dependency relate to opiates, cocaine, cannabis, amphetamine and Ecstasy. Mortality due to alcohol dependency relates to the ICD categories liver disease and -cirrhosis, heart disease, gastric inflammation and pancreatic inflammation, all resulting from excessive alcohol consumption, as well as mental disorders and behavioural disorders resulting from excessive alcohol consumption.
- including secondary Parkinsonism.
- prevalence relates to people receiving treatment for angina pectoris or (the consequences of) an acute myocardial infarction.
- prevalence is lifetime prevalence, i.e. the number of people that have ever suffered a stroke.
- incidence relates to the number of hospital admissions and thus primarily reflects the number of aneurysms requiring surgery. The actual number of newly diagnosed cases of aneurysm is not known.
- relates to the average annual incidence in the period of week 27 of 2002 to week 26 of 2004 (two seasons).
- relates to *colitis ulcerosa* and Crohn's disease.
- relates to irritation eczema and contact-allergic eczema.
- relates only to arthritis of the limbs (neck and back arthritis are included under neck and back problems).
- incidence relates to prevalence at birth in living neonates (of both sexes). The figures quoted relate to 2002 and have not been standardized for 2003.
- premature birth: birth in the period between the twenty-fourth and thirty-sixth week of pregnancy. The figures quoted relate to 2002 and have not been standardized for 2003.
- average annual incidence for the period 2000 to 2003.
- average annual incidence for the period 1999 to 2003.

[a] transient diseases and acute injuries for which no prevalence figure is given.
[b] no (definite) data available.
[c] no care record data available. On the basis of other sources, the six-month prevalence of a number of mental problems in children has been estimated. ADHD (young people aged thirteen to seventeen): 12,800; autistic disorders (children and young people up to the age of twenty): 5,000; behavioural disorders (young people aged thirteen to seventeen): 55,000 young people with antisocial behavioural disorder and 6,900 young people with oppositional-defiant behavioural disorder. For more information and sources, see the National Compass on Public Health (www.nationaalkompas.nl).
[d] no definite data available; also included in other illness groups.
[e] mortality rate and number of lost life-years are very low or zero.
[f] not relevant.
[g] mortality rate unreliable.

[1] of the incident cases in 2003 4.3% were recidivist.
[2] incidence relates only to the bacterial form and has been corrected for underreporting.
[3] incidence reflects the number of hospital admissions where one of the specified diseases is the primary discharge diagnosis.
[4] annual prevalence in 2003 is the number of cases reported between the start of the AIDS epidemic and the end of 2003, minus the number of fatalities up to the end of 2002.
[5] the viral STDs included are *herpes genitalis*, hepatitis B and *condylomata acuminate*; the bacterial STDs are infection with *Chlamydia trachomatis*, syphilis and gonorrhoea. Where bacterial STDs are concerned, cases recorded in the LINH have not been counted.
[6] the prevalence estimated on the basis of the IKA and IKZ data is the ten-year prevalence and reflects the number of people alive on 1 January 2002, in whom the illness was diagnosed in the preceding ten years. In other words, people who have been cured and are no longer under medical supervision are included.

[7] the prevalence relates to the number of clients in (outpatient) addiction care in 2003. The incidence is the number of new clients, i.e. people who were not previously registered as addicts. The data on drug dependency relate to opiates, cocaine, cannabis, amphetamine and Ecstasy. Mortality due to alcohol dependency relates to the ICD categories liver disease and -cirrhosis, heart disease, gastric inflammation and pancreatic inflammation, all resulting from excessive alcohol consumption, as well as mental disorders and behavioural disorders resulting from excessive alcohol consumption.
[8] including secondary Parkinsonism.
[9] prevalence relates to people receiving treatment for angina pectoris or (the consequences of) an acute myocardial infarction.
[10] prevalence is lifetime prevalence, i.e. the number of people that have ever suffered a stroke.
[11] incidence relates to the number of hospital admissions and thus primarily reflects the number of aneurysms requiring surgery. The actual number of newly diagnosed cases of aneurysm is not known.
[12] relates to the average annual incidence in the period of week 27 of 2002 to week 26 of 2004 (two seasons).
[13] relates to *colitis ulcerosa* and Crohn's disease.
[14] relates to irritation eczema and contact-allergic eczema.
[15] relates only to arthritis of the limbs (neck and back arthritis are included under neck and back problems).
[16] incidence relates to prevalence at birth in living neonates (of both sexes). The figures quoted relate to 2002 and have not been standardized for 2003.
[17] premature birth: birth in the period between the twenty-fourth and thirty-sixth week of pregnancy. The figures quoted relate to 2002 and have not been standardized for 2003.
[18] average annual incidence for the period 2000 to 2003.
[19] average annual incidence for the period 1999 to 2003.

Appendix 5: Detailed international comparisons

For each indicator, a table is presented below listing the five EU member states with the best scores for the indicator in question and the five with the worst scores; where available, the averages for the fifteen old member states (EU-15) and the twenty-five current member states (EU-25) are given in the middle of the table. In cases where the Netherlands is neither in the five best-scoring member states, nor in the five worst scoring member states, the Dutch average is also given in the centre group of figures. In some cases, the figure given for the Netherlands differs from that quoted elsewhere in the PHSF. This is because the international comparisons have sometimes been made on the basis of other data sources, or because the (mortality) statistics have been standardized.

Table 1: Incidence of lung cancer (per 100,000), 2001 (Source: WHO-HFA, 2006).

Country	Incidence per 100,000
Hungary	114.1
Denmark	68.2
United Kingdom	63.4
Czech Republic	57.9
Italy (2000)	56.8
Netherlands	55.6
EU-25	53.7
EU-15 (2000)	53.0
Ireland	31.1
Portugal (2000)	30.5
Luxemburg	28.5
Malta	28.2
Cyprus (2000)	20.8

Table 2: Mortality attributable to lung cancer (per 100,000), 2002 (Source: WHO-HFA, 2006).

Country	Mortality per 100,000
Hungary	64.9
Poland	53.2
Denmark (2001)	51.0
Netherlands	47.0
Czech Republic	46.1
EU-25	39.2
EU-15	36.9
Austria	33.4
Malta	30.8
Finland	26.9
Sweden	25.0
Portugal	23.0

Table 3: Incidence of breast cancer (per 100,000), 2001 (Source: WHO-HFA, 2006).

Country	Incidence per 100,000
Denmark	147.9
Sweden	145.4
Netherlands	144.7
Luxemburg	139.7
France(2000)	138.2
Estonia (2000)	72.9
Latvia	70.2
Lithuania	66.3
Slovakia	66.0
Poland	61.0

Table 4: Mortality attributable to breast cancer (per 100,000), 2002 (Source: WHO-HFA, 2006).

Country	Mortality per 100,000
Denmark (2001)	36.1
Netherlands	33.3
Slovenia	30.8
Hungary	30.6
United Kingdom	30.1
EU-15	26.7
EU-25	26.3
Portugal	22.0
Sweden	21.5
Poland	21.4
Finland	21.0
Spain	20.1

Table 5: Incidence of cervical cancer (per 100,000), 2001 (Source: WHO-HFA, 2006).

Country	Incidence per 100,000
Hungary	26.6
Lithuania	26.1
Estonia(2000)	22.0
Czech Republic	19.9
Slovenia	19.7
Ireland	7.6
Netherlands	7.5
Malta	6.1
Finland	5.9
Cyprus (2000)	4.3

Table 6: Mortality attributable to cancer (per 100,000), 2001(Source: Eurostat, 2006).

Country	Mortality per 100,000
Hungary	265.6
Czech Republic	233.2
Slovakia	225.6
Denmark	218.8
Poland	216.5
Netherlands	194.7
EU-25	187.7
EU-15	180.5
Greece	164.8
Malta	162.1
Portugal	161.7
Sweden	157.9
Finland	149.6

Table 7: Healthy life expectancy, 2003 (Source: WHO-HFA, 2005a).

Country	Years
Latvia	62.8
Lithuania	63.3
Estonia	64.1
Hungary	64.9
Poland	65.8
Netherlands	71.2
Germany	71.8
France	72.0
Spain	72.6
Italy	72.7
Sweden	73.3

Table 8a: Life expectancy at birth (women), 2003 (Source: Eurostat, 2006).

Country	Years
Latvia	75.9
Hungary	76.7
Estonia	76.9
Lithuania	77.7
Slovakia	77.8
Netherlands	80.9
EU-25	81.2
EU-15	81.7
Finland	81.8
Italy	82.5
Sweden	82.5
France	82.9
Spain	83.6

Table 8b: Life expectancy at birth (men), 2003 (Source: Eurostat, 2006).

Country	Years
Latvia	65.7
Estonia	66.0
Lithuania	66.5
Hungary	68.4
Slovakia	69.9
EU-25	75.1
EU-15	76.0
Netherlands	76.2
Malta	76.7
Italy	76.8
Spain	76.9
Cyprus	77.0
Sweden	77.9

Table 9: Total mortality (per 100,000), 2001(Source: Eurostat, 2006).

Country	Mortality per 100,000
Latvia	1,148.3
Estonia	1,116.6
Lithuania	1,037.9
Hungary	1,035.4
Slovakia	990.6
EU-25	685.4
Netherlands	680.5
EU-15	640.7
Austria	632.4
France	621.8
Spain	606.6
Sweden	599.5
Italy	585.0

Table 10: Infant mortality (per 100,000), 2003 (Source: Eurostat, 2006).

Country	Mortality per 100,000 infants $<$ 1 year)
Latvia	9.4
Slovakia	7.9
Hungary	7.3
Estonia	7.0
Poland	7.0
Netherlands	4.8
EU-25	4.6
EU-15	4.3
Greece	4.0
Czech Republic	3.9
Spain	3.6
Finland	3.1
Sweden	3.1

Table 11: Mortality attributable to coronary heart disease (per 100,000), 2001 (Source: Eurostat, 2006).

Country	Mortality per 100,000
Lithuania	343.5
Estonia	330.7
Latvia	306.4
Slovakia	290.0
Hungary	225.5
EU-25	106.1
EU-15	93.4
Netherlands	79.5
Luxemburg	77.2
Italy	72.2
Spain	63.6
Portugal	61.3
France	48.4

Table 12: Mortality attributable to stroke (per 100,000), 2001 (Source: WHO-HFA, 2006).

Country	Mortality per 100,000
Latvia	217.0
Estonia	157.2
Hungary	138.7
Czech Republic	133.4
Portugal	130.6
EU-25	68.6
EU-15	59.4
Germany	56.3
Sweden	56.0
Spain	54.5
Netherlands	53.9
France	38.0

Table 13: Mortality attributable to suicide (per 100,000), 2001 (Source: Eurostat, 2006).

Country	Mortality per 100,000
Lithuania	43.7
Latvia	28.6
Estonia	28.1
Hungary	26.6
Slovenia	26.5
EU-25	11.5
EU-15	10.1
Netherlands	8.6
Spain	6.8
United Kingdom (2000)	6.8
Portugal	6.3
Italy	5.9
Greece (2002)	2.6

Table 14: Mortality attributable to road traffic accidents (per 100,000), 2001 (Source: WHO-HFA, 2006).

Country	Mortality per 100,000
Latvia	22.9
Lithuania	21.0
Portugal	19.0
Estonia	15.2
Greece	15.0
EU-25	10.4
EU-15	9.7
Finland	7.5
Netherlands	5.8
Sweden	5.3
United Kingdom	5.3
Malta	3.8

Table 15: Mortality attributable to chronic liver disease (per 100,000), 2001 (Source: WHO-HFA, 2006).

Country	Mortality per 100,000
Hungary	56.7
Slovenia	34.1
Slovakia	25.3
Estonia	22.1
Lithuania	19.1
EU-25	14.1
EU-15	12.7
Ireland	5.8
Sweden	5.4
Greece	5.0
Netherlands	4.5
Malta	4.1

Table 16: Incidence of AIDS (per million), 2004 (Source: EuroHIV, 2005).

Country	Incidentie per million
Portugal	79.6
Spain	43.0
Latvia	39.8
Italy	29.2
Luxemburg	26.1
Netherlands	12.1
Finland	3.7
Slovenia	3.5
Hungary	2.3
Czech Republic	1.2
Slovakia	0.4

Table 17: Percentage of people with serious ADL disabilities, 2001 (Source: Eurostat, 2006).

Country	%
United Kingdom	16.4
France	10.4
Germany	10.2
Finland	9.5
EU-15	9.3
Portugal	8.9
Netherlands	8.6
Spain	5.8
Belgium	5.6
Austria	5.3
Italy	4.5
Ireland	4.4

Table 18: Percentage of people in 'good' perceived health, 2004 (Source: Eurostat, 2006).

Country	%
Slovenia	26.6
Portugal	28.2
Latvia	36.7
Estonia	41.9
Poland	43.9
Netherlands	77.7
Denmark	77.9
Cyprus	80.8
Germany	82.1
Ireland	87.1

Table 19: Percentage of infants still exclusively or partially breastfed at six months (Source: WHO-HFA, 2006).

Country	%
United Kingdom (2000)	21.0
Netherlands (2002)	27.0
Lithuania (2004)	31.0
Czech Republic (2004)	35.8
Slovakia (2004)	37.7
Spain (2001)	44.9
Estonia (2004)	47.8
Finland (2000)	51.0
Hungary (2004)	53.3
Sweden (2003)	70.6

Table 20: Percentage of the population (>15 years) who are daily smokers (Source: WHO-HFA, 2006).

Country	%
Greece (2000)	37.6
Germany (2003)	33.9
Hungary (2003)	33.8
Poland (2004)	32.0
Luxemburg (2004)	31.0
Netherlands (2004)	30.8
EU-25 (2003)	28.8
EU-15 (2003)	28.4
Slovenia (2001)	23.7
Malta (2002)	23.4
Finland (2004)	23.0
Belgium (2003)	20.0
Sweden (2004)	16.2

Table 21: Percentage of fifteen and sixteen-year-olds who have smoked in the last thirty days, 2003 (Source: Hibell et al., 2004; ESPAD study).

Country	%
Austria	49
Germany (6 deelstaten)	45
Czech Republic	43
Lithuania	41
Latvia	40
Netherlands	31
Portugal	28
Malta	27
Spain	27
Cyprus	25
Sweden	23

Table 22: Alcohol consumption (litres of pure alcohol per person), 2003 (Source: WHO-HFA, 2006).

Country	Litres per head
Luxemburg	14.6
Czech Republic	13.7
Hungary	11.6
Ireland (2001)	11.4
Germany	10.7
EU-15	9.4
EU-25	9.3
Netherlands	7.8
Greece	7.7
Italy	7.6
Poland	6.7
Sweden	5.6
Malta	5.4

Table 23: Percentage of fifteen and sixteen-year-olds who have had three or more 'drinking binges' in the last months, 2003 (Source: Hibell et al., 2004; ESPAD study).

Country	%
Ireland	32
Netherlands	28
United Kingdom	27
Malta	25
Sweden	25
Greece	11
Poland	11
Cyprus	10
France	9
Hungary	8

Table 24: Number of problem drug users [a] per 1000 people aged fifteen to sixty-four (Source: EMCDDA, 2005).

Country	Number per 1,000 people
United Kingdom (2001)	9.4
Luxemburg (2000)	9.3
Italy (2003)	7.5
Denmark (2001)	7.2
Portugal (2000)	7.1
Czech Republic (2003)	3.6
Netherlands (2001)	3.0
Germany (2003)	2.5
Greece (2003)	2.4
Poland (2002)	1.9

[a] 'Problem drug use' is defined for EMCDDA purposes as 'injecting drug use or long duration or regular use of opiates, cocaine and/or amphetamines'. Age band: fifteen to sixty-four. Methods may differ from country to country. Where more than one estimate was available for a country, the average was taken.

Table 25: Percentage of fifteen-year-olds who used contraception when they last had sexual intercourse; unweighted average for boys and girls, 2001/2002 (Source: Currie et al., 2004; HBSC study).

Country	%
Poland	73.0
Estonia	78.3
Hungary	78.5
Portugal	78.8
Great-Britain	83.4
Germany	91.4
Sweden	91.4
Austria	91.6
France	92.3
Netherlands	94.7

Table 26: Percentage of people who engage in moderate physical activity four to seven days per week, 2002 (Source: EORG, 2003a).

Country	%
France	19
Italy	22
Sweden	25
Spain	27
Austria	28
EU-15	31
Greece	39
Germany	39
Denmark	42
Portugal	49
Netherlands	72

Table 27: Percentage of people who are overweight (BMI 25.0-29.9); unweighted average for men and women (Source: IOTF Prevalence Data, 2005) [a].

Country	%
Germany (2002)	44.3
Greece (1994-98)	43.9
Slovakia (1992-1999)	40.9
Finland (2003)	40.5
Slovenia (2001)	40.5
Netherlands (1998-2002)	36.0
Austria (1999)	33.5
Italy (1999)	33.4
Denmark (2003)	32.9
France (2003)	30.6
Estonia (1997)	28.0

[a] The Netherlands has not been given a 'traffic light' colour, because it is on the boundary between amber and green.

Table 28: Percentage of people who are obese (BMI ≥ 30.0); unweighted average for men and women (Source: IOTF Prevalence Data 2005).

Country	%
Greece (1994-1998)	32.8
Czech Republic (1997-1998)	25.5
Cyprus (1999-2000)	25.2
Germany (2002)	22.9
UK (England) (2003)	22.6
France (2003)	11.4
Sweden (1996-1997)	11.0
Netherlands (1998-2002)	10.3
Italy (1999)	9.7
Estonia (1997)	8.0

Table 29: Percentage of children who are overweight or obese; unweighted average for boys and girls (Source: IOTF Prevalence Data, 2005).

Country	Percentage of boys and girls
Malta (1992)	35.6
Portugal (2002-2003)	31.9
Belgium (1998-1999)	27.3
Italy (1993-2001)	25.7
Spain (1998-2000)	25.2
Denmark (1996-1997)	14.7
Czech Republic (2001)	14.1
Germany (1995)	14.0
Netherlands (1997)	10.3
Slovakia (1995-1999)	9.0

Table 30: Percentage of people with ample social support, 2002 (Source: EORG, 2003b).

Country	%
Finland	8.5
Italy	9.1
Greece	10.1
Portugal	10.8
France	13.5
Great-Britain	24.4
Ireland	28.2
Sweden	28.4
Denmark	31.1
Netherlands	34.4

Table 31: Relative five-year survival rate for cancer (all forms, collectively), diagnosis 1990-1994 (Source: Sant et al., 2003; Eurocare-3).

Country	%
Poland	29.0
Estonia	32.0
Slovakia	33.6
Slovenia	35.0
Czech Republic	36.1
Netherlands	47.6
Spain	49.0
Duitland	49.8
France	50.7
Sweden	53.2
Austria	56.6

Table 32: Relative five-year survival rate for breast cancer, diagnosis 1990-1994 (Source: Sant et al., 2003; Eurocare-3).

Country	%
Slovakia	59.5
Estonia	61.9
Poland	63.1
Czech Republic	64.0
Slovenia	67.4
Netherlands	78.2
Italy	80.6
France	81.3
Finland	81.4
Sweden	82.6

Table 33: Relative five-year survival rate for lung cancer, diagnosis 1990-1994 (Source: Sant et al., 2003; Eurocare-3).

Country	%
Denmark	6.0
Poland	6.3
Czech Republic	6.6
Groot-Brittanië	7.5
Slovakia	7.5
Germany	10.7
Netherlands	11.8
Spain	12.4
France	13.4
Austria	14.0

Table 34: Relative five-year survival rate for cervical cancer, diagnosis 1990-1994 (Source: Sant et al., 2003; Eurocare-3).

Country	%
Poland	48.2
Estonia	53.2
Portugal	55.6
Slovakia	57.1
Slovenia	59.9
Denmark	66.7
France	67.8
Spain	68.7
Netherlands	69.4
Sweden	69.6

Table 35: Antibiotic resistance (MRSA percentage), 2004 (Source: EARSS, 2006).

Country	MRSA percentage
Malta	56.4
Cyprus	48.7
Portugal	46.1
Greece	44.3
United Kingdom	43.7
Estonia	4.8
Finland	3.1
Denmark	1.3
Netherlands	1.1
Sweden	0.7

Table 36: Percentage of children vaccinated against measles, 2004 (Source: WHO-HFA, 2006).

Country	%
Austria	73.5
United Kingdom	81.0
Ireland	81.1
Belgium	82.2
Italy	84.0
Netherlands	96.3
Poland	97.4
Lithuania	97.7
Slovakia	98.0
Latvia	98.7
Hungary	99.9

Table 37: Breast cancer screening (percentage women attending for mammography in a given year), 2002 (Source: EORG, 2003c).

Country	%
Ireland	9.4
Denmark	10.7
United Kingdom	12.5
Greece	12.6
Germany	17.3
EU-15	20.2
Italy	25.1
Netherlands	25.4
Luxemburg	31.3
Portugal	32.2
Austria	35.8

Appendix 6: References to websites providing background information

All the background information used in the compilation of this report can be found on the following websites:

- www.rivm.nl/vtv/phsf2006
- www.nationaalkompas.nl (dutch)
- www.zorgatlas.nl (dutch)
- www.costofillness.nl