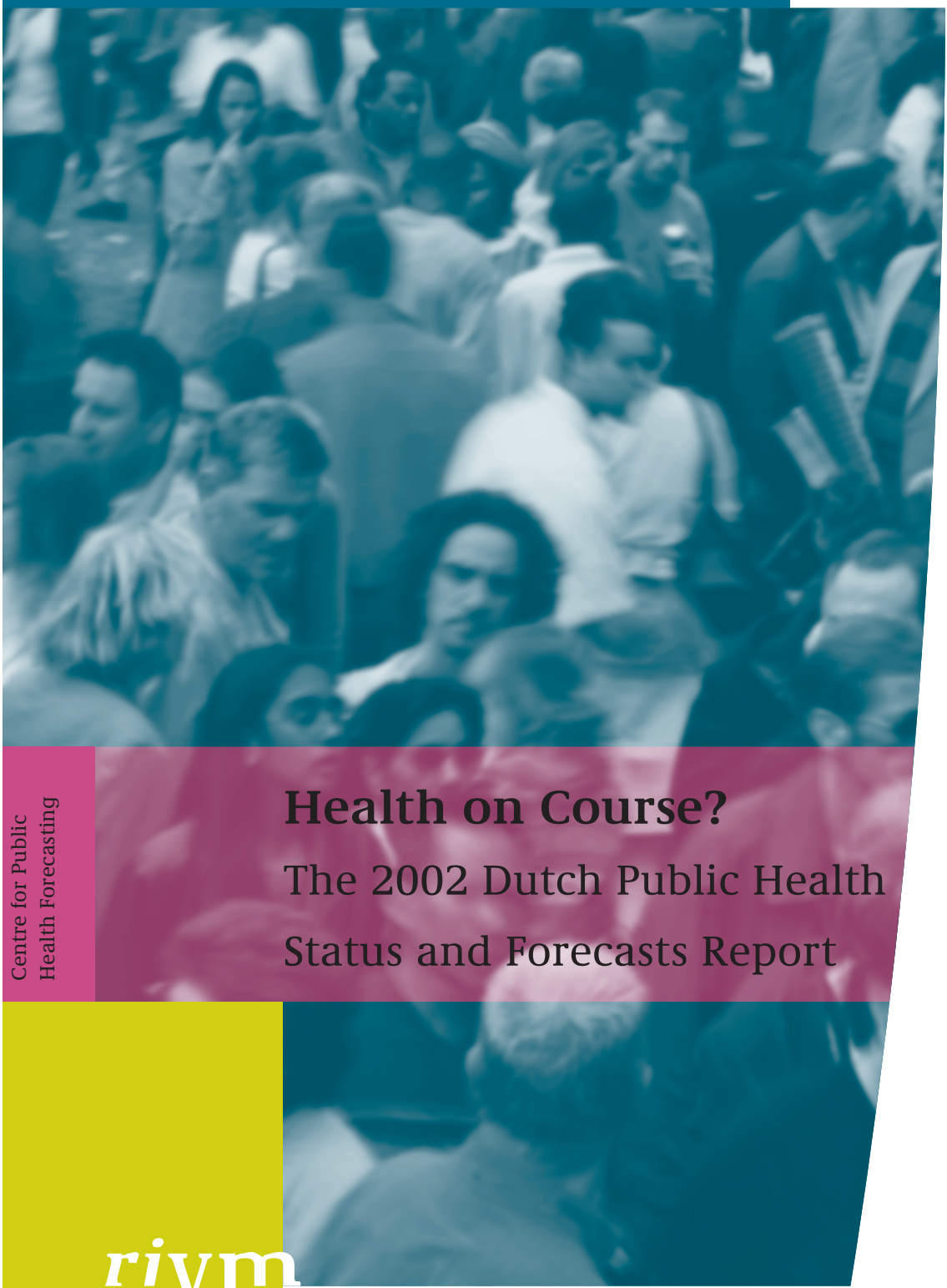

Centre for Public Health Forecasting

Health on Course?

The 2002 Dutch Public Health Status and Forecasts Report

rivm
National Institute for Public Health and the Environment

Health on Course?

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National Institute for Public Health and the Environment

This report is the result of a national collaborative effort.
Many organisations in the Netherlands, i.e. hospital medical centres, university departments, research institutes, and government organisations provided valuable data and expertise. Their references and websites are provided at our 'Compass', 'Atlas', and 'Cost of Illness' websites: www.nationaalkompas.nl; www.zorgatlas.nl, www.costofillness.nl, which also contain more detailed background data.

Health on Course?

The 2002 Dutch Public Health Status and Forecasts Report

J.A.M. van Oers (editor in chief)

Bohn
Stafleu
Van Loghum

rivm
National Institute
for Public Health and
the Environment

Centre for Public Health Forecasting

National Institute for Public Health and the Environment
PO Box 1, 3720 BA Bilthoven, The Netherlands
Tel.: +31-30-2749111; Fax: +31-30-2742971

A publication by
The National Institute for Public Health and the Environment
PO Box 1
3720 BA Bilthoven
The Netherlands

Bohn Stafleu Van Loghum, Houten
Het Spoor 2
3994 AK Houten
The Netherlands

Original Dutch publication:
Gezondheid op koers? Volksgezondheid Toekomst Verkenning 2002. J.A.M. van Oers (editor in chief). RIVM report number 270551001 (ISBN 90-313-4008-1; NUGI 741).

RIVM report number: 270551002
ISBN 90 313 4163 8
NUGI 741

PREFACE

This third Public Health Status and Forecasts (PHSF) report again contains a great deal of up-to-date information about Dutch public health and care. Hence, it is a valuable document for policy-makers and provides a solid foundation for new policies while also creating an opportunity to evaluate current policy affecting public health and care. In addition, as far as possible, it enables policies to be 'evidence-based'. The Minister for Health, Welfare and Sport has ultimate responsibility for the policies concerning public health and health care. Accordingly, in 1999 this PHSF report was commissioned by the then minister. In fact, it provides a valuable source of inspiration for others than the Ministry of Health, Welfare and Sport as well. Local government councils, other ministries and the various parties in the health care sector may also benefit from the PHSF report when drawing up their policies. I therefore strongly recommend that all such bodies should read this report.

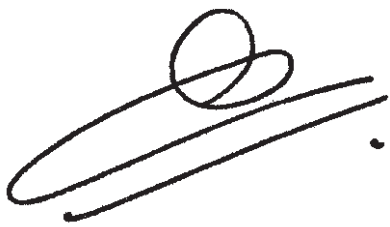
Dutch health policy is facing considerable challenges. There are an increasing number of healthy elderly people whereas the young are tending to display unhealthy behaviour. It is difficult to create a broad basis for effective prevention when the current emphasis is on individual interests and choices. The health care sector's limited capacity, a limited budget and an increase in both the demand for care and the growing potential of medical technology place increasing demands on an effective harmonization of supply and demand. European regulations exert a growing influence on all aspects of prevention and care. Good information will assist an efficient decision-making process for all these areas.

The timeliness of this report, when basing policy on information, is reflected by the fact that this PHSF report will be followed by a government policy document on prevention. The latter document will draw to a great extent on the information contained in this report. This is the essence of the policy cycle. Decisions are formulated on the basis of both factual information and socio-political points of interest. Subsequently, information is collected to determine the extent to which these policy intentions have been achieved, especially those that involve quantitative goals.

Even more than its predecessor from 1997, this 2002 PHSF report consists of a brief summary and builds on a further analysis of work that has been previously published either in book form or on the Internet. Implicitly, the title 'Health On Course?' also refers to related Web publications: the 'National Compass on Public Health' (*www.nationaalkompas.nl*) and the 'National Atlas of Public Health' (*www.zorgatlas.nl*). We can use the Compass and Atlas to find out whether we are in fact on course! Apart from these Web publications, a great deal of basic information has been derived from a series of PHSF thematic reports, which have been published over the last two years.

The PHSF team has produced all these reports through close collaboration with many well-known researchers and specialized institutes throughout the Netherlands. In all, well over 300 people have contributed their expertise. While compiling the 'Health on

Course?' report, the PHSF team was supported by a National Scientific Advisory Committee and a Supervisory Committee consisting of representatives of the Ministry of Health, Welfare and Sport. The involvement of so many individuals has made the PHSF report a truly national undertaking. I would like to offer all of them my sincere thanks for their efforts.



Clémence Ross-van Dorp,
State Secretary for Health, Welfare and Sport

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KEY MESSAGES

The *Health on Course?* report presents new data and insights about public health, care and prevention in the Netherlands. It simultaneously examines the past, present and future, and draws comparisons both at home and abroad. These insights may support the Ministry of Health, Welfare and Sport in the development of a medium and long-term vision for health and care. This information is also important for other players in the Netherlands: the public health inspectorate, local government councils, other ministries, patients and consumers, prevention and health care providers, health insurers, and health research and research programming organizations. Here we present the major findings and dilemmas, along with their significance for the parties involved.

Major findings

We in the Netherlands are living and staying healthy for longer

Since 1980, male life expectancy has increased by 3.1 years while female life expectancy has grown by 1.4 years. From birth, we can now expect an average life span of, respectively, 75.5 and 80.6 years. The years that have been added over the last decade are generally spent in good health. Statistics Netherlands predicts that life expectancy will increase even more over the next 20 years.

- This increase is mainly due to fewer deaths from *coronary heart disease and stroke*. In addition, fewer men are *dying of lung cancer*.
- The major cause of death is still *coronary heart disease*. Along with *mental ill health* and *chronic lung diseases*, this disorder also causes the greatest loss of quality of life.
- Around the year 2000, both men and women experienced roughly the same number of healthy years: 61 years are spent in self perceived good health, more than 70 without disabilities, and 68 in good mental health. Consequently, the number of subsequent unhealthy years is considerably higher for women than for men.
- Considering that neither the *incidence* nor the *duration* of chronic disorders has decreased, certain health care provisions, such as medical devices and pharmaceuticals, seem to have effectively improved the social participation of the chronically ill.

Yet the Netherlands drops toward the European average

However, the Netherlands is falling behind in the EU. Male *life expectancy is increasing less rapidly* than in most EU countries. The *increase in the life expectancy* of women is actually *stagnating* to such an extent that we are now below the EU average.

- Male *mortality from lung cancer* is still one of the highest in the EU. Female mortality is increasing more rapidly than the European average. Ever more women are also dying from *chronic lung diseases* (COPD). Smoking is the main cause of both lung cancer and COPD.
- The Netherlands has comparatively high infant and perinatal mortality rates. This also applies to mortality from breast cancer, although this has recently fallen.

- If we assume the most favourable mortality rates in the EU for 14 major causes of death, Dutch life expectancy could still be improved by six years for men and four years for women. However, we would lose four years if we were to have the most adverse rates in the EU for these causes of death.

There are also persistent differences in health

Health is unequally divided across the Netherlands. There are considerable differences in health between the rich and the poor, and from one neighbourhood to another. There is no indication that these differences have decreased over the last five years.

- Men with the *lowest level of education* live 5.0 years less than their most *highly educated* counterparts. For women, this difference is 2.6 years. Moreover, men and women with the highest level of education live on average ten years longer without disabilities. In terms of the number of years spent in self-perceived good health, the difference is 16 years for men and 14 years for women.
- Comparing *regions or neighbourhoods* also reveals similar differences in health. Poorer health in deprived areas is frequently linked to an accumulation of adverse environmental factors, both social and physical, combined with an unhealthy lifestyle.
- Trends in inequalities in health cannot be reliably established on the basis of the available data. However, there is no indication of a decrease in the existing differences in health.

Unhealthy behaviour is the major cause of stagnating health

Unhealthy behaviour is the major cause of the stagnating life expectancy of Dutch adults. Over the last few years, women have acquired many of men's unhealthy behaviour patterns. But adverse trends in unhealthy behaviour are also particularly prevalent amongst the young and can be regarded as long-term investments in 'bad health'. By contrast, the elderly have adopted a healthier lifestyle. Environmental factors also contribute to the Netherlands' total burden of disease. There is no indication that stagnating life expectancies are linked to problems within the health care sector.

- There are particularly worrying trends among *young people*, involving smoking, the excessive use of alcohol, not eating enough fruit and vegetables, and taking insufficient exercise. In addition, there is a growing incidence of serious overweight in ever younger age groups.
- The Netherlands scores badly in Europe in terms of smoking and the excessive use of alcohol. By contrast, we do relatively well as far as physical activity is concerned. If we Dutch were to achieve Europe's most favourable level for known risk factors, we would in theory add another 1.4 years to male life expectancy while females would gain 1.2 years.
- A considerable proportion of the total annual mortality (140,000 deaths in 2000) in the Netherlands is linked to unhealthy behaviour and could therefore be theoretically avoided. The major factors are: smoking (around 15% of deaths each year), the excessive consumption of saturated fat (5%), not eating enough vegetables and fruit (5%), a lack of exercise (6%), high blood pressure (6%) and serious overweight (6%). Rough estimates indicate that the contribution of environmental factors to the Netherlands' total burden of disease does not exceed 5%.

- A considerable proportion of Dutch health care use can be attributed to an unhealthy lifestyle, overweight and high blood pressure. The costs involved amount to between 5 and 9% of total health care expenditure.
- Access to Dutch health care has been placed under pressure over the past years by, for instance, waiting times and waiting lists. There is no indication that this is in any way linked to the stagnation in the growth of life expectancy, which is mainly due to adverse developments in lifestyle.

A new approach to prevention can turn the tide

Prevention, particularly by promoting a healthy lifestyle, *could result in considerable health gains*. A modern approach is based on a stimulating environment and an integrated method within existing 'settings' rather than by solely placing the emphasis on influencing behaviour. This could occur by making a healthy lifestyle an obvious part of socio-cultural life: at school, during sport and recreation, at work, in neighbourhoods and in traffic. Moreover, prevention demands a durable vision, and long-term attention and investment. Much could also be gained if prevention were to acquire a more explicit role in the provision of care.

- Along with the Ministry of Health, Welfare and Sport, other government sectors, and public and private bodies can also contribute to the development of better health. Factual information, price incentives, clarity about 'healthy' and 'unhealthy' products, and the organization of both the workplace and the built environment could entice the citizen into making healthy choices and avoiding unhealthy behaviour. Here, preventive interventions are more effective when supported by legislation and regulations.
- Prevention is more likely to succeed when it involves an approach that is specifically geared towards the particular target group and is based on a long-term vision involving constant support.
- Prevention programs are too rarely evaluated, and successful local initiatives should be more frequently copied at a national level.
- The clear inclusion of prevention within the health care sector would benefit both public health and the sector's efficiency. This is often obstructed by the sector's system of budgeting and the lack of financial incentives, for instance, and by other organizational aspects along with the pressure of work. Medical training generally places insufficient emphasis on prevention.

More care and different care are needed in the future

In the future, *a growing and more elderly population will result in a considerable increase in the number of disease cases*, particularly those involving chronic disorders. If the trend of the last few years continues, the total volume of Dutch health care will have to expand by 2.4% each year until 2006 just to maintain its present level. There must also be an additional shift from cure to care. Over the next few years, the elimination of waiting lists and other obstacles will require an estimated further investment of at least 0.6% each year for four years.

- Dutch society spent 36 billion euros on health care in 1999, which was 9.6% of the gross domestic product. Most of this was for *cure* facilities such as hospitals (29%), pharmaceuticals (10%) and GPs (3%). Caring for the elderly, the chronically ill and

the handicapped (*care* facilities) accounted for more than 36% of all expenditure. Less than 4% was spent on prevention, half of which involved occupational health care. This does not cover prevention as included in the provision of care.

- The elderly use more care than do young people. This also accelerates from the age of sixty onwards and applies to both men and women.
- In the future, half of the requisite extra growth in volume will be due to population growth and an ageing society; the other half will be caused by advances in medical technology and by the consumer's changing demand for care.
- There are already considerable waiting times and capacity deficits in the nursing care sector. The extra resources that have been made available in recent years have resulted in a higher level of production. However, recent trends show that as yet most sectors have not experienced any decrease in waiting lists.
- Health care use in the Netherlands is average when compared with that of neighbouring countries. This applies to the volume of health care, to its share of the gross domestic product and to the average health expenditure per capita. Over the past few decades, the growth in per capita health expenditure has been less than that of our immediate neighbours.

Care is not only a question of quantity but also of quality

In the future, it will not only be a matter of *more* care but also of *high quality* care. High quality care means care that is effective, safe and available to everyone. Care could become both more effective and safer if 'best practices' and standards were to be applied effectively, and if the lessons learned in trial projects were to be broadly implemented. Trial projects could, for instance, involve safer or more integrated care. Such qualitative improvements could also reduce costs. Obstacles to the implementation of these improvements are generally of an organizational or financial nature.

- The prompt application of new and effective medical technology and the reduction of unnecessary inter-doctor variations could result in health gains. However, evaluation of the effectiveness and safety in actual practice is still necessary and involves both 'medical technology assessment' and 'post-marketing surveillance'.
- Integrated care - optimizing the patient's journey through the care circuit - could result in health gains, in creating a more patient-specific approach and in a more targeted use of resources.
- Research in the United States and Australia has shown that adverse effects of medical treatment may lead to a considerable loss of health involving a decrease in life expectancy of 6 to 12 months. As yet there has been no Dutch research in this area, but the situation in the Netherlands is unlikely to be significantly different. Trial projects have shown that focused alertness can greatly reduce the incidence of certain specific health risks in care such as decubitus ulcers and wound infections.
- There are no indications in the Netherlands of socio-economic differences in access to necessary care. However, those with lower educational levels seem to make less adequate use of care, for example when they have a chronic disease.

Prevention not only better, but also frequently cheaper

The costs of each additional, healthy year of life gained through interventions can vary considerably from one area of prevention and health care to another. *Some interventions reduce expenses while others cost more than one hundred thousand euros* for each additional, healthy year of life. Preventive interventions can result in a considerable health gain, and often at little expense. So prevention is not only better than cure, it is also frequently more efficient. It pays to invest in prevention, particularly in the long term. However, this is not simply a matter of health gains per invested euro, it is also about solidarity and access to cure and care.

- Preventive measures at the beginning of the disease chain, such as the neonatal heel prick, vaccinations or traffic regulations, are often more efficient than interventions at the end of the chain, such as lung transplantation. The general desire for a high level of individual protection also has as a result that sometimes expensive environmental measures are taken.
- However, apart from the cost-effectiveness and efficiency of interventions, there is also the issue of solidarity and of each Dutch citizen's legitimate right to protection, cure and care. Nonetheless, making the relation between costs and health gains more explicit could create greater transparency in the decision-making process.

There are certain gaps in the provision of information

An effective and constant flow of information is the basis of monitoring, analysis and reporting, as presented by the PHSF reports. Since the 1997 PHSF report, *the flow of information has improved in certain areas, but deteriorated in others*. There are still some major problem areas:

- Many data collections lack continuity, fail to represent the country as a whole or allow insufficient opportunity for regional differentiation.
- Registration and research do not draw sufficiently on information about socio-economic status, ethnicity, domestic situations and other relevant characteristics such as the severity of a disease or the quality of life.
- Care registration is too fragmented and frequently fails to include diagnostic data or to assign a unique number to each patient. This makes it impossible to monitor a given course of care at the level of individual patients.
- Various data collections (including those from the public domain) are compiled and stored by private bodies, as a result of which access to this information is becoming increasingly difficult or even totally impossible.
- Data about the quality, effectiveness, safety and accessibility of prevention and health care is extremely incomplete.
- There is an increasing need for international 'benchmarking'. Various schemes for measuring 'health system performance assessment' are being developed but the international comparability of data still leaves much to be desired.

The findings' significance for the various players

Central government must invest in prevention to reverse the stagnation in health

Investment in prevention is vital if we are to break through the stagnation in the development of our health. The government will have to achieve this by creating a *coherent policy framework* and a *long-term vision* for health. Therefore, it must *continue to invest* in existing preventive facilities, and *must strongly encourage* the development, evaluation and national implementation of new, preventive interventions. Here, the focus of attention needs to be directed at strengthening prevention within the health care system as well as intersectoral policy.

- The 2002 PHSF report provided the *government* with leads for developing national priorities for collective prevention. The government could subsequently link *quantitative objectives* to these priorities in consultation with the other players. This creates the opportunity to monitor the policy's progress empirically. In addition, national objectives may stimulate and inspire the other players to develop and implement their own policy plans.
- The government must continue to invest in existing preventive facilities so as to sustain the existing level of health gain. This entails keeping the existing system of preventive facilities up to standard, which also involves their inspection and maintenance.
- The national implementation of new and effective interventions must be promoted. This could occur through the distribution of information about these interventions in dialogue with the other players, the creation of collaborative alliances and the structural financing of national implementation.
- The government must continue to invest in research into the development, effectiveness, implementation and evaluation of preventive interventions so as to broaden the prevention policy's basis.
- The implementation of effective prevention activities within the health care system must be promoted by, for instance, eliminating organizational and financial obstacles or by stimulating *care providers* and *health insurers*.
- The government could encourage health-oriented, intersectoral policy at a *departmental level* by making agreements about common goals within the various policy fields. Here, opportunities include the major cities policy (Ministry of the Interior and Kingdom Relations), sport (the Ministry of Health, Welfare and Sport), schools (Ministry of Education, Culture and Science), employment (Ministry of Social Affairs and Employment), traffic safety (Ministry of Transport, Public Works and Water Management), and housing and the environment (Ministry of Housing, Spatial Planning and the Environment).
- The government could encourage structural co-operation between local government councils and local representatives of *health care providers*, *health insurers*, and *consumer* and *patients' organizations*.

Local-level prevention players should combine forces

The actual implementation of collective prevention largely occurs at local level. *Councils and municipal medical and health services* are important local players in co-operation with the local representatives of the *care providers, the health insurers and the requesters of care*. They should combine forces and work together on formulating and developing a local prevention policy with common, local priorities and policy objectives. A national public health policy framework could inspire the local players and provide guidance for drawing up local public health reports and for formulating local objectives.

- Within the national policy framework, local players could promote the development, implementation and evaluation of new interventions within the local setting. They could also stimulate the implementation of effective interventions, which have been adjusted to reflect the local circumstances.
- Local forms of intersectoral co-operation must be strengthened. Here, national agreements could be developed at departmental level, and local initiatives elsewhere could serve as a source of inspiration for all the players including the national government.
- The local players must jointly examine how effective preventive interventions could be included in the basic responsibilities of the relevant care providers. They must also reinforce the development of new preventive interventions within the health care system.
- There must be joint investment in a two-way risk communication system between the government and the citizen which also refers to the citizen's own responsibility. *Consumer and patients' organizations* could make a major contribution to a balanced approach to risks and their perception.

More care, different care and better care are both necessary and feasible

The 2002 PHSF report was neither willing nor able to deal with the full scope of the health care sector. It examines care primarily in terms of attainable health gain. Here, the key words are 'accessibility', 'effectiveness', 'safety', 'costs' and 'efficiency'. *More* and *different* care will be needed in the future, and this is mainly due to a growing and increasingly elderly population. Moreover, there are still many opportunities to improve the *quality* of care.

More care and *different* care could be achieved by:

- Keeping the annual increase in the Dutch health care budget in step with demographic changes, advances in medical technology and other autonomous developments. An annual increase of at least 2.4 to 3% would appear to be needed until 2006. This can be partly justified by the budget's interrupted growth in the 1990s.
- Solving the capacity deficits by expanding medical training in combination with a long-term vision for developing the capacity of the medical professions.
- Making the necessary shift of investments from cure to care within the required total increase.

Better care could be achieved by:

- The explicit inclusion of health objectives when formulating preconditions for a new health care system. These could include health gain, promoting quality of life and reducing inequality in health.

- Increasing the quality of care by encouraging the use of standards and guidelines while retaining the flexibility needed for modernizing the health care system.
- Eliminating financial and organizational obstacles that needlessly block the adoption of effective forms of health care modernization, integrated care and new technology.
- Examining whether, within a patient-specific orientation, a boundary could be defined for the 'medically unjustified' demand for care.
- Extra investment in the availability and, particularly, in the tailoring of care for weaker social groups.
- Encouraging the development of methods for institutions and care providers that measure health outcomes or relevant process parameters. These indicators could be used for improving internal quality, for the external assessment of quality by care market consumers and insurers, and to achieve accountability to both society and parliament.

Dilemmas in prevention and care

The analysis of prevention and care in the Netherlands reveals a number of dilemmas that sometimes seem to obstruct rational policy choices. Some dilemmas have existed for quite some time while others will only reach practical significance in the future. It is important to *stimulate* a *political and social debate* on these issues in order to achieve the right social balance for these dilemmas.

- Prevention is a long-term undertaking. Investments generally require time to yield health dividends, and this often occurs gradually and in an imperceptible manner. This means that prevention may suffer in a political arena where short-term problems are fighting for priority.
- The citizen demands maximum safety from the government at all costs yet rejects any restriction on his freedom to, for instance, subject his health to considerable risks. Hence, policy-makers are confronted with the difficult choice of whether to opt for the collective interest of public health or to respect the individual's freedom of choice. Here, a related dilemma concerns the contradiction between the collective interests of public health and the private economic interests of, for instance the drinks and tobacco industries.
- Experts and the public frequently fail to agree about the potential, nature, extent and control of health risks. The public tends to ignore the risk experts' estimates. Hence, the government faces the dilemma of whether to deal with these risks rationally on the basis of 'scientific' estimates of potential risk, damage and the cost effectiveness of safety measures, or to consider the public's legitimate experience of those risks as based on a range of values and norms.
- Investing in preventive measures aimed at avoiding or delaying disease often yields a higher level of health gain than the care provided during the later phases of the disease process. Here, prevention is better than cure and the health gain is frequently obtained in a cheaper way. This in turns leads to a dilemma between the efficient use of limited resources and every Dutch person's right to the best possible care.
- The basic premise of demand-oriented care and the 'right to care' runs counter to an imperative financial framework, whereby care provision is limited. However, a budget ceiling always exists even within an ample financial framework. Improving the functioning of this 'imperfect' care market also entails a considerable number of dilem-

mas: should solidarity be sacrificed for efficiency through, for instance, individual insurance contributions? Should the basic insurance policy be extended or will people have to opt for additional coverage? Could a useful distinction be made between 'evidence-based' medicine and problems that have been 'unjustly medicalized'?

- Endeavouring to maintain standards in health care raises its quality but, in theory, this could also hamper timely modernization and impede a patient-oriented approach.
- Developments in genetics provide us with greater insight into our personal risk and treatment profile. This means that in the future we will be able to apply both prevention and treatment increasingly effectively. However, these developments also entail all manner of moral and ethical dilemmas. This is primarily because the diagnostic potential is increasing far more rapidly than the possibilities for treatment. How do we deal with the right *not* to know which diseases we may develop later on if, as yet, there is no prospect of a cure? How should we treat a technology that produces more diseases and diagnoses them at an earlier stage, yet does not yield any significant health gain? Should the often-pricey pharmaceuticals that compensate for an individual's unhealthy lifestyle be a collective financial burden?
- Some argue in favour of measuring the quality or performance of health care so as to increase its quality and make the options of both consumers and insurers more transparent. To what extent should we support the public disclosure of this information? Do we want to use quality measurement to create league tables and rogues galleries? Or should we use it as a lesson for the improvement of quality?

Opportunities to create a more effective flow of information

An effective and constant flow of information is essential for creating the basis of an 'evidence-based policy'. Hence, the government must develop a long-term vision for its information and research policies, which it must also direct.

- The government must clearly indicate the health and care subjects that need to be regularly supplied with data. The monitoring of quantitative policy objectives could be a part of this process.
- The government could agree on the characteristics and working structure of data collections in consultation with other parties. Central direction enables efficiency gains to be made by improving the co-ordination between data collections. The government must also ensure that private interests do not obstruct access to relevant data collections.
- The government should promote local-level collection of data concerning local needs, in good co-ordination with the existing needs at national level.
- The government must forcefully pursue the development and funding of national public health and health care research programs.
- The government could provide an extra stimulus for the on-going development of frameworks and indicators for measuring performance and risks in care and prevention. This will eventually create more effective possibilities for 'benchmarking' at the meso-level (between institutions) and at the macro-level (between countries).
- The government could encourage the Netherlands to become more deeply involved in the efforts of European and other international institutions to make data from different countries more readily comparable. One way in which this could be achieved is to encourage Dutch researchers to make an active contribution to the design and implementation of the European public health programme.

1 THE 2002 DUTCH PUBLIC HEALTH STATUS AND FORECASTS REPORT: A NATIONAL UNDERTAKING

The new Public Health Status and Forecasts report

How healthy are the Dutch, both now and in the future? Are there major differences between population groups, regions or neighbourhoods? As a country, how do we compare with our neighbours and what can we conclude from this? What have all our efforts concerning prevention and care actually achieved, also in terms of the constantly increasing costs? Will health care remain affordable for our rapidly ageing population while our doctors are also becoming more competent? These are the kind of questions that are discussed in the 2002 *Dutch Public Health Status and Forecasts report (PHSF 2002*.

The third edition of the PHSF report has a new structure. The information and analyses are divided into three sections so as to relate more efficiently to the various users' needs:

1. Basic detailed information is available 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' site (www.costofillness.nl).
2. The *PHSF thematic reports* mainly provide information about specific, medium-term government policies.
3. This *'Health on Course?'* report outlines the current views and is primarily intended to support policy development, both national and local, over a longer period of time.

New in this PHSF report is also an emphasis on making comparisons. Figures are especially interesting in terms of developments over time and of differences between population groups, regions or countries. These differences show what has already been achieved and where new opportunities exist. Moreover, the geographic perspective is linked with two important trends: on the one hand, the increasing focus of national policy on the international context (the EU, the other OECD countries and the World Health Organization) and, on the other hand, on the progressive decentralization of responsibilities by re-assigning them to lower government institutions.

The PHSF's role

Judging by the broadly-based use of the two previous editions, the Public Health Status and Forecasts reports have acquired a clear role in the provision of information. These reports support the Ministry of Health, Welfare and Sport in the evaluation of its ongoing policy and by providing direction in the preparation of new policies for the coming years. However, there are other players in the field of public health who also use the PHSF's information: consumers or those with a demand for care, providers of care and prevention, insurers, government health authorities and the lower government institutions. In addition, the PHSF reports are frequently used as a standard reference work in university-level education and in the prioritising and programming of academic research. (See also: *text block 1.1*).

Text block 1.1: Ten years of Public Health Status and Forecasts reports

As the co-ordinating institution, the National Institute of Public Health and the Environment (RIVM) published in 1993 the first Public Health Status and Forecasts report 1950-2010. This rather bulky publication followed the example of successful Dutch environmental surveys such as 'Concern for Tomorrow' ('Zorgen voor Morgen'). Many researchers, registration holders and policy-makers contributed to this report. Therefore, as a whole, the PHSF reports are the product of a national effort that emphasizes a complete and quantitative description of the status of Dutch public health and the most important factors that determine it. Here, the findings concerning shifts in the healthy life expectancies of both men and women, the most important causes of death and illness, and the potential for prevention through lifestyle changes are expressed in a somewhat abstract way and have probably provided inspiration instead of having directly supported concrete policy. Nonetheless, partly due to gaps highlighted by the 1993 PHSF report, research was undertaken to determine the incidence of psychiatric disorders in the general population (NEMESIS).

The second PHSF report was published in 1997 as a brief summary of a series of report sections. It was more focused on concrete policy issues, and provided a solid prognosis of the annual increase in health care costs. Accordingly, it was used to adjust the fairly low estimates included in the government agreements of the day. Well-documented proof of the considerable differential in health between urban and rural areas, and between different neighbourhoods and regions undoubtedly helped socio-economic health variations to acquire a higher priority on the political agenda. The PHSF finding that young people in particular are increasingly opting for unhealthy behaviour was included in the prevention policy and subsequently combated with a combination of information and legislation, which focused on tobacco and alcohol. Unfortunately, the PHSF recommendation that resources be made available for the evaluation of local preventative programs was never taken up.

In the present layout, the PHSF consist of three parts:

1. *Websites* (www.nationaalkompas.nl, www.zorgatlas.nl and www.costofillness. nl) that provide a wide range of up-to-date information about health and health care;
2. *Thematic reports* about specific subjects, which are intended for short and medium-term policy development. These thematic reports are linked via policy advice groups to the policy developments of the relevant ministries and, in particular, those of the Ministry of Health, Welfare and Sport. Various thematic reports have now published in this series: 'Health in the Cities' ('Gezondheid in de grote steden'), 'Mother and child care within reach' ('Ouder- en kindzorg binnen bereik'), 'Medicines and Medical Devices' ('Geneesmiddelen en medische hulpmiddelen'), 'Time for Healthy Living' ('Tijd voor gezond gedrag'), 'Cost of Illness in the Netherlands' ('Kosten van Ziekten in Nederland') and 'Regional variations in the use of pharmaceuticals' ('Slikken in Nederland; Regionale variaties in geneesmiddelengebruik'). Their findings are often even more specifically geared towards policy development;
3. The *'Health on Course?' summary report* that focuses on medium and long-term policy.

It is difficult to say to what extent the PHSF's findings have influenced policy. Policy development is based on an accumulation of information and discussion generated by the academic and scientific worlds with obvious contributions from the social sector, such as professional groups, patients' organizations and political bodies. A number of government papers specifically refer to PHSF information, as was the case with the government's plan to include health explicitly in its urban policy as a result of the 'Health in the Cities' thematic report and other documents. The PHSF reports' influence is clearly demonstrated by their use as a standard reference work in university-level education, and in the prioritizing of research (such as the Netherlands Organisation for Health Research and Development). It was partly due to the 1997 PHSF report that the Second Dutch National Survey of General Practice ('Tweede Nationale Studie') was set up to examine the incidence and prevalence of diseases by monitoring by GPs' practices. Scientific publications also frequently refer to the PHSF reports when dealing with public health in the Netherlands. There are also numerous references to the PHSF reports in the policy documents of the Ministry of Health, Welfare and Sport and in those of related organizations such as the Royal Dutch Medical Association (KNMG), the Netherlands Mental Health care Association (GGZ-NL), the Netherlands Institute for Health Promotion and Disease Prevention (NIGZ), the Netherlands Institute for Care and Welfare (NIZW) and the Dutch Municipal medical and health services (GGD).

Over the years, the PHSF reports have incorporated a large body of information concerning the web of Dutch health information, in which they have

(continue text block 1.1)

now assumed a central position. This has in turn led to the people behind these reports becoming increasingly involved with international activities. The ECHI (European Community Health Indicators) Project was the clearest example of this. Here, all the countries of the European Union attempted to draw up a common, comparable and policy-relevant set of health indicators. These activities also increased the PHSF's focus on international comparisons.
Finally, the Dutch Ministry of Health, Welfare and Sport's new 'Prevention Policy Memorandum' ('Nota Preventiebeleid'), which is soon to be published, draws extensively on the updated information and analysis that was collected for the 2002 PHSF report.

Historical gains

More than 150 years of public hygiene and health care have resulted in an unprecedented improvement in Dutch public heath. Children born today have a life expectancy of almost 80 years with more than 60 of them spent in good health. The average life expectancy in the middle of the 19th century was at most 38 years and those years were full of illness and disability. We all know that we owe this miracle to inspired hygienists, a combination of engineers and doctors, who advocated the construction of sewers, the system of provision of drinking water and decent housing. Moreover, medical care became increasingly important throughout the 20th century. Vaccination and the use of antibiotics have added many years of healthy life. In addition, our increasing prosperity, improved working conditions, eating patterns, domestic comfort and an extensive system of health protection have also contributed considerably.

The control of *environmental* factors has virtually eliminated early death through infectious diseases. Society's modernization has also led to a greatly reduced birth rate. This 'health transition' is ultimately the cause of the West's ageing population. The emphasis on collective prevention has shifted away from the physical environment and towards unhealthy *behaviour* as being the cause of many chronic diseases. This has also lead to increasing research into the relation between behaviour and the social and physical environments.

Life expectancy will continue to increase over the coming decades. A major factor here is our increased ability to tackle a third group of disease determinants, namely *genetic factors*. Hence, knowledge of individual genetic traits will result in lifestyle advice that is tailored to the individual. The most important challenges for the next few years are to ensure the preservation of what has already been achieved and that the extra years are spent in reasonable health.

Since the 1980s, a major focus of interest has been the distribution of health across the population. Even in an egalitarian country such as the Netherlands, there are considerable differences in health between the various population groups. These differences are linked to socio-economic factors such as income and education, and to behavioural differences. From a geographical perspective, we see these differences reflected in the below average health of residents of deprived areas or in differences between urban and rural communities. Moreover, health differences between population groups indicate that there is still much to be achieved.

Growing care

Today's health care strongly emphasizes quality of life, and reducing and postponing social restrictions associated with chronic disorders of the elderly. On average, the health of the Dutch scores reasonably well when compared with their foreign counterparts, while health care costs remain average. Should we therefore be happy with our efficient health system? Unfortunately not entirely. Persistent waiting lists, high workloads and major shortages of staff illustrate growing levels of friction in the health care sector. Demographic and social developments place the health system under considerable pressure. An increasingly elderly society, fewer young people, individualization, more assertive and better-informed citizens, internationalization, increased prosperity and rapidly-progressing medical technology seem to disturb the relation between supply and demand still further. Not only will the demand for health care increase and change, but the quality and diversity of its supply will also grow considerably.

Moreover, we have now reached a situation of diminishing returns (Council for Public Health and Health Care (RVZ), 2001a). Each year, we spend many billions on our health system (almost 10% of the gross domestic product) and this budget is growing steadily. Moreover, we will never again achieve the enormous health gains that we once did with relatively simple interventions in the domestic environment.

Health remains just as precious to us as ever, and we are continually widening our interpretation of this concept. For many years now, it has no longer been a question of a tangible absence of disease and infirmity but, in the spirit of the World Health Organization's well-known definition, of 'complete physical, mental and social well-being'. This also means that, in theory, there is virtually no limit to the appropriation of resources, and that the efficiency of the health system plays an increasingly important role (Saracci, 1997). In view of this, the definition of health has been limited in first instance to the absence of physical and psychological symptoms that can be recognized and named by a physician (Netherlands Scientific Council for Government Policy (WRR), 1997).

Gradually, concepts such as 'efficiency', 'freedom of choice' and 'market forces' have gained importance and new dilemmas have developed. Are we sacrificing some solidarity in the interests of extra efficiency? Must we extend the standard health care package or should you be willing to pay for additional insurance for extras? For that matter, it is striking that this discussion focuses on money, staff, organization and the health care provided. The repercussions for public health are generally not considered. If efficiency comes to play a more pivotal part then, ultimately, the ability to measure achievements will also become more important.

The players

The rapid changes outlined here require timely and adequate information about the state of public health, and developments within it. Such information is not only for the government but also for a large number of other parties. Who are the players in the field of our health system and what are their primary information needs?

In the *health care* field, the players are mostly described as *the requesters of care*, *the providers of care*, and *health care funders* or *insurers*. These groups have their own sector and professional organizations. The government (Ministry of Health, Welfare and Sport, the Public Health supervisory service and lower government institutions) is also present on the field. It is right at the heart of things, maintaining or adjusting the rules. Complicated relations exist between the players, and roles are sometimes switched (*figure 1.1*). Hence, the requester of care is the patient so far as the provider of care is concerned, but is the policy holder vis-à-vis the health care funder. The carer is not only a professional carer but also an entrepreneur. Ultimately, as the financier of care, the health care funder is also the insurer of the requester of care. This complicated triangular relationship makes it difficult to operate the health system. Moreover, there is an increasing pressure to alter roles and to direct through demand rather than through supply, and to improve the health system's efficiency. Hence, the *requester of care* is expected to be better informed, more emancipated and to act as an actual consumer complete with, for instance, his or her individual budget. The *provider of care* must focus more on his or her clients, and must place greater emphasis on efficiency and safety. The *health care funders* are expected to provide greater direction. They could stimulate competition between the providers of care by purchasing the best care for the lowest possible prices. The government must ultimately play a more distant role. All these parties need information concerning public health and care, so as to develop their policies (Westerhout, 2000).

Roles in the broad domain of *prevention* are more subtly divided than they are in care. The protection of health has traditionally been a constitutional task for the government. The maintenance of rules and laws concerning the safety of food, goods, homes and buildings, work, traffic and the environment is controlled by the Public Health supervisory service and by other inspectorates. In terms of prevention, the role of the Ministry

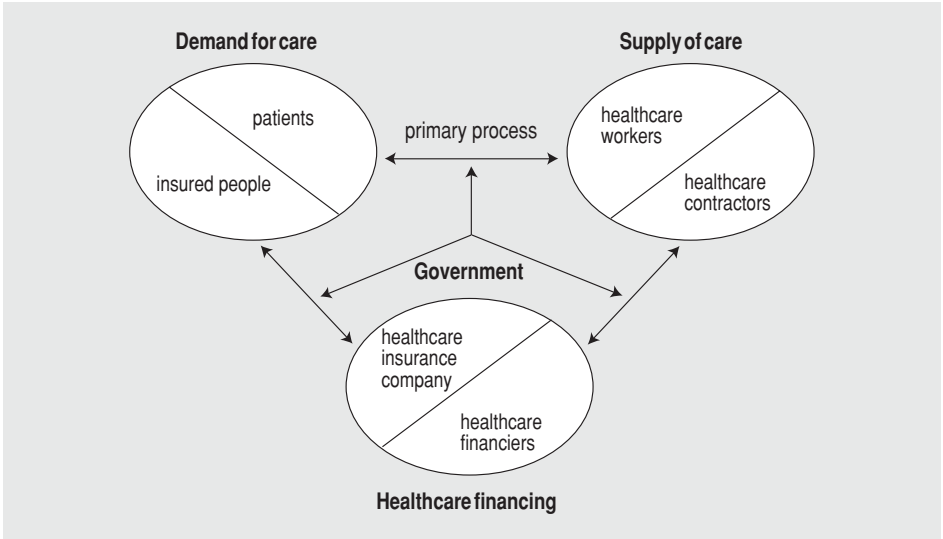


Figure 1.1: The players in the health care field (Source: Van der Maas & Mackenbach, 1999).

of Health, Welfare and Sport is to provide directives, to stimulate and to create the right conditions. It is assisted in this task by a series of advisory councils. However, other departments dealing with social affairs, employment, managing the environment, housing, traffic and justice contribute just as much to public health through their intersectoral policy. Municipal councils, frequently through their municipal medical and health services, bear responsibility for the realization, continuity and cohesion of collective prevention and for gearing it to curative care.

Prevention is 'provided', among others, by municipal medical and health services, child health centres, and outpatients' clinics for STD's along with organizations that primarily focus on care. A series of private institutions, which are also involved with prevention, collect and distribute information about responsible lifestyles and disease prevention. This diverse group includes institutions such as Dutch traffic safety organisations and anti-cancer charities. Prevention is also promoted in the workplace, at school, in neighbourhoods, during sporting activities, and in medical and paramedical practice. This work is carried out by a range of professionals who provide health information, advice, screening and vaccinations, and who modify the working environment, both physically and psycho-socially.

Policy-relevant information by answering seven questions

Over the past few years, the policy agendas of the Ministry of Health, Welfare and Sport have reflected the motto: '*care* for people in a *healthy* society'. The policy aims at 'promoting a general state of health, promoting healthy behaviour, eliminating or diminishing the factors that threaten health and, wherever possible, protecting against harmful exposures. Life expectancy and the quality of life are the policy's primary premisses.

The agendas of the Ministry of Health, Welfare and Sport provide citizens with the prospect of 'timely care and services for which they are insured and to which they are entitled' (VWS, 2001, 2002a). Here, the key concepts are 'risk solidarity' and 'accessibility'. Every Dutch person must be able to insure himself against the cost of illness and care, no matter the individual risk involved given a particular age, socio-economic status or state of health. It should also be pointed out that all this must be available *at an acceptable price*. It is anticipated that this will ultimately entail a radical overhaul of the entire Dutch health care system.

In the latest yearly report on health care, ('Zorgnota'; VWS, 2002a), the Balkenende government, which took office in July, gives further emphasis to the citizen's right to care throughout the year. Hence, financial and organizational barriers must be eliminated and counterproductive incentives should disappear. The *providers of care* become *care entrepreneurs* who are stimulated by *health care insurers* and *care consumers* to provide greater, timely and higher-quality *care*. The insurers provide directions, supervized by the government. It is striking that the Balkenende government is endeavouring to take an extremely positive view of our ageing society, rather than simply seeing it as an unfortunate expense. Investing in health contributes substantially to the population's welfare and is therefore worthwhile.

The outlined objectives have already been laid out in the most recent public health policy memorandum, 'Healthy and Well' (Nota: 'Gezond en Wel'; VWS, 1995), and in a series of memoranda for specific areas. The two main current Dutch health policy objectives can be summarized as follows:

Maintaining and improving public health.
There are three points of special interest here:
- preventing avoidable disease and mortality;
- reducing differences in health between socio-economic groups;
- preserving quality of life (particularly for those with chronic diseases).

Cure and care for people with diseases and handicaps.
Both the cure and the care should be:
- of high quality (effective, safe and appropriate);
- available to everyone when needed;
- provided at an acceptable price.

This PHSF report aims to illustrate the current state of these two core objectives and how they may develop in the future. Therefore, using the basic model of public health as its guiding principle, the contents of this 2002 PHSF report have been structured around the following seven questions. The questions are colour-coded according to this model's blocks (*text block 1.2*).

1. *How is our health?* What are the most important public health problems and how are they developing? How do we compare with other countries in the European Union? Are there striking health differences in the Netherlands between the various population groups, neighbourhoods or regions?

2. *What factors determine our health?* What are the obvious causes of health problems (such as behaviour or environment) and what are the trends? How do we compare with the rest of the European Union? Are there environmental or social differences in these factors in the Netherlands?

3. *What is the significance of prevention and care for our health?* Are there geographical or inter-institutional differences in the Netherlands? Are prevention and care as effective as they could be, in the light of contemporary scientific evidence? Is this effectiveness adversely affected by problems in the health care system?

4. *How much care is used, for what and by whom?* Which health problems entail the greatest costs? Do we spend more or less than other EU countries? Are there regional differences in the use of care and what is their significance?

5. *Are the profits and costs in balance?* How much health does a euro buy? Is prevention always cheaper than cure?

6. *What will the future bring?* How and to what degree will the expected socio-demographic developments and advances in medical technology influence our health?

And finally:

7. What does this information mean in terms of health policy? Where are the opportunities for health gains? What are the dilemmas of the future? What is the most important information for guiding the various players?

Text block 1.2: The basic conceptual model of the 2002 PHSF report.

As with previous PHSF reports, we use a conceptual framework to structure the information and to deal with it systematically (*figure 1.2*). It focuses on our health status along with the determining factors (determinants). This health status can be described in terms of the prevalence of disorders, and how this influences social participation and quality of life, or in terms of causes of death or composite measures such as healthy life expectancy. Personal characteristics including age, gender, hereditary predisposition or overweight greatly influence our health. Other determinants concern lifestyle, and the social or physical environment. Current policy around 2002 places great emphasis on our lifestyle, eating patterns and bad habits, such as smoking and the excessive use of alcohol. The social and physical domains cover issues such as education, profession or income, exposure to harmful substances, radiation or pathogens in the workplace, and the domestic environment and our food.

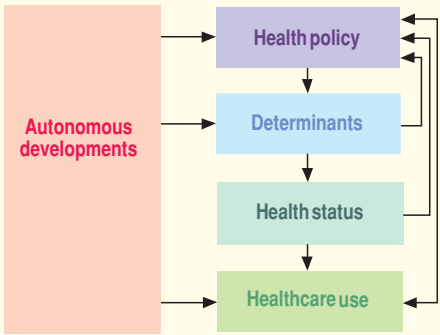


Figure 1.2: The basic conceptual model of the PHSF reports (Source: Ruwaard & Kramers, 1997).

Health policy should maintain everyone's health and, as far as possible, improve it through prevention and care. Prevention primarily focuses on the determinants: reducing exposure to factors that damage health through health protection or by influencing behaviour. Prevention also includes the early detection and treatment of disease. Care focuses on health problems that have already been identified. Here, it may involve either a cure or primarily care (where there is no prospect of a cure). Finally, another major factor is health care use. Health care use naturally depends on health status, but is also inevitably linked to supply. Care is formally provided in the various sectors of our health system (such as a hospital or nursing home), but also on an informal level by the immediate family, friends or neighbours. Health policy influences health status, health care use and determinants of health, and is, in turn, influenced by them. This dynamic system is affected by autonomous demographic, macro-economic, sociocultural developments and by advances in medical technology.

Looking from different angles

Let us once again review the contents of the PHSF report from the different players' perspectives: which of the questions discussed are relevant for which target group?

Considering its responsibility, the *national government* has an interest in answers to all these questions. Where are the shortcomings in our health status, what are their causes and where are the opportunities for improvement amongst the Dutch as a whole, specific Dutch groups or even individuals? What are the trends? What do prevention and care

achieve and where are the opportunities for integrating both areas? What incurs the major costs? Are these costs acceptable? What do we exactly mean by efficiency? The next government report on prevention policy ('Nota Preventiebeleid'), which will appear shortly, will make extensive use of the information that has been collected in this 2002 PHSF report.

Lower government institutions, primarily municipal councils, will be mainly interested in the question of benchmarking, in how their residents' health compares with the rest of the Netherlands, and how the situation varies from neighbourhood to neighbourhood. An understanding of the relation between health, behaviour, quality of the social and physical environment, health care use and provision can help local government councils to develop an integrated, intersectoral approach to deprivation involving neighbourhoods, schools, sports clubs, neighbourhood associations and medical professionals.

Health care funders can profit from insights into present and future patterns of disease, given the developments in demography, the trends in behaviour and the quality of both the domestic and working environments. Will there be major shifts in the demand for care and what would the financial consequences be? What is the situation in terms of the health gains of prevention and care? This may be a matter not only of the *quality* of care and the *accessibility* of care facilities but also of a *customer-friendly* attitude. Can the health gains be increased by integrating prevention into care? An increased directing role for health care funders also requires more opportunities for monitoring health care achievements with the help of a transparent and valid set of indicators. Moreover, a comparison with achievements in other countries creates insight into opportunities for improvement.

The developments in lifestyle and patterns of disease are naturally also important for the *providers of care,* in relation to the expected demand for care and the opportunities for integrating prevention into care. They too will be involved with making reliable measurements of achievements, both medical and organizational, in relation to both funding and the requester of care. Insight into the chain of care also benefits the provider of care. What is the significance of the various parts of the chain both in terms of time and cost? Insight into the lifestyles of groups of citizens, the quality of the physical and social environment, and successful, local experimental prevention schemes may also benefit 'prevention providers' such as municipal medical and health services.

Those in need of care benefit from insights into the determinants of health, particularly behaviour, but also from insights into the health related quality of their domestic and working environments. This equally applies to *non-governmental organizations* (consumer's representatives) in the case of specific diseases (i.e. cancer or diabetes mellitus) or specific causes (smoking or environmental pollution) when organizing campaigns. *People that are demanding care* currently seem to believe that 'access to information' and 'the right provider attitude' are the most important aspects. However, as consumers, they also have an interest in information about the outcomes of medical interventions.

What is the structure of the 2002 PHSF report?

Chapter 2 consists of the facts and analyses covering the first five questions from the above series of seven. One question is discussed per section. This chapter continues the theme of the 1997 PHSF report with a description of the most important developments in the field of public health.

In *chapter 3*, these facts and analyses are placed in a future perspective, as based on socio-demographic and medical-technological prospects. This chapter concentrates on the sixth question in the above-mentioned series.

Chapter 4 charts the consequences for policy. The most important dilemmas for health policy are identified, on the basis of the diagnosis (*chapter 2*) and of quantitative and qualitative forecasts (*chapter 3*). This also takes account of the perspectives of various players and the changing division of roles. The fourth chapter also discusses the need for and optimalization of the provision of information. Finally, *chapter 4* also indicates how the status of public health and the achievements of the health system may be coherently described and monitored with the help of well-chosen indicators.

2 HEALTH AND CARE IN THE NETHERLANDS: SIGNIFICANT TRENDS AND SALIENT DIFFERENCES

This chapter presents facts, interrelationships and analyses concerned with health status, the underlying determining factors, health care and prevention. We identify the areas that have recently been the subject of marked trends and the areas that show clear regional or international differences. This chapter also describes the health differences that exist between socio-economic groups and ethnic groups in the Netherlands. Such trends and differences clarify what has been achieved so far, and help to identify opportunities for further improvement.

The information in this chapter is arranged in accordance with the PHSF conceptual model (*figure 1.2*), based on the following questions:

2.1 What is the state of affairs with regard to our health?
2.2 What factors determine our health?
2.3 What do prevention and care mean for our health?
2.4 How much health care is used, what is it used for and by whom?
2.5 Are the benefits and costs in balance?

Each section briefly presents several core data items, together with more detailed examples. Each of *sections 2.1, 2.2* and *2.4* looks at the following topics: current national situation, historical trends, position of the Netherlands relative to other European countries, regional differences, and differences between sections of the population.

Additional material on underlying studies, further details and references to data sources and research is available in the National Compass on Public Health (www.nationaalkompas.nl), the National Atlas of Public Health (www.zorgatlas.nl) and the 'Cost of Illness' site (www.costofillness.nl). We have kept the number of references to these websites to a minimum in this report in the interest of readability. However, the websites mentioned have special hyperlinks to take the readers of 'Health on course' directly to the corresponding background information (mostly in Dutch, however).

2.1 What is the state of affairs with regard to our health?

Dutch health would appear to be developing in the right direction

We are living longer and we are healthier than ever, which is borne out by numerous facts, for example that the life expectancy of Dutch men in 2000 has increased to 75.5 years, and that of women to 80.6 years. This increase is mainly attributable to the sustained decline in mortality from coronary heart disease and stroke. Furthermore, the

declining mortality from lung cancer in men is contributing to a rise in life expectancy, under the influence of both a healthier lifestyle and improved health care.

Healthy life expectancy also increased in the 1990s, by an amount equal to or greater than the increase in life expectancy. The years that have been gained are therefore enjoyed in good health, especially for men. Women are living ever longer free of disabilities and in good mental health, but, conversely, shorter in terms of good self-perceived health.

Nonetheless, our ill health is a major burden on both the individual and society
The burden of ill health consists of more than the cost of health care alone, as it also entails premature mortality, a loss of quality of life for patients and people in their environment, diminished social participation and work incapacity.

The major causes of death are coronary heart disease, stroke and lung cancer. What is more, many years of life are lost to mortality from breast cancer and suicide. Mental disorders (depression, anxiety disorders and alcohol dependence), coronary heart disease and chronic obstructive pulmonary disease (COPD) are the main conditions associated with a decline in quality of life.

People with chronic diseases and impairments are to a lesser extent taking part in a wide range of social activities. Their degree of participation in labour is also lower, especially among patients with cardiovascular and musculoskeletal diseases. The majority of work incapacity is attributable to mental disorders and musculoskeletal disorders.

Furthermore, there are ample reasons for us to be concerned about our health
Our health is not only a burden, but also gives cause for concern. The Netherlands is lagging behind other EU countries. Men's life expectancy is increasing at a slower rate than in most EU countries, and women's is stagnating to such an extent that we have now fallen below the EU average. The mortality from lung cancer in men is still one of the highest in the EU, and in women it is increasing faster than the EU average. The death rate from chronic obstructive pulmonary disease (COPD) among women is increasing relative to other member states. The mortality from breast cancer in the Netherlands also remains obstinately high by international standards. Depression, anxiety disorders and diabetes mellitus are also on the increase, but in these cases the main reason is better recognition by physicians and patients.

Another cause for concern is that health is distributed unequally in the Netherlands, with considerable differences between rich and poor, city and countryside, indigenous Dutch and members of ethnic minorities. The least educated men live 5.0 years less than the best educated. The corresponding difference for women is 2.6 years. Furthermore, the most highly educated men and women remain free of disabilities for an average of almost 10 years longer. The difference in the number years that people feel healthy is as much as 16 years for men and 14 years for women. There are also similarly large differences between regions, with residents of deprived areas in the major cities being the worst off on average. Finally, life expectancy varies greatly between groups of different ethnic origin.

2.1.1 Life expectancy and health

How long do we live, and how many years of our lives do we enjoy in good health? Are we living ever longer, and remaining healthy ever longer? How does the situation in the Netherlands compare with other EU countries? And are there any striking differences in life expectancy and health in the Netherlands between regions or population groups? This section presents core information on the life expectancy and health of the Dutch population. *Section 2.1.2* elaborates this picture by discussing specific diseases and disorders that cause ill health, and by answering questions such as 'What are the most significant causes of death?', 'What are the common diseases and disorders?', 'Which contribute most to a decline in quality of life, to work incapacity and to the total burden of disease?', 'Which diseases have shown a marked increase or decrease in prevalence?', 'How large are the differences between socio-demographic groups, or between regions?' and 'Are there any significant differences with other EU countries?'. The answers to all these questions helps us to form a view of both health and ill health in the Netherlands.

The health status of the population can be described by referring to various different indicators. *Text block 2.1* sets out the indicators that we use in this report and how they relate to each other.

Text block 2.1: A systematic look at health status

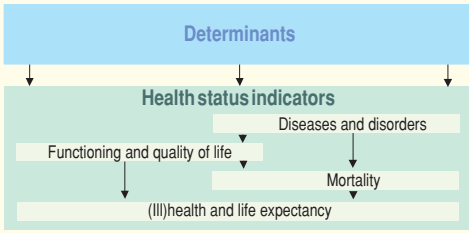


Figure 2.1: The conceptual model of PHSF; elaborated for the block 'Health status' (Source: Ruwaard & Kramers, 1997).

The health status of the population of the Netherlands is described with reference to four types of indicators *(figure 2.1): diseases and disorders; functioning and quality of life; mortality; (ill) health plus life expectancy.* These indicators are not entirely independent; for example, diseases can lead to a reduction in functioning and quality of life, and to a rise in mortality. The (ill) health and life expectancy indicator combines disease prevalence, quality of life and mortality in a single measure at population level.

Women live an average of five years longer than men, but the difference is becoming smaller

In 2000, life expectancy at birth was 75.5 years for men and 80.6 years for women, which is a difference of more than five years. At 65 years of age, the difference in life expectancy between men and women is still almost four years (*table 2.1*). Men have a higher rate of mortality at any age, but the difference is especially large between 60 and 80 years of age, by a factor of almost two.

Between 1980 and 2000, life expectancy increased by 3.1 years for men and 1.4 years for women. The rising life expectancy among men coincides with the declining mortality from significant causes of death such as coronary heart disease, stroke and lung can-

Table 2.1: Life expectancy and healthy life expectancy of the Dutch population in 2000, at birth and at 65 years of age (Sources: see text block 2.2).

	Men	Women
At birth:		
Life expectancy	75.5	80.6
Healthy life expectancy		
• life expectancy in good self-perceived health	61.3	60.8
• disability-free life expectancy	70.2	70.6
• life expectancy in good mental health	67.4	68.1
65 years of age:		
Life expectancy	15.3	19.2
Healthy life expectancy		
• life expectancy in good self-perceived health	9.3	9.9
• disability-free life expectancy	12.1	12.8
• life expectancy in good mental health	14.0	16.4

cer. For women, the increase in life expectancy has been stagnating since the late 1980s, mainly as a result of the past increase in the number of women starting to smoke. For example, there has been a consequential rise in mortality from lung cancer and COPD in women (see also *section 2.1.2*). The effect of this stagnation is a constant erosion of the difference in life expectancy between men and women.

Healthy life expectancy is almost equal for men and women

Healthy life expectancy is an indication of the proportion of life expectancy that is enjoyed in good health. Healthy life expectancy is a measure that combines the length and quality of life (for definitions of life expectancy and healthy life expectancy see *text block 2.2*). This report presents the following three types of healthy life expectancy: as determined by self-perceived health, by having physical impairments (disability) and by mental health.

For each of these three types, healthy life expectancy is almost equal for men and women. For instance, life expectancy in good self-perceived health is 61.3 years for men and 60.8 years for women, which, although not a large difference, does mean that women live almost 20 years in ill health and men 'only' 14 years.

Moreover, at 65 years of age, the years that women outlive men will be spent almost completely in ill health (*table 2.1*). It should be noted that this ill health is for the most part 'minor ill health' (*figure 2.2*), which is also true of the years with disability and the years in mental ill health (Perenboom et al., 2002).

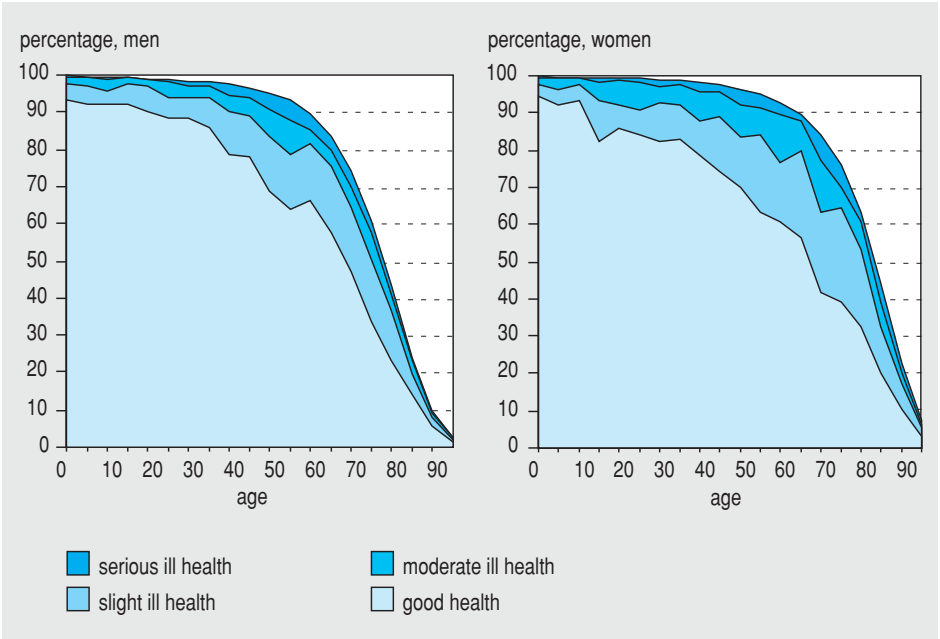


Figure 2.2: Survival curve for Dutch men and women in 2000. The area between the lines represents the number of years of self-perceived good health, or, conversely, of minor, moderate and major ill health (Sources: see text block 2.2).

Text block 2.2: What is healthy life expectancy?

What is life expectancy?
Life expectancy indicates how many years people can expect to live, on the assumption that the current age-specific mortality probabilities remain constant. For the purposes of this report, life expectancy is calculated on the basis of the mortality probabilities in 2000.

What is healthy life expectancy?
Healthy life expectancy is the number of years that one may expect to live in good health. It is thus a combined measure of the length and quality of life. The quality of life is determined by three health indicators, each of which yields a particular type of healthy life expectancy:
- Life expectancy in good self-perceived health;
- Life expectancy without disability;
- Life expectancy in good mental health.

In the case of *life expectancy in good self-perceived health*, the number of 'healthy' years is determined on the basis of the percentage of individuals answering 'good' or 'very good' to a question about self-perceived health. Those who answered 'fair', 'sometimes good and sometimes bad' or 'bad', on the other hand, are classified as 'unhealthy'. In this connection, the response 'fair' is taken to correspond to slight ill health, 'sometimes good and sometimes bad' to medium ill health and 'bad' to severe ill health.
Life expectancy without disability is calculated with the aid of data on long-term physical impairment in ten activities in the fields of hearing, sight, mobility and activities of daily living (ADL). Individuals are classified as suffering from a disability if they state that they are unable to carry out one or more of these activities, or can only carry them out with great difficulty.
The determination of *expectancy of life in good mental health* makes use of the Affect Balance Scale, which considers five negative feelings (loneliness, unrest, boredom, depression and distress). The number of years of 'ill health' is determined on the basis of the percentage of individuals suffering from one or more of these five feelings often or very often.

Sources used
The mortality and life expectancy data were derived from the CBS-StatLine (CBS = Statistics

(continue text block 2.2)

Netherlands).
Information about the health of individuals living on their own comes from the Statistics Netherlands' continuous survey (called 'Gezondheidsenquête' (Health Survey) up to and including May 1996, and the 'POLS gezondheid en arbeid' survey (Keeping a finger on the pulse in health and work) from 1997 onwards). Data on the elderly in nursing and care homes was taken from surveys on elderly people in institutions (Ouderen In Instellingen) (OII-2000 and earlier versions). The data on healthy life expectancy was processed by TNO-PG (Prevention and Health department of the Netherlands Organization for Applied Scientific Research) (Perenboom et al., 2002; Mulder et al., 2002; Van Herten et al., 2002)

The healthy life expectancy of men is increasing, while the trend for women is unclear

Life expectancy is increasing, but the question is whether people actually live longer in good health. This is indeed the case for men, who have seen an increase in total life expectancy in the past decade accompanied by an increase in healthy life expectancy (*table 2.2*). The increase in life expectancy in good self-perceived health and in good mental health is approximately as large as the increase in total life expectancy, which means that the years gained are enjoyed in good health. Disability-free life expectancy is increasing even more than life expectancy.

The findings are contradictory for women: life expectancy in good self-perceived health is decreasing, while life expectancy in good mental health, and especially disability-free life expectancy, are increasing (Perenboom et al., 2002).

There is no less disease, but there is less disability

The number of years that people live with disabilities has therefore decreased sharply (compression of morbidity), with an especially steep decline in mobility and hearing impairments among the elderly. However, there are no indications that musculoskeletal diseases or hearing impairments are declining. In general, the number of years that people live with disease would actually appear to have increased, as can be seen in an analysis that included fourteen self-reported chronic diseases (Perenboom et al., 2002). Apparently, therefore, people are becoming better able to cope with the physical impairments of their disease or disorder, which could be related to the increased use of medical devices such as rollator walkers (walking frames) and hearing aids. As in most western countries, a pattern seems to be emerging of a decrease in impairments, or at least of their severity (Robine et al., 2002).

In contrast to disability-free life expectancy, life expectancy in 'good self-perceived health' has increased less than total life expectancy (men), or has even decreased (women). The number of unhealthy years has therefore increased, especially for women (expansion of morbidity). It is unclear where the discrepancy in the trends between the different measures of health originates. One possible factor is that self-perceived health is a subjective measure, which involves both objective health and increasing expectations of an individual's own health.

Table 2.2: Change [a] in life expectancy and healthy life expectancy of the Dutch population (in years), in the period from 1980 to 2000 (Sources: see text block 2.2).

	Men	Women
Change in total life expectancy		
from 1980-2000	+3.1	+1.4
from 1983-2000 [b]	+2.7	+1.1
from 1989-2000 [c]	+1.8	+0.6
Change in life expectancy in good self-perceived health 1983-2000	+2.4	-1.2
Change in disability-free life expectancy 1989-2000	+5.8	+5.5
Change in life expectancy in good mental health 1989-2000	+1.9	+2.8

a) the changes are based on regression coefficients and are all statistically significant.
b) self-perceived health was first measured in 1983.
c) disability (physical impairments) and mental health were first measured in 1989.

Life expectancy in the Netherlands is rising more slowly than the EU average

What is the position of the Netherlands in comparison with other European countries in terms of life expectancy? The life expectancy of Dutch men at birth is rising less rapidly than the EU average (*figure 2.3*). Nonetheless, the Netherlands still occupies a relatively favourable position in terms of life expectancy at birth for men. However, this is no longer the case for the remaining life expectancy at a greater age. In other words, Dutch men suffer relatively high mortality at an advanced age. In comparison with other European countries, a relatively large number of elderly Dutch men die from lung cancer, COPD, pneumonia and prostate cancer.

The life expectancy of Dutch women continues to lag even further behind the EU average than that of men (*figure 2.3*). Their life expectancy is stagnating at all ages and has now fallen below the EU average. A similar development can be seen only in Denmark, where the effect is even more marked.

The stagnation women's life expectancy is mainly a consequence of smoking

One obvious candidate for the cause of the relatively unfavourable developments in life expectancy is the most significant cause of death in the Netherlands, coronary heart disease. However, the associated trend fails to explain the stagnating life expectancy, since mortality from coronary heart disease is developing favourably, both for men and women. The decline in mortality that took place in the Netherlands between 1980 and 1993 was even one of the most pronounced in Europe.

Mortality from smoking-related diseases is a major element in the unfavourable trend for women. For instance, the increase in mortality from lung cancer among Dutch women in the period from 1980 to 1993 was the highest in Europe, at over 85% (La Vecchia et al., 1998). The incidence of lung cancer in Dutch women now exceeds the European average. The mortality from COPD, breast cancer and colorectal cancer among Dutch women is also higher than in other European countries (Van der Wilk et al.,

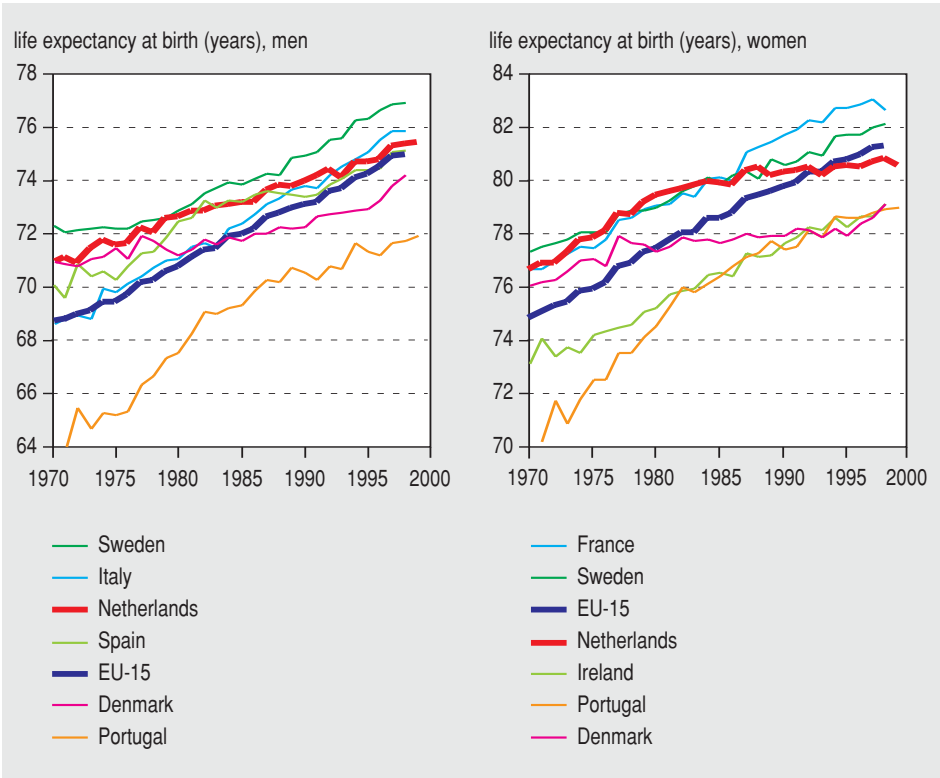


Figure 2.3: Life expectancy trends for men and women in various EU countries in the period from 1970 to 2000. As well as the Netherlands and the EU average (EU-15), the most and least favourable countries are shown (Source: WHO-HFA, 2002).

2001). More information on international mortality differences according to cause of death can be found in *section 2.1.2*.

A difference of almost ten years in healthy life expectancy between regions

Geographical life expectancy differences exist not only within Europe, but also within the Netherlands. For instance, life expectancy is relatively low in South-Limburg, the northeast of the Netherlands and the major cities (*text block 2.3*). People in several regions in the west (including Amstelland - De Meerlanden and Delfland) attain the greatest average age. The maximum differences in life expectancy between these municipal medical and health service regions (GGD-regions) are 3.2 years for men and 2.5 years for women. The regional differences in healthy life expectancy (on the basis of self-perceived health) rise to almost ten years (Mulder et al., 2002). For instance, people in the major cities, South Limburg and the northeast enjoy relatively few healthy years (55-58 years), while people in several regions in the west of the country, the Veluwe and North and Central Drenthe enjoy approximately 65 years of good self-perceived health (*figure 2.4*). This is true for both men and women. The regions with many low socio-economic status residents have a particularly modest life expectancy. Indeed, there are striking similarities between the regional pattern of healthy life expectancy and that of socio-economic status (*figure 2.4*).

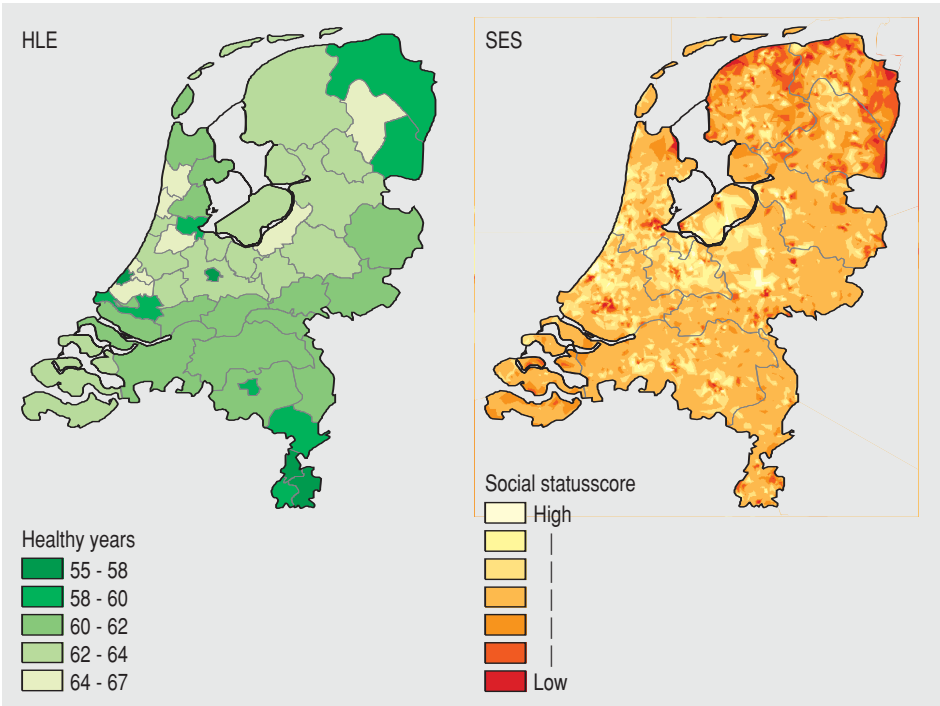


Figure 2.4: The regional spread of healthy life expectancy (HLE) in the period from 1995 to 1999 and socio-economic status (SES) in the Netherlands in 1995 (education, occupation and income) (Sources: see text block 2.2; Knol, 1998).

Text block 2.3: People who live in deprived neighbourhoods are less healthy

The lower level of health in cities can be mainly ascribed to the situation in the deprived urban areas, which are subject to multiple health problems. For example, the probability of dying before the age of 65 is 50% higher in a deprived area than in a prosperous neighbourhood. The reasons for this are largely related to the socio-demographic make-up of the neighbourhoods. A relatively large proportion of the people who live in deprived areas have a low socio-economic status and/or are immigrants, and both these groups are associated with poorer health. It is clear that the mechanisms that give rise to socio-economic differences in health also play a role in the differences in health observed within the big cities. Relevant factors here include material and immaterial living conditions, lifestyle factors and the accessibility and quality of health care (Van der Lucht & Verkleij, 2001).

Less well educated men live an average of five years less than highly educated men

The difference in life expectancy of men with only an elementary school education and men with a higher vocational or academic education is almost five years. The respective life expectancies are 73.1 and 78.0 years. For women the difference is 2.6 years: women with only an elementary school education live 79.5 years on average, while highly educated women live 82.1 years on average (*figure 2.5*). A difference of five years in life expectancy is large. It is as large as the total difference in life expectancy of men and women. In order to find a life expectancy for men that is five years less than their cur-

rent life expectancy, we have to go back approximately thirty years. The difference in life expectancy between people with a low and a high educational level differs from that reported in PHSF 1997. It was calculated then that the difference in life expectancy between the lowest and the highest Social Economic Status (SES) group was 3.5 years for both men and women. This finding was based partly on Swedish research results. The new figures are based on four longitudinal Dutch studies (ERGO, LASA, PPHV, GLOBE) (Van Herten et al., 2002).

There are also socio-economic differences in healthy life expectancy

Socio-economic differences exist not only for life expectancy, but also for healthy life expectancy, and the difference between people of a low and a high educational level is then even larger: less well educated men and women then live 9.9 and 8.6 fewer years, respectively, in good health (in other words: without disability). For instance, men with only an elementary school education live on average for 64 years without disability, and 9 years with disability (*figure 2.5*). Their total life expectancy, 73 years, is even lower than the *disability-free* life expectancy of more highly educated men (higher vocational or academic education), who live on average for 74 years without disability, but 'only' four years with disabilities. Another measure for healthy life expectancy, self-perceived health, shows even greater differences, with less well educated men and women then having 15.8 and 14.0 fewer healthy years, respectively.

Socio-economic differences in health are not becoming any smaller

The differences in healthy life expectancy are greater than was stated in PHSF 1997. It is difficult to establish trends in health differences on the basis of the data available. Currently, four educational levels are distinguished as opposed to three: the highest educational level has been divided in two to increase the homogeneity within a class. Nonetheless, the differences would not appear to be declining. This is evident in analy-

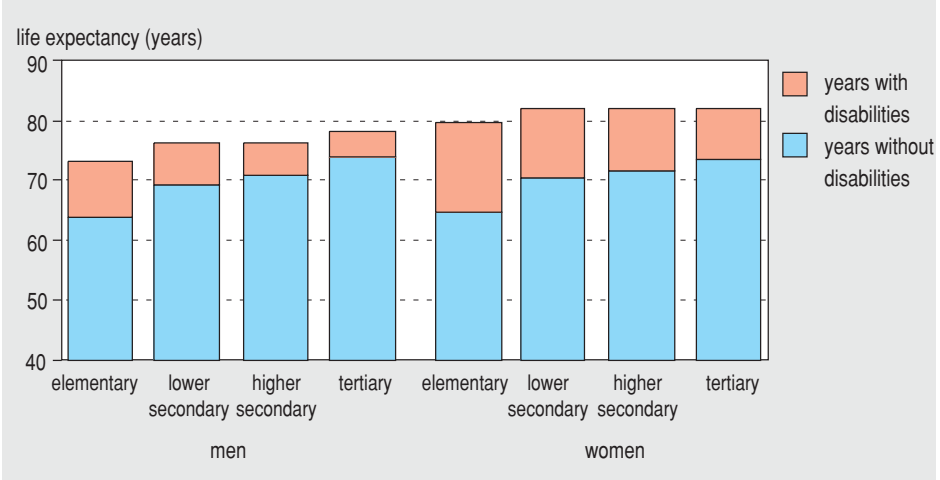


Figure 2.5: Life expectancy and disability-free life expectancy according to educational level for Dutch men and women, 1995-1999 (Sources: see text block 2.2).

ses of trends in socio-economic differences on the basis of self-reported health, as measured since the early 1980s in various Statistics Netherlands (CBS) surveys (Konings-Dalstra et al., 2000). These data indicate at most that the health differences are stabilizing. The inequality in self-perceived health and the presence of two or more chronic diseases has even increased. The main increase is in income-related differences, more so than those related to educational level. This is possibly connected with the slower progress being made by the poorest groups in the Netherlands in well-being and living conditions (including material living conditions) (Konings-Dalstra et al., 2000).

The life expectancy of ethnic minority groups is not always shorter

It is often assumed that ethnic minority population groups also have a lower life expectancy, in particular because of their less favourable socio-economic status. However, this assumption is not entirely consistent with the available data, which actually show a high mortality rate among the young (and very young) members of ethnic minorities and, conversely, a more favourable mortality rate among the older members of ethnic minorities (Hoogenboezem & Israëls, 1990; Wild & McKeigue, 1997; Razum et al., 1998; Abraido Lanza et al., 1999; Weitoft et al., 1999). Among the possible explanations for the lower mortality among older members of ethnic minorities in the Netherlands are selective remigration and the fact that immigrants form a healthy, selected group from the country of origin (Uitenbroek et al., 2001). Differences in lifestyle or genetic factors may also play a role. Moreover, there are considerable health differences between the various ethnic minority population groups (*text block 2.4*).

Text block 2.4: Differences in life expectancy by country of origin

Life expectancy at birth depends on the country of origin, among other things. Appreciable differences may exist between one country and another. For example, men of Moroccan origin live on average more than 3.5 years longer than Dutch men, while men of Turkish and Surinamese origin have a life expectancy which is on average about 1.5 years less than for Dutch males. Men from the Dutch Antilles and Aruba have nearly the same life expectancy as Dutch men. Moroccan women live on average nearly a year longer, and Surinamese women nearly 1.5 years less long, than Dutch women. The life expectancies for women of Turkish and Antillean or Aruban origin are roughly equal to those for women of Dutch origin.
In general, mortality among migrant groups is relatively high in lower age groups and relatively low in higher age groups. The age at which the expected mortality becomes less than that for individuals of Dutch origin depends strongly on country of origin and gender. For example, Moroccan men up to 30 years old have a higher risk of mortality while above 40 they have a lower

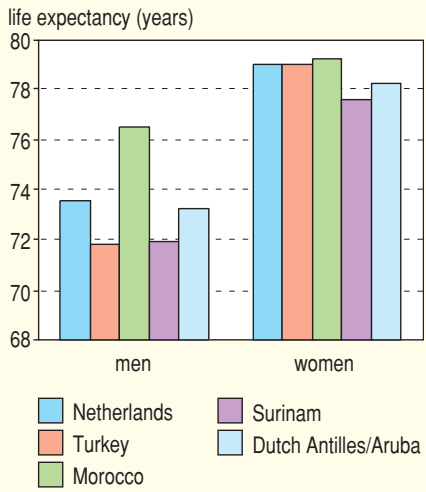


Figure 2.6: Life expectancy among Dutch residents from different countries of origin, in the period from 1995 to 2000 (Source: Statistics Netherlands (CBS) mortality and population statistics).

(continue text block 2.4)

risk of mortality, while Surinamese men up to 75 years of age have a higher expected mortality. In this study, migrants are defined according to their own country of origin and that of both parents; the results thus relate to first- and second-generation migrant groups combined. The data on older individuals (aged 75 years or older) of Turkish, Moroccan, Antillean and Aruban origin should be treated with some caution in view of the small size of these groups. The expected mortalities for migrant groups aged less than 75 years are, however, based on such large populations that conclusions about relative mortality rates can be drawn with confidence.

(Authors: V Bos, JP Mackenbach and AE Kunst from Erasmus MC, University Medical Centre Rotterdam and IM Keij-Deerenberg from Statistics Netherlands Voorburg. Based on unpublished studies.)

2.1.2 Mortality, disease and quality of life

The previous section discussed the (healthy) life expectancy of the population of the Netherlands. This section considers the question of which diseases and disorders are responsible to a significant degree for the years people spend in poor health, on the basis of a variety of health measures (*text block 2.5*). It should be noted that we use the terms diseases and disorders here to refer only to the 53 diseases and disorders selected for PHSF (unless stated otherwise). By identifying which diseases and disorders are chiefly responsible for our 'ill health', we also identify opportunities for prevention and care.

Coronary heart disease, stroke and lung cancer are the major causes of death

The total number of deaths in the Netherlands in 2000 amounted to more than 140,000 people. Cardiovascular diseases and lung problems were the top five major causes of death. Most men die of coronary heart disease (9,900 deaths) and lung cancer (6,300 deaths), and most women of coronary heart disease (7,500 deaths) and stroke (7,200 deaths) (*table 2.3* and *appendix 1*). As well as differences between men and women, there are also differences between the various age groups (*text block 2.6*).

Coronary heart disease, lung cancer and stroke head the list of the major causes of death for both mortality and the number of years of life lost (*text block 2.5*). However, the other diseases and disorders in the top five mortality list are pneumonia and COPD, while those in the top five for the number of years of life lost are breast cancer and suicide (*table 2.3* and *appendix 1*). In comparison with PHSF 1997, pneumonia is a new entrant in the top five major causes of death, replacing chronic heart failure. In the list of diseases and disorders that are responsible for most of the years of life lost, chronic heart failure has been replaced by suicide.

The most common ailments are neck and back problems, hearing impairments and anxiety disorders

It is important to know not only what people die from, but also what they suffer from. The most frequently occurring diseases (prevalence) in the Netherlands according to an *epidemiological population survey* are neck and back problems, hearing impairments

and anxiety disorders (*table 2.3* and *appendix 1*). It is difficult to say whether these are actually the most frequently occurring disorders, because data is not available from the population survey for all 53 diseases and disorders. Data from *care registrations* also show that coronary heart disease, visual impairments, asthma and diabetes mellitus occur very frequently, and they put hearing impairments at the top of the list of frequently occurring diseases for both men and women. For men, coronary heart disease is in second place, whereas for women it is osteo-arthritis. The diseases with the most new cases per year in the Netherlands (incidence) are infections of the upper respiratory tract (including the common cold), domestic accidents, and neck and back problems (*table 2.3* and *appendix 1*).

In order to obtain the most complete picture possible, we used both a variety of care registrations and epidemiological population surveys as sources, recognizing that there is often a discrepancy between these two types of sources.

Much quality of life is lost as a result of mental disorders

The prevalence and incidence figures shed light on the occurrence of diseases and disorders, but they say nothing about their consequences in terms of quality of life. It is important to gain an insight into this aspect because some diseases have far-reaching consequences for people's performance and quality of life, while the consequences of other diseases are less serious. The impact of diseases on quality of life can be measured in years lived with disability (YLD) (*text block 2.5*), which is a measure not only of the number of years spent in disease, but also the severity of the disease or disorder. Disorders such as neck and back problems, hearing impairments and contact eczema do not appear in the top five when severity is taken into account. The main conditions associat-

Table 2.3: The major diseases and disorders in the Netherlands in 2000, according to mortality, years of life lost, prevalence, incidence, loss in quality of life, and disability-adjusted life-years (DALY) (Sources: see text block 2.5). For a more extensive overview of the ranking of diseases and disorders, see appendix 1.

Ranking	Cause of death with most mortality	Largest number lost years of life	Highest prevalence [a]	Highest incidence [b]	Most loss in quality of life	Highest loss of DALYs
1	Coronary heart disease	Coronary heart disease	Neck and back problems	Infections of the upper respiratory tract	Anxiety disorders	Coronary heart disease
2	Stroke	Lung cancer	Hearing disorders	Private accidents	Depression	Anxiety disorders
3	Lung cancer	Stroke	Anxiety disorders	Neck and back problems	Coronary heart disease	Stroke
4	Pneumonia	Breast cancer	Contact eczema	Acute urinary tract infections	Dependence on alcohol	COPD
5	COPD	Suicide	Knee or osteo-arthritis of the hip	Pneumonia and acute bronchi(oli)tis	COPD	Dependence on alcohol

a) ranking based on population surveys.
b) ranking based on care registrations.

Text block 2.5: Different measures of health give different insights

There are different ways of measuring people's health. The ones used in this chapter are summarized below.

Mortality and years of life lost
The most traditional measure of health is *mortality,* i.e. the number of people dying of a particular disease. A second measure, based on mortality statistics, is the number of *years of life lost*; age at the time of death is also taken into account in the calculation of this measure. Years of life lost is thus the number of years an individual dying of a particular complaint still had to live according to his or her life expectancy at that time. Hence, an individual who dies young loses more years of life. Mortality data was derived from Statistics Netherlands' (CBS) mortality statistics.

Prevalence and incidence
The *prevalence* of a particular disease is the number of individuals who have that disease at a particular moment in time (the *point prevalence*) or in a particular period (e.g. the *annual prevalence*). The *incidence* is the number of *new* cases of the disease in question or the number of *new* individuals with this disease in a particular period. Unless otherwise indicated, the point prevalence and the annual incidence are given in this report. Prevalence and incidence data were derived from various sets of primary care records: the *Continue Morbiditeitsregistratie Nijmegen (KUN)* (Nijmegen Continuous Morbidity Registration), the *Continue Morbiditeitsregistratie Peilstations Nederland (Nivel)* (Continuous Morbidity Registration for Sampling Stations in the Netherlands, maintained by Nivel), the *Transitieproject (UvA)* (Transition Project, maintained by the University of Amsterdam), the *Registratienet Huisartspraktijken Limburg (UM)* (Registration Network for Primary Care practices in Limburg, maintained by the University of Limburg, Maastricht), the *Registratie Netwerk Universitaire Huisartspraktijken Leiden en Omstreken (UL)* (Registration Network for University Primary Care practices in Leiden and environment, maintained by the University of Leiden) and the *Tweede Nationale Studie naar ziekten en verrichtingen in de huisartspraktijk* (Nivel/RIVM) (Second Dutch National Survey on General Practice, undertaken jointly by Nivel and RIVM). Use has also been made of records specific to certain diseases such as the *Nederlandse Kankerregistratie (*Dutch Cancer Registration System), records from institutions such as nursing homes, and epidemiological population studies (such as NEMESIS and the ERGO study). For an overview of the sources used per disease, see the *Nationaal Kompas Volksgezondheid* (Dutch National Compass on Public Health: www.nationaalkompas.nl).

Loss of quality of life expressed as years lived with disability
The number of *years lived with disability* is calculated by multiplying the prevalence of the disease in question (or the incidence multiplied by the duration) by a weighting factor indicating the severity of the disease. This weighting factor, which is determined by a panel of experts, permits comparison of the years lived with disability for various diseases and also allows years lived with disability to be compared with years lost by death. If, for example, a disease has a weighting factor of 0.5, this means that a year lived with this disability is regarded as equivalent to six months lost by premature death. Uncertainties still remain, however, about certain aspects of the estimation of years lived with disability. This is particularly true of the relationship between the weighting factor and the prevalence of the disease. It is of crucial importance that the description of the disease for which a weighting factor has been determined agrees with the description of the disease for which the prevalence is known. Mild, highly prevalent diseases are associated with the greatest uncertainties.

DALY combines information on mortality, morbidity and quality of life
The burden of disease for the population as a whole is expressed in DALYs ('Disability-Adjusted Life-Years') - a concept developed by the WHO. The DALY is the sum of the years of life lost and the years lived with disability. It may be noted that the calculation of the DALY is associated with the same limitations as that of the years lived with disability.

ed with a loss in quality of life are mental disorders, coronary heart disease and COPD (*table 2.3* and *appendix 1*). For men, alcohol dependence is at the top, followed by coronary heart disease and anxiety disorders. For women, anxiety disorders, depression and osteo-arthritis occupy the top three.
Different ages have different diseases that lead to a significant loss of quality of life (*text block 2.6*).

The high burden of disease is chiefly attributable to coronary heart disease, anxiety disorders and stroke

Years lived with disability (YLD) therefore say something about both the prevalence and the severity of diseases. DALYs go further by taking account of the fact that some diseases lead to premature mortality (*text block 2.5*). Of the diseases studied here, coronary heart disease, anxiety disorders, stroke and COPD cause the most burden of disease (*table 2.3* and *appendix 1*). The loss of DALYs through coronary heart disease, stroke and COPD arises from a loss of both years of life and quality of life, whereas for anxiety disorders only the loss of quality of life is involved. It may appear strange at first sight that anxiety disorders are responsible for so much loss of health. However, it is significant here that anxiety disorders have a powerful impact on cognitive and emotional performance, and because they therefore affect the more complex and higher human capacities, they are a significant threat to quality of life (Ormel et al., 1994). Furthermore, these disorders occur relatively often. There are some differences in the dis-

Text block 2.6: A closer look at different age groups

Disease and the burden of disease can vary from one age group to another. The main differences between age groups are summarized below.

Mortality

Each age group has characteristic causes of death. In the 0-14 year age group, these are perinatal disorders, congenital abnormalities (in particular of the cardiovascular and nervous systems), domestic and traffic accidents and cancer. In the 15-24 year age group, they are traffic accidents, suicide, cancer (in particular lymphomas, leukaemia and brain cancer), diseases of the nervous system (in particular epilepsy and muscular dystrophy), murder and manslaughter. The main causes of death in the 25-44 year age group are suicide and coronary heart disease, while in the 45-74 year age group they are coronary heart disease, lung cancer, other heart diseases (in particular chronic heart failure and cardiac arrest), stroke, COPD, cancer of the colon and rectum and breast cancer. Additional important causes of death in the 75+ year age group are pneumonia and dementia.

Loss of quality of life

In children (0-14 years), asthma (and COPD), intellectual disability, traffic accidents and respiratory tract infections account for a large part of the years lived with disability (referred to as 'loss of quality of life' from now on). In young people (15-24 years) and young adults (25-44 years), alcohol dependence, depression and anxiety disorders account for more than half of the loss of quality of life. Coronary heart disease, osteo-arthritis and COPD are added to this list in the 45-65 year age group. The elderly tend to suffer somewhat less from mental disorders: loss of quality of life in this age group is largely due to coronary heart disease, osteo-arthritis, visual impairment, stroke and COPD. It may be noted that these results apply to the 53 diseases selected for the PHSF. This means that no cancers that occur especially in children are included in the overall loss of quality of life. The picture would be different if all diseases and complaints would have been taken into consideration.

Burden of disease expressed in DALYs

Eleven percent of the overall burden of disease in the Netherlands is found in children and young people (0-24 years), 45% in adults (25-64 years) and 44% in the elderly (65+ years). The main factors contributing to the burden of disease in children (0-14 years) are injuries due to (traffic) accidents, asthma and COPD, congenital abnormalities and intellectual disability. The relevant factors in young people (15-24 years) and young adults (25-44 years) are depression, anxiety disorders, alcohol dependence and suicide, though traffic accidents also continue to play an important role. The burden of disease above 44 years is mainly due to coronary heart disease, lung cancer and COPD; mental disorders also remain important in this age group, however. The elderly are also affected by stroke, COPD, dementia, osteo-arthritis and diabetes mellitus. As in the case of the loss of quality of life (see above), these data only refer to the 53 diseases selected for the PHSF.

eases responsible for the greatest burden of disease for men and women: in the case of men, the greatest DALY loss is through coronary heart disease, followed by alcohol dependence and COPD, whereas for women, the top three are anxiety disorders, coronary heart disease and depression. For different ages, different diseases are associated with a high burden of disease (*text block 2.6*).

Having a disease and disabilities hinders social participation

Diseases, disorders and impairments have consequences for mortality and quality of life. One of the determinants of quality of life is the degree of participation in social and public activities. In general, people with impairments (involving some combination of hearing, walking and vision) have more participation problems than people with a disease (such as asthma or COPD, a cardiac abnormality or stroke). People with impairments therefore devote less of their leisure time to social contacts and going out. They also take less part in sport and visit cultural or recreational facilities less often, which is a result not only of their poorer state of health, but also of transport problems and the less than perfect accessibility of buildings (SCP reports on the disabled: De Klerk, 2000, 2002). Unfortunately, no information is available concerning the extent to which certain diseases and impairments lead to participation problems. A better understanding of this entire issue is needed (*text block 2.7*).

Text block 2.7: More insight into social participation is desirable

The results concerning social participation are based on reports on the disabled published by the Social and Cultural Planning Office (SCP). The 2000 report dealt with the participation of disabled individuals in the work process and their financial position, while the 2002 report also covers other aspects of social participation such as free time and care. The category 'disabled' includes people with chronic diseases as well as those with physical and mental disability. However, the SCP makes no distinction between the various forms of complaints or impairments. Additional studies are needed to give insight into the extent to which different complaints and impairments contribute to disability. This is particularly important in the interests of effective prevention. Future studies will be able to make use of a new classification of functioning and participation, as described in the International Classification of Functioning, Disability and Health (ICF) published by the WHO (WHO, 2001a). Use of this classification will promote uniformity of terminology in the various studies, and the comparability of their results. A further aim for the future is a better understanding of trends in the field of social participation. An initial analysis of Statistics Netherlands' data yields encouraging results: the social participation of elderly individuals with disabilities has improved over the past decade (Perenboom, 1999).

Chronic diseases and disability give rise to lower labour participation

The labour participation of those suffering from a disease is also lower than that of those who are free of disease, and this is especially true of people with a chronic disorder. Of all 15 to 65-year-olds, 61% work; of the chronically ill, 52% have a paid job of 12 hours or more. The participation is particularly low among those with heart disease, the after-effects of a stroke and musculoskeletal disorders. Conversely, asthma sufferers, for example, work virtually the same hours as those who are free of chronic disease. The associated impairments have an even stronger influence than the nature of the disease itself: of those with physical impairments, 38% work. Those with physical impairments who also work are likely to have a part-time job and a less senior position than disability-

free working people. This diminished participation in the labour process means that people with chronic disorders and/or disabilities have a lower income. In addition, they have higher disease-related expenses. Furthermore, people with a chronic disease or impairment more often draw a social benefit, such as a work incapacity benefit (De Klerk, 2000, 2002; Rijken et al., 2001).

Mental disorders are the major cause of work incapacity among young people

Which diseases and disorders lead most to work incapacity? This can be deduced from work incapacity benefits records, which reveal that in the year 2000 one quarter (25.5%) of current benefits [Work Incapacity Benefits (WAO), Work Incapacity Benefits for Self-Employed Persons (WAZ) and Work Incapacity Benefits for Persons with an Early Handicap (WAJONG); in total 952,000] were paid to people who had been declared unfit for work because of musculoskeletal disorders (*figure 2.7*). One third (33.8%) became unfit for work because of a mental disorder, 5.0% because of cardiovascular diseases and 5.6% because of acute physical injuries. Mental disorders are responsible for more than half of the work incapacity among younger people (up to 35 years of age). Older disabled people more often become unfit to work as a result of musculoskeletal diseases.

The major changes in the pattern of disease

We described in the sections above how often diseases and disorders occur and what the consequences are. However, it is also important to know which diseases and disorders have increased or decreased in incidence, and where changes have occurred in the mortality trends. We derived data on trends from various registrations, such as the Netherlands Tuberculosis Register, the Netherlands Medical Registration System (LMR), the Dutch Cancer Registration System (NKR) and the cause of death statistics of Statistics Netherlands (CBS). As a source of trend data from general practitioner registrations, we

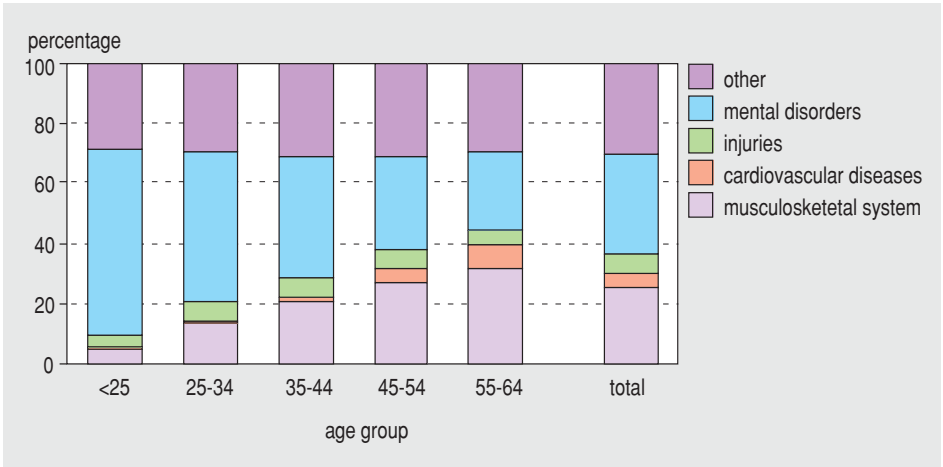


Figure 2.7: Percentage of the total number of disability benefits in the Netherlands according to diagnostic groups and age in 2000 (Source: National Institute for Social Insurance (LISV, 2001).

also used the Nijmegen Continuous Morbidity Registrations, which have been maintained in the same way for some considerable time and cover a large number of diseases and disorders. *Table 2.4* includes the diseases and disorders that have exhibited the greatest changes in the past ten years in terms of an absolute increase or decrease. A number of readily explainable developments in the pattern of disease are given below.

As well as diseases exhibiting large, absolute changes some diseases have increased or decreased sharply in percentage terms, and they are usually the less frequently occurring ones, which tends to mask the changes. Some examples are prostate cancer (60% increase) and basal cell carcinoma (55% increase). Sometimes, marked changes are also visible within certain age groups or for certain diagnoses within a disease group. One example is acute bronchiolitis in children from birth to four years of age (an almost 300% increase in the number of hospital admissions between 1992 and 1999). More information on trends in certain age groups or for specific diagnoses within disease groups can be found in the National Compass on Public Health. The description of the trends also mentions aspects of lifestyle, care and prevention, which are covered in greater detail in *sections 2.2* and *2.3*.

Health problems aggravated by changing behaviour

The increase in health problems in the Netherlands is partly the consequence of changing behaviour, a clear example of which is the increasing *mortality from lung cancer* among women. This trend reflects the developments in smoking habits of women in the 1970s. The same is true of *COPD*, a chronic obstruction of the respiratory tract, and another major cause of death: the fact that women started to smoke more in the past led to a marked increase in the prevalence and mortality figures in the 1990s. This also partly explains the unfavourable trend in the life expectancy of Dutch women in comparison

Table 2.4: Ranking of diseases in the Netherlands on the basis of the largest, statistically significant, changes in the period from 1990 to 2000.[a]

	Prevalence	Incidence	Mortality
Fastest increase	Asthma (m,f) [b]	Cystitis (f)	Pneumonia (m,f)
	Cataract (m,f)	Domestic accidents (m/f)	Lung cancer (f)
	Diabetes mellitus (m)	Depression (f)	COPD (f)
	COPD (f)	Diabetes mellitus (f)	Oesophageal cancer (m)
	Osteoporosis (f)	Anxiety disorders (m,f)	Sepsis (m,f)
Fastest decline	Neck and back problems (m)	Upper respiratory tract infections (m)	Coronary heart disease (m,f)
	Congenital abnormalities cardiovascular system (m/f)	Gastrointestinal tract infections (m)	Lung cancer (m)
	Parkinson's disease (f)	Sports injuries (m/f)	Stroke (m,f)
	Gastric ulcer (f)	Lung cancer (m)	Stomach cancer (m,f)
		Stomach cancer (m,f)	AIDS (m)

a) the results were obtained using linear regression analysis on age-corrected data for the incidence, prevalence and mortality of the 53 disease (groups) selected for PHSF. The diseases with the sharpest rise or fall are at the top.
b) m=men; f=women; m/f=figure only available for the total of men and women.

with other European countries (*figure 2.3*). Another effect of changing behaviour, but in a completely different area, has been the increasing number of *domestic accidents* ('injuries in and around the house'). Domestic accidents are now high in the top five disorders with the highest incidence. The increase is probably attributable to the fact that people have more leisure time, which they use for ever more active pursuits. The number of healthy, active elderly people is also increasing. It goes without saying that besides the undesirable effects mentioned here, physical activity also has many favourable effects on health (see *section 2.2*).

Favourable developments attributable to changes in behaviour and prevention

However, changing behaviour can also lead to positive developments for health. For instance, the incidence of and mortality from *lung cancer* is decreasing rapidly, as a result of the fact that men are smoking less. This decline in mortality started in the early 1980s. The sharp decrease in the number of *sports injuries*, as recorded by hospital emergency departments, is also connected with changes in behaviour. Among the possible explanations are the declining frequency of sport participation (the percentage of those who participate in sports who do so each week) and the growing popularity of individual, unorganized sports such as swimming, cycling and walking, which are associated with a smaller probability of injury than organized team sports.

Furthermore, the number of cases of *mortality from stomach cancer* has been declining for several decades. This is probably connected with the replacement of pickling as a means of preserving food in favour of refrigeration in the second half of the twentieth century, in view of the fact that the previously high salt intake would have increased the chance of stomach cancer. Moreover, *Helicobacter pylori*, a bacterium that is involved in the development of stomach cancer, is becoming less common. Finally, there is also a visible decline in the number of children being born with a *congenital abnormality of the cardiovascular system*. It is plausible that the increasing use of folic acid and, to a smaller extent, prenatal investigation (followed by termination of pregnancy) have also made a contribution. The intake of folic acid prevents not only neural tube defects, but also abnormalities of the cardiovascular system (Cornel et al., 2002).

The declining mortality from major causes of death through improved treatment

Another favourable trend is the declining mortality through improved treatment. For instance, the *mortality from coronary heart disease*, the most significant cause of death in the Netherlands, has decreased sharply. The mortality from myocardial infarction has shown a particularly marked decrease. Alongside a more healthy lifestyle, improved care plays an important role: both the treatment of hypercholesterolemia and high blood pressure, and hospital care have improved. The marked *decrease in mortality from stroke* is also attributable to the above mentioned factors. A striking new development since 1996 is that the number of hospital admissions for the chronic forms of coronary heart disease, such as old myocardial infarction, angina pectoris and chronic heart failure, appear to have stopped increasing. In the past, this increase had existed as a side-

effect of the improved survival rates from myocardial infarction. Finally, the *incidence of and mortality from AIDS* are also declining, which is attributable to a combination of antiviral agents that have been in general use since 1996. As a result, HIV infection leads less frequently or much later to AIDS. The number of HIV infections is probably not decreasing, although no satisfactory registrations are kept. This suspicion is based on the finding that the number of cases of sexually transmitted diseases (STD) increased sharply in 2001 compared with 2000 (Van de Laar et al., 2001).

Some trends reflect changes in diagnostics and demand for care

Certain diseases appear to show a trend, while in reality the increase or decrease must be attributed to changes in diagnostics and demand for care. *Anxiety disorders and depression,* which are common and sometimes major disorders, have been recorded more frequently by general practitioners in recent years. It is unlikely that any 'real' increase (trend) is involved here. Other factors whose relevance is beyond doubt are the improved ability of general practitioners to recognize the disorders, the enhanced therapeutic possibilities and the introduction of standards. Currently, it is often the case that those with mental problems also seek professional help at an earlier stage. The sharp increase in *diabetes mellitus* is also partly attributable to an increased alertness to symptoms on the part of general practitioners and patients themselves. On the other hand, there has been a decrease in the number of hospital admissions for diabetes mellitus. Complications associated with diabetes mellitus apparently occur less often, possibly because of better treatment in primary health care and outpatient clinics. The sharp decrease in the number of recorded *upper respiratory tract infections* (especially the common cold and acute nasal sinusitis) ultimately reflects only a change in the demand for care, and not a true decrease in incidence. The decreasing demand for care is connected with the fact that the costs of certain pharmaceuticals, such as nose drops, have not been covered by insurance since 1994 (Van de Lisdonk et al., 1999).

Mortality from lung cancer in the Netherlands is high in comparison with other EU countries

Besides comparisons based on time, comparisons between countries are also relevant. How does the mortality in the Netherlands compare with that in other countries? For two of the three major causes of death in the Netherlands, the average mortality rate is approximately equal to the European Union average (in the case of heart disease) or below it (in the case of stroke). However, the mortality from lung cancer among Dutch men is the highest in the European Union, especially among elderly men. Indeed, the mortality from lung cancer among Dutch men older than seventy is three to four times as high as among Swedish men of the same age (*figure 2.8*) (Van der Wilk et al., 2001).

In all countries, mortality from lung cancer among women is much lower than it is among men, and it shows marked variation - by a factor of five - within the EU. Danish women have the highest and Spanish and Portuguese women the lowest mortality from lung cancer. The mortality from lung cancer among Dutch women is moving relentlessly towards the highest rate, having already exceeded the EU average. This partly explains the stagnating life expectancy among women in the Netherlands (see also *section 2.1.1*).

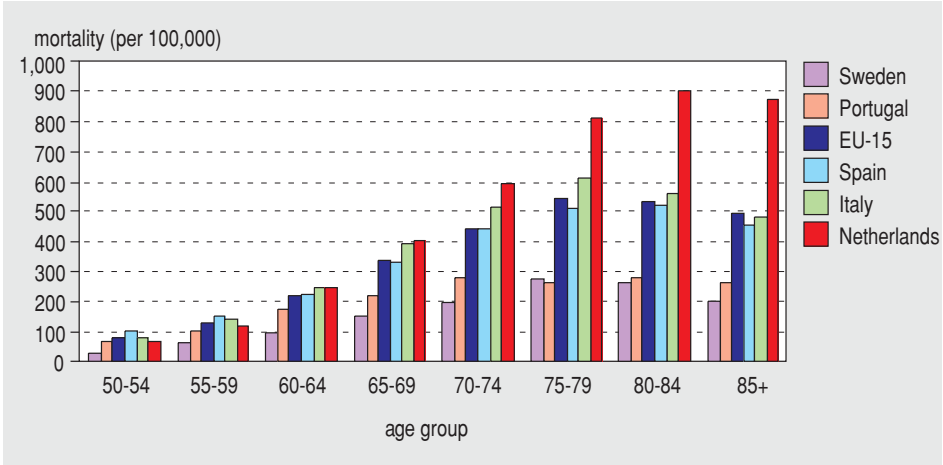


Figure 2.8: Lung cancer mortality for men in 1996; EU average (EU-15) and selected EU countries (Source: Eurostat, New Cronos 2001, data processed by RIVM).

Mortality from breast cancer among Dutch women is relatively high

Breast cancer is a major cause of death among Dutch women. The mortality from breast cancer among Dutch women is one of the highest in the EU. Spanish and Greek women have the lowest mortality from breast cancer. As well as Dutch women, Belgian, Danish, Irish and British women also have a high mortality from breast cancer (*figure 2.9*). The difference between the highest and lowest mortality is almost a factor of two, which suggests that the potential health gain is considerable. However, the related risk factors would need to be better known and accessible for the purpose of prevention. Currently, however, breast cancer screening would appear to be the only way of reducing mortality. A number of countries have recently experienced a stabilization or a slightly declin-

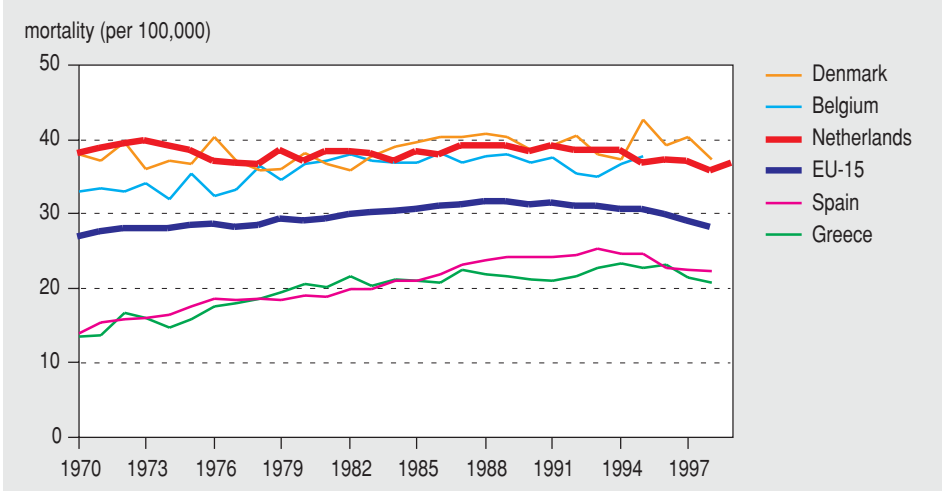


Figure 2.9: Trends in standardised breast cancer mortality over the period 1970-1999, EU average (EU-15) and selected EU countries (Source: WHO-HFA, 2002).

ing trend in mortality from breast cancer, which is attributed to the effects of breast cancer screening. For instance, the recent decline in mortality from breast cancer in Sweden has been most marked in those regions that were the first to introduce breast cancer screening (Persson et al., 2001).

Mortality from traffic accidents in the Netherlands is low, and is continuing to decline

The Netherlands is one of the top three countries in Europe in terms of traffic safety, being bettered only by the United Kingdom and Sweden, which have slightly lower traffic-related mortalities. The traffic-related mortality in France and Belgium is approximately twice as high. The number of traffic fatalities has declined relatively slowly in the Netherlands since 1989, falling by 27% between 1989 and 1998, whereas there were larger decreases in Finland (46%), Sweden (40%) and the United Kingdom (36%) (Eurostat, 2000). The relatively modest decrease in mortality from traffic accidents in the Netherlands is possibly attributable to the numerous traffic safety measures implemented in the years prior to 1985. Some examples of the measures involved are the law against driving while intoxicated, the introduction of speed limits, the mandatory use of seat belts, 30 km/hour zones and the separation of fast and slow traffic categories (motorway building). In other countries, such measures were chiefly undertaken after 1985 (Davidse, 1999).

The burden of chronic disease in the Netherlands is probably relatively low

In addition to mortality rates, incidence and prevalence figures to facilitate international comparisons are also available. However, a summary of international comparative studies on the incidence and prevalence rates of major diseases goes beyond the scope of this report. The international differences per disease are covered in the National Compass on Public Health. In general, the international incidence and prevalence patterns of diseases that are also major causes of death (cardiovascular diseases, stroke, cancer) show the same picture as mortality. There is little or no good, internationally comparable data on diseases that are less often recorded as a cause of death, such as asthma, rheumatoid arthritis and diabetes mellitus. We restrict ourselves here to concluding that the burden of chronic diseases, which occur chiefly at an advanced age, will be relatively low in the Netherlands because of the relatively modest ageing of the population (*text block 2.8*).

Large regional differences in diseases and disorders

As well as international differences, there are also differences between regions, which are of interest because they reflect the differences in the occurrence of health-influencing factors. There are large differences between regions in the occurrence of and the mortality from specific diseases and disorders. However, it is no simple matter to identify a clear general pattern here. Nonetheless, two general aspects can be observed in the regional patterns. In the first place, a number of diseases occur more often in regions where many of the residents have a low socio-economic status (SES). This is the case not only in the major cities (deprived areas) (Van der Lucht & Verkleij, 2001), but also

Text block 2.8: The ageing of the Dutch population has led to compartively little increase in the burden of disease

While the percentage of elderly people in the Netherlands has increased steadily during the past few decades, the degree of ageing of the population is still relatively low compared with that in other countries of the European Union (*figure 2.10*). The percentage of the population aged more than 65 years in the Netherlands (13.5% in 1998) is lower than that in any other EU country with the exception of Ireland. Sweden and Italy show the most ageing of all EU countries (more than 17% aged 65+). Because the prevalence of most chronic diseases is much higher in the 65+ age group than in younger sectors of the population, demographic changes can lead to large differences in the numbers of cases of chronic disease (per 100,000 head of population). This is true of such diseases as rheumatoid arthritis, dementia, COPD, diabetes mellitus, cardiovascular diseases and various forms of cancer. The burden of disease and the cost of care will therefore be strongly determined by demographic trends in all countries in the future (see also *sections 3.2* and *3.5*).

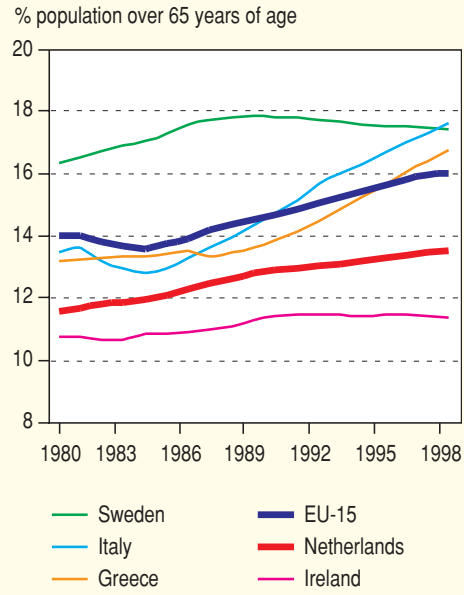


Figure 2.10: Trends in ageing (percentage of population over 65 years of age) in selected EU countries over the period 1980-1998 (Source: WHO-HFA, 2002).

in the northeast of the Netherlands and parts of North-Brabant and Limburg. This pattern could also be observed in the healthy life expectancy per municipal medical and health service region (*figure 2.4*).

A second pattern that can be observed is that the occurrence of and mortality from a given disease is higher or lower in a group of adjacent areas. One example of this effect is the mortality from diseases of the respiratory organs (excluding lung cancer) (*figure 2.11*), which is higher in the east of the country and South-Limburg. We also see a clustering of areas in the number of hospital admissions for chronic heart failure (East-Brabant, Limburg). These patterns cannot be explained entirely by the distribution of SES in the Netherlands. It seems that other factors are also involved here, such as regional differences in socio-cultural factors, environmental factors and aspects of health care (including hospitals' and institutions' admission policies, accessibility and quality).

Not all diseases are equally strongly related to socio-economic status

Many diseases and disorders exhibit a socio-economic gradient. In other words, they occur relatively more frequently among those with a low socio-economic status than among those towards the top of this scale. This is apparent from an investigation into diseases in general practice (Mol et al., 2002). There is a comparable connection between mortality and SES, but it is not the same for each cause of death (Bos et al., 2000; Smits et al., 2001). Extreme socio-economic mortality differences among men are

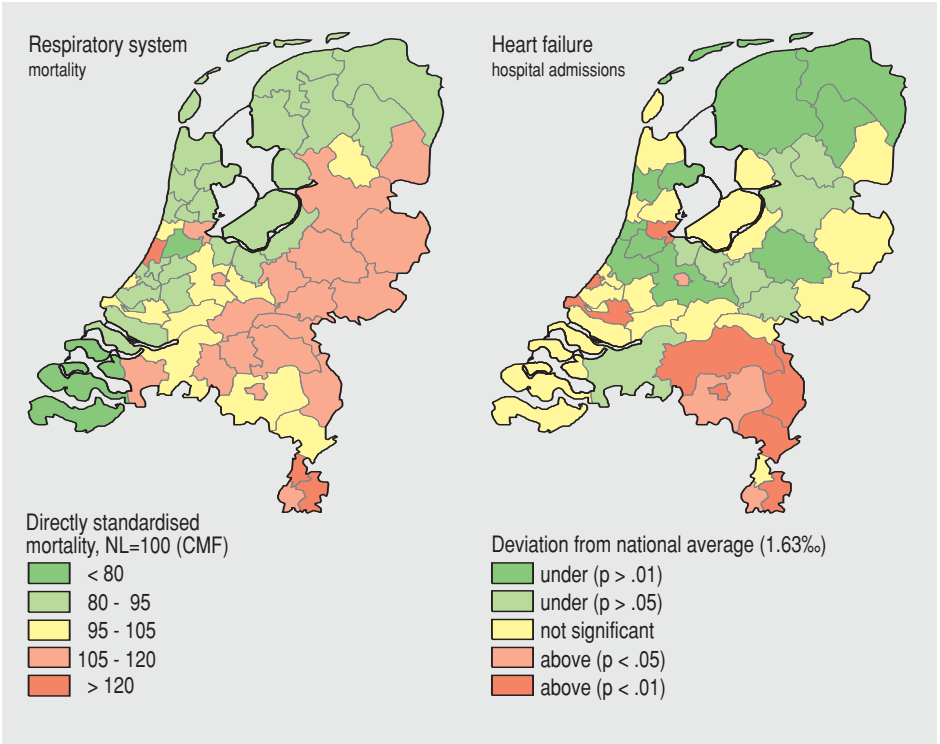


Figure 2.11: Regional distribution of two health indicators in the Netherlands after correction for age and sex (Sources: CBS cause-of-death statistics and LMR; data processed by RIVM).

visible, for example, in diseases of the digestive organs (*figure 2.12*). Among women, there are large differences in mortality from diseases of the blood, haematopoietic organs and immune disorders. Within the neoplasm category, the greatest mortality differences according to SES are for stomach cancer and neoplasms of the trachea and lung. Large mortality differences are also evident in diabetes mellitus, myocardial infarction and chronic heart failure (especially for men) (Smits et al., 2001).

2.1.3 Finally: the provision of information has improved, but is still not as good as it could be

We are dependent on the data available on the state of health of the Dutch population. The Netherlands has a wide variety of registrations, surveys and other, usually one-off, studies that yield data on the health status of the population. The provision of information has improved in a number of respects in recent years, and initiatives have been taken to achieve further improvement. However, a number of significant obstacles remain.

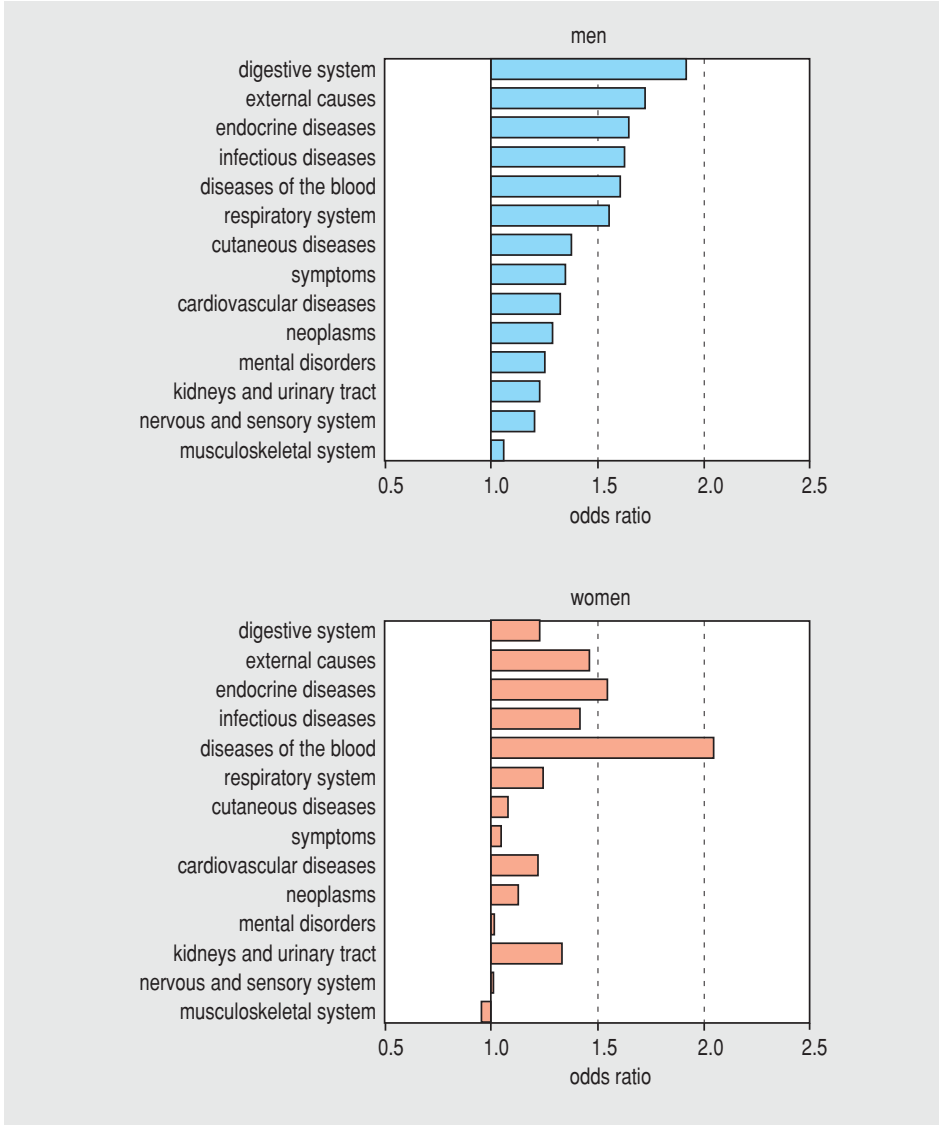


Figure 2.12: Association between socio-economic status in Dutch areas (postal code level) and mortality by ICD-headings. The strength of the association is given as odds ratio's with the highest social status as reference point (Source: Smits et al., 2001).

To start with, data on *health and life expectancy* is based chiefly on Statistics Netherlands (CBS) mortality and health figures, which are obtained from the POLS continuous health and labour survey. The associated problem areas are the low response and the under representation of ethnic minority groups. Furthermore, the survey was modified in 2001, which will give rise to discontinuities in trends. Otherwise, the survey was improved in a number of important respects, including in the area of questions on the quality of life.

Secondly: data on the incidence of *diseases and disorders* was obtained from various epidemiological studies and care registrations, such as the Second Dutch National Survey of General Practice into diseases and interventions. However, one major problem area is that there is still a lack of insight into epidemiological trends. For several diseases (such as neoplasms and a few infectious diseases) national, continuous and valid databases do exist, but for many diseases they do not. This PHSF again makes extensive use of a single set of general practice registrations: the Nijmegen Continuous Morbidity registrations, which are, however, limited in scale and regional in character. In the near future, considerable progress could be made in this area with relatively modest resources, by maintaining and continuing the existing infrastructure (the National Information Network for Primary Health care, LINH), which was expanded (on a one-off basis) for the purpose of the Second Dutch National Survey of General Practice. This will make it possible to establish, within approximately five years, which diseases and disorders have increased or decreased in scale. Furthermore, there is also a lack of data on trends in mental disorders, and on mental disorders among young people and members of ethnic minorities. This situation could be changed by conducting a follow-up to NEMESIS.

Thirdly, the calculation of *years lived with disability (YLD) and disability-adjusted life-years (DALY)* requires information on the severity of diseases or on the distribution of the stages (of severity) within diseases, which is absent in almost all registrations. Ideally, the severity or the quality of life would be recorded as standard for the chronically ill. An alternative would be to link data on quality of life (as a measure of the severity) with data on diseases, and initiatives have already been taken in this direction.

A fourth problem area is that in measuring *regional differences* in health we now have to rely mainly on data on mortality, hospital admissions and self-reported health (POLS health and labour). The Local and National Monitor (an initiative of the Municipal Medical and Health Service in the Netherlands (GGD-Nederland), and the National Institute of Public Health and the Environment (RIVM)) will supply additional, more detailed, information in the future. We are gaining a deeper insight into *socio-economic health differences*. However, it should become so natural to measure socio-economic status in registrations, including mortality registrations, that we gain more insight into the development of the differences in the future. In the meantime, some initiatives have been taken to set up linking projects, in which existing registrations are enriched with SES data on an individual level.

Finally, there is almost no information on the mortality and health of *ethnic minority groups*, and this is especially so for the elderly among ethnic minorities. This information is not recorded systematically anywhere.

Policymakers increasingly stress the value of international benchmarks of health indicators. However, many more improvements are still required in the *availability, the quality and the comparability of international health data* if this is to be achieved, for example by harmonizing databases. Although the WHO, OECD and Eurostat (European

Union) have been active in this area for many years and have achieved a great deal, many countries are still not putting sufficient effort into reporting their data as completely as possible to these organizations.

2.2 What factors determine our health?

Hardly any favourable developments in lifestyle and personal risk factors
The number of Dutch people who smoke, drink too much, take too little exercise and eat unhealthy food, remains disturbingly high. Attributes related to unhealthy behaviour such as overweight and high blood pressure are becoming more frequent. The only favourable development is in the consumption of saturated fats and the associated high total serum cholesterol level. The unfavourable developments generally apply equally to young people. In spite of the focus on this group in recent years in terms of health policy, young people have taken up smoking and drinking and are indulging in unsafe sex at an increasing rate. Furthermore, the number of overweight young people is increasing. In contrast, there are a number of favourable trends that can be observed in lifestyle factors of the elderly.

Like health itself, unhealthy behaviour is also unevenly distributed in the Netherlands
Unhealthy behaviour is more prevalent among groups low on the socio-economic scale, who are more likely to smoke, drink heavily, and have an unhealthy dietary pattern, in addition to taking less exercise than the average Dutch person. Furthermore, more women in low socio-economic groups have taken up smoking in recent years, while in the total population the percentage of female smokers has remained almost unchanged. The picture for ethnic minority groups is much more varied; they eat and drink less than average, but do less well in terms of drug use, safe sex and sporting activities. Finally, there are also regional differences in healthy behaviour, which often, but not always, reflect regional socio-economic differences in the Netherlands.

Within the EU, the Netherlands achieves a poor score in terms of smoking and drinking and a good one in terms of exercise
Compared with the other EU countries, the Netherlands achieves a poor score in terms of smoking and heavy drinking. The Netherlands does do well in terms of exercise. The Netherlands is also among the European countries where serious overweight is somewhat less common, but in terms of moderate overweight, the Netherlands is in the middle bracket. In general, it would appear that differences in lifestyle between EU countries are becoming smaller, which is most clearly visible in dietary patterns and alcohol use.

It is chiefly lifestyle factors that contribute to ill health, but environmental factors are also involved
Smoking is still the major determinant of disease and mortality in the Netherlands and a major cause of the stagnating extension in life expectancy among women. Almost 15% of all deaths are attributable to this cause. However, other lifestyle factors and personal risk factors also make a considerable contribution to mortality, with high blood pressure, serious overweight and too little exercise each adding about 6%. An

unhealthy lifestyle also accounts for much loss of quality of life, especially heavy drinking and smoking, both of which contribute a loss of more than 8%, chiefly through alcohol dependence, stroke and coronary heart disease. Finally, smoking, high blood pressure and serious overweight are important cost items in health care. The costs attributable to lifestyle factors and personal risk factors are between 5% and 9% of the total expenditure on health care.

Approximately 2% to 5% of the total burden of disease in the Netherlands is attributable to environmental factors, especially air pollution, noise nuisance, microbiological food contamination and an unhealthy indoor environment.

From health to determinants of health

Section 2.1 discussed the state of health in the Netherlands. The question that remains is which factors - or determinants - determine our health? How important is a healthy lifestyle compared with factors that play a role in an individual's environment? Are there any differences between population groups and regions in the Netherlands with regard to the incidence of determinants? How do we compare with other EU countries? What contribution do determinants make to health problems and is there anything to be said about the contribution to the cost of health care? In this section we answer all these questions, structured according to the determinant groups from the PHSF conceptual model (see *text block 2.9*). The objective is to gain the best possible insight into the factors that determine our health.

Text block 2.9: The relationships between the various determinants of health

The conceptual model of the PHSF, worked out for the determinants in *figure 2.13*, distinguishes three clusters of factors. The first comprises personal characteristics, including genetic susceptibility to certain diseases and disorders, but also factors acquired in the course of one's life, such as blood pressure and body weight. Psychological characteristics such as self-esteem and inhibitions also belong in this cluster. The factors in this cluster are influenced by the exogenous determinants that form the second cluster. The latter includes factors from the physical and social environment on the one hand and lifestyle factors on the other. The third cluster comprises the health care and prevention system that influences the state of health, with or without interactions with personal characteristics and exogenous determinants.

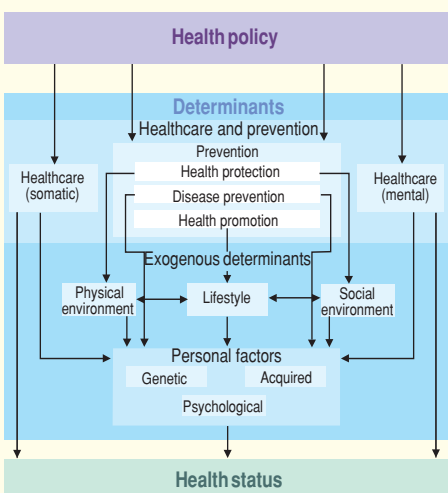


Figure 2.13: Conceptual model for PHSF; elaborated for 'Determinants' (Source: Ruwaard & Kramers, 1997).

Most determinants of health are interrelated, sometimes in a complex way. Here are a couple of examples. The development of overweight is determined both by genetic factors and by the balance between energy intake through the diet and energy consumption as a result of physical activity. The amount of exercise a given individual gets depends among other things on all kinds of environmental factors, such as support from the social environment and whether the individual's work is sedentary in nature. The spending power (socio-economic status) of the household is also

(continue text block 2.9)

of importance, since this determines whether one can afford to participate in sporting activities. In brief, personal characteristics, lifestyle and environmental factors are closely interrelated. The relationship between the various determinants has received increased attention in recent years, especially because this relationship has important implications for prevention (see *text block 2.21*).

2.2.1 We are learning ever more about health determinants

The causes of many diseases and disorders remain unknown. Nonetheless, our knowledge of health determinants is still growing (see *table 2.5*). In recent years, for example, we have learned more about the major factors involved in the development of mental disorders, such as depression. More determinants have also been established for breast cancer. It is also becoming easier to identify the social environmental factors that contribute to the creation of health problems. Future studies will have to identify the specific neighbourhood characteristics or combinations of characteristics that are responsible for the observed health differences between neighbourhoods (see *text block 2.3*). *Table 2.5* shows, moreover, that when diseases develop, a combination of lifestyle factors, personal risk factors and environmental factors is often involved.

Table 2.5 is restricted to a selection of diseases and determinants, based on the diseases and disorders in *table 2.3*. Consequently, a number of diseases and related determinants (such as drug dependence and drug use) are not included in *table 2.5*, because they are not in the top five for incidence, prevalence, mortality and loss of quality of life. For instance, other than urinary tract infections, there is no mention of the consequences of unsafe sexual behaviour, such as sexually transmitted diseases and teenage pregnancies. These lifestyle factors and health consequences are nonetheless covered in this section, in view of the social importance of these determinants and the existing means of prevention. Although certain diseases in turn form a risk factor for the incidence of other diseases, they too are not included in *table 2.5*. For example, diabetes mellitus patients have a greater risk of coronary heart disease, stroke, retinopathy and renal failure, and those suffering from coronary heart disease have an increased risk of stroke.

Much interest in lifestyle factors and related personal risk factors

While the factors that determine our health are largely personal, such as lifestyle and personal risk factors, others are present in the social and physical environment (see *text block 2.9*). We concentrate on lifestyle factors and personal risk factors in this report (and in this section) because these are the determinants on which health policy is able to exercise a direct influence. The task of influencing social and physical environmental factors belongs largely to other departments. In recent decades, however, much progress has been made in promoting a healthy environment, one instance being the introduction of health protection measures in the field of working conditions and environmental factors. Further health gains can still be made, mainly through influencing the behaviour of the population or of subgroups. Besides changes on an individual level (such as changes in knowledge and skills) behavioural change also requires supporting changes to be made in the environment. We deal with this subject in greater detail in *section 2.3*.

Table 2.5: Determinants associated with the development of diseases and disorders with the highest mortality, number of years of life lost, prevalence, incidence and/or loss of quality of life in the Netherlands in 2000 (see table 2.3) (for an elaboration of the associations, see the National Compass on Public Health) (red dots: already known in 1993, black dots: knowledge that has become available since 1993).

	Cardiovascular		Respiratory system			Musculoskeletal system		Mental health				Cancer		Sensory system	Urinary tract	Injuries	Skin
Determinants	Coronary heart disease	Stroke	Upper respiratory infections	Lower respiratory infections	COPD and asthma	Arthrosis	Dorsopathies	Depression	Anxiety disorders	Alcohol dependence	Suicide	Breast cancer	Lung cancer	Hearing impairments	Acute urinary infections	Home and leasure accidents	Contact dermatitis
Lifestyle																	
Smoking	●	●			●							●	●				
Nutrition	●	●										●	●	●			
Breastfeeding												●					
Alcohol use/dependence	●	●					●		●	●	●	●					
Physical activity/fitness	●	●					●										
Sexual behaviour															●		
Cosmetics use																	●
Contraceptive use												●					
Personal risk factors																	
Personality traits	●							●	●	●	●						
Total cholesterol	●																
Blood pressure	●	●															
Body weight		●	●				●						●				
Glucose intolerance	●	●															
Social environment																	
Family problems								●		●	●						
Social relationships			●					●									
Social vulnerability							●	●			●						
(Early) life-events								●	●	●							
Working conditions							●						●	●			●
Workload/stress						●	●	●		●				●			
Work satisfaction							●										
SES	●	●	●	●	●	●	●	●	●		●		●	●	●	●	●
Ethnicity						●											
Household structure								●		●	●						
Degree of urbanization					●			●		●							
Physical environment																	
Sound/noise	●													●			
Housing design/maintenance					●											●	
Chemical factors													●				
Large-scale air pollution					●												
Radiation (radon etc.)													●				
Micro-organisms (incl. viruses)			●	●				●						●	●		

2.2.2 Determinants: variation in time and between groups, regions and countries

Hardly any favourable developments in lifestyle and personal risk factors

Three quarters of the Dutch population eat too much saturated fat and too few vegetables and fruit, on top of which half the Dutch population takes insufficient exercise. Furthermore, approximately one in three of the Dutch population smokes and approximately one in ten indulges in unsafe sex (see *table 2.6*). Hardly any favourable developments have been observed in the *unhealthy behaviour* of the Dutch population in recent years. In general, there has been a continuation or worsening of the situation relative to PHSF 1993 and PHSF 1997. The only exceptions in recent years have been a decrease in the consumption of saturated fat and an increase in breastfeeding (see also *text block 2.14*). The decline in saturated fat consumption is attributable not only to more healthy eating patterns, but also to the efforts of the food industry to replace saturated and trans-saturated fats with unsaturated vegetable fats in many products. *Table 2.6* also shows that men's behaviour is generally less healthy than women's.

The only favourable development in *personal risk factors* is the strong decline (by one half) of the percentage of people with high total cholesterol. In contrast, the growth in the numbers of overweight people is a cause for concern (see *table 2.6*). The percentage of the Dutch population in the 20-60 year age range who are overweight (body mass index ≥ 25) has increased. When the serious overweight (body mass index ≥ 30) are considered, the percentage even almost doubled from approximately 5% in the late 1970s to approximately 9% in recent years (Sources: Morgen, 1995-1997; Regenboog/Doetinchem, 1998 - 2000; data processed by RIVM). Currently, four in every ten women and five in every ten men are overweight (body mass index ≥ 25). The situation regarding the other personal risk factors has hardly changed in recent years. The percentage of those with high blood pressure has increased slightly, but only among men, and the percentage of people with a low level of the protecting HDL cholesterol has remained the same.

There are both favourable and unfavourable developments in environmental factors

As with lifestyle factors and personal risk factors, the picture for the selected *social environmental factors* is largely unfavourable (see *table 2.7*). It would appear, for instance, that in 1997 more than three in every ten workers were regularly exposed to considerable work stress, and the number increased sharply in the second half of the 1990s, stabilizing in 1998. In addition, the existence of feelings of loneliness among large groups in society, including young adults, can be seen as a gentle hint of a deficiency in *social support*. There is a lack of insight into how feelings of loneliness develop in society.

For the selected *environmental factors* (see *table 2.7*), the following developments can be observed. A favourable development is the decrease in air pollution (by 20% to 30% in the past ten years) and industrial noise. The same is true to a smaller extent of traffic

Table 2.6: Lifestyle and personal risk factors in the Netherlands: current situation (reference year) and trends [a] (period).

Determinant	Prevalence		Trend
	Men	Women	
Lifestyle (≥ 12 years, unless stated otherwise)			
Smoking (≥ 15 years) (2000) (current smokers)	37%	29%	Unfavourable, decline stagnating (1980-2000)
Passive smoking at work and/or home (2000)	40%	20%	No information available
Physical inactivity (2001) (moderate activity for half an hour or more less than five days a week)	56%	54%	Constant (1998-2001)
Excessive alcohol use [b] (1997) (three or more glasses a day)	14%	2%	Unfavourable, slight rise among men (1987-1995)
Heavy alcohol use (1997) (six glasses or more at least once a week)	22%	6%	Constant
Teetotallers (1998) (zero glasses of alcohol a day)	19%	45%	No information available
Drug use [c] (2001)			Unfavourable indication: slight rise
• soft drugs: cannabis	17%	17%	(1997-2001)
• hard drugs [d]	5%	5%	
Sexual behaviour (15-35 years; 2001) (condom use with casual partners)			No clear trend
• sometimes	24%	42%	
• never	16%	8%	
Insufficient vegetables (1998) (< 200 grams/day)	78%	80%	Unfavourable, slight rise (1988-1998)
Insufficient fruit (juice) (1998) (< 200 grams/day)	76%	68%	Unfavourable, slight rise (1988-1998)
Too much saturated fat (1998) (> 10 energy per cent)	92%	92%	Favourable, slight rise (1988-1998)
Being breastfed (2000)			Favourable, rise (1996-2000)
• at birth	75%	75%	
• after three months	32%	32%	
Personal risk factors (20-60 years) [e]			
Overweight (1998-2000)			Unfavourable trend (1987-1997)
• total (BMI ≥ 25)	48%	36%	Rise
• moderate (BMI 25-30)	40%	27%	Slight rise
• serious (BMI ≥ 30)	9%	9%	Rise
High total cholesterol (1998-2000) (≥ 6.5 mmol/l)	14%	11%	Favourable, sharp fall (1987-1997)
Reduced HDL cholesterol (1998-2000) (≥ 6.5 mmol/l)	19%	4%	Constant (1987-1997)
High blood pressure (1998-2000) (>160/95 mmHg)	13%	12%	Unfavourable for men, slight rise; constant among women

a) for additional information on the prevalence of the determinants and the sources used, please refer to the National Compass on Public Health.
b) alcohol use per capita: eight litres at 100% (2000), stable since the 1990s. Shift in type of drink: more wine, less spirits; beer consumption unchanged (PGD, 2001).
c) estimates on the basis of surveys in several municipalities with varying urbanization (Abraham et al., 1999).
d) the following hard drugs were considered: cocaine, amphetamines, ecstasy (XTC), hallucinogens (excluding psilocybin mushrooms), heroin.
e) the source of most recent prevalence figures is 'Regenboog/Doetinchem, 1998-2000' and the source of the trend figures is 'Morgen, 1987-1997'; data processed by RIVM.

Table 2.7: Environmental factors in the Netherlands: current situation (reference year) and trends [a] (period).

Environmental factors	Scale of the problem [b]	Trend [b]
Physical environment		
Air pollution (1997) (particulate matter as indicator)	For four out of five residents of the Netherlands the exposure to particulate matter is higher than the standard (140 µg/m^3)	Favourable: average annual concentration of particulate matter has fallen (early 1990s-1997)
Ozone (1997)	Number of days with more than the standard 8-hour average (110 µg/m^3): 18 days	No clear trend
UV radiation(1999)	Risk groups with an exposure two to three times higher than average: patients undergoing UV therapy, sunbed users, outside workers, sunbathers	Unfavourable: UV exposure 6% to 7% up (1980-1999)
Noise from traffic and industry (1998)	Percentage of residents of the Netherlands reporting serious nuisance • road traffic: approximately 27% • air traffic: approximately 13% • industry: approximately 5% It is estimated that 11% of residents of the Netherlands experience serious nuisance from sleep disturbance from traffic and industrial noise	(1987-1998) Almost constant for road traffic Fairly constant for air traffic Favourable: decrease for industry
Noisy neighbours (1998)	Indicators for the percentage of people that are exposed to excessive noise from their neighbours • approximately 22% of residents of the Netherlands report serious nuisance • approximately 7.5% of adults experience serious nuisance through sleep disturbance from noisy neighbours	Nearly constant (1987-1998)
Noise at work (1995)	One in five workers in industry and the building trade is exposed to a noise level that may lead to high frequency hearing damage	No information available
Pop music (1998-2001)	• 2.5% of 25 to 30-year-old men have a 9-10 dB (at 6,000 Hz) hearing loss through exposure to music at concerts/discotheques) • 6.2% of men and women have a 3 dB (at 4,000-6,000 Hz) high frequency hearing damage through exposure to pop music via headphones	No information available
Faecal contamination of fresh swimming water in recreation areas (1995)	The contamination in one in three recreation areas with fresh swimming water is above the gastrointestinal infection increased risk threshold (average concentration higher than 100/100 mL)	Constant (1993-1995)
Fungus, dust mite (1997)	the exposure to fungus/dust mite is relatively high in one in five houses because of problems with damp	Unfavourable: rise
Radon (1998)	Average radon value for the entire housing stock: 23 Bq/m^3	Unfavourable: rise (50% more radon in dwellings in 2000 relative to 1987)

(continue table 2.7)

Environmental factors	Scale of the problem [b]	Trend [b]
Social environment		
Work stress in work environment (2000)	Percentage of employees that are regularly/ usually troubled by: • high rate of work: 40% • high time pressure: 35%	Unfavourable: first rise (until 1997) Then stabilizing (1997-2000), except in the care sector and education
Perceived loneliness (1999)		No information available
- young adults	• 18-24 year old men and women (19 and 34% respectively)	
- adult population	• 27% of adults (≥ 18 years)	

a) for additional information on the prevalence of determinants and the sources used, please refer to the National Compass on Public Health.
b) where possible an indication is given of how many people have been exposed, but most often indicators of exposure are stated (e.g. how many people report serious nuisance, how many locations have a relatively high exposure).

and aircraft noise, which is remarkable, because the most important culprit, traffic, has increased considerably in the same period. On the other hand, an unfavourable development is the increasing pollution of swimming water in recreational areas. The increasing UV radiation as a result of the damaged ozone layer is also forming a health risk, especially for those who are exposed to sunlight relatively often, such as outdoor workers and sunbathers (with two to three times the average UV exposure). For some other environmental factors (see *table 2.7*), the situation is reasonably stable (RIVM, 2002). The increase in the number of houses with damp problems is unfavourable for the indoor climate, because it is associated with a relatively high exposure to fungus and dust mites.

The quality of the urban living and working environment can still cause local problems in connection with the enormous pressure on the limited available space, which has to be shared among transport, industrial, recreational and residential functions. This causes a succession of unfavourable factors such as noise, odour, an unhealthy indoor climate, and particularly an increased risk of disasters involving hazardous substances, explosions, or road, rail and aircraft accidents (computed, or perceived by the public).

An increasing number of young people are indulging in unhealthy behaviour

The previous sections presented the determinants for the total population. However, considerable differences in determinants exist between population groups. For instance, there is still much *unhealthy behaviour*, particularly among young people, in spite of the attention devoted to this group in recent years. This is true, among other things, of smoking (44% of 15 to 19 year-olds), the consumption of five or more glasses of alcohol the last time they went out (39% of secondary school students) and unsafe sex (6%-9% of secondary school students). Otherwise, there has been an unfavourable trend in almost all lifestyle factors in the past ten years, with the use of cannabis, for example, increasing by approximately 30%. The increase occurred mainly in the early 1990s, with a stabilization appearing to set in during the second part of the 1990s (see *table*

2.8). From an international viewpoint too, the picture of Dutch young people is unfavourable. The Netherlands occupies sixth position within the EU, with 36% of 15 and 16-year-olds smoking. The highest prevalence of smoking in this age group is in France (44%). In the United States, conversely, the percentage of young people of this age who smoke is 'only' 17% (Hibell et al., 2000). In the 1990s, smoking increased among young Europeans (Joossens, 1999). Dutch young people also stand out in alcohol use. The percentage of 15 and 16-year-old school students who had consumed alcohol ten times or more in the previous month is higher in the Netherlands than in other European countries (Hibell et al., 2000). As well as unfavourable developments in healthy behaviour, more young people are becoming overweight (*text block 2.10*).

The elderly provide good news about healthy behaviour

Unlike young people, behaviour among *the elderly* is actually more favourable in some respects than that of the total Dutch population, with the exception of physical exercise

Text block 2.10: Overweight in young people

An increasing number of young people in the age range from 3 to 21 years are suffering from overweight (body mass index ≥ 25) (Cole & Roede, 1999; Fredriks et al., 2000b). Overweight children are often stigmatized and are thus also often plagued by social problems. Moreover, individuals who were overweight as children are often overweight as adults too (Kemper et al., 1999). These adults are subject to an increased risk of diabetes mellitus and cardiovascular disease. There are further indications that the duration of the overweight represents an additional risk e.g. of developing type-2 diabetes mellitus. As a result, overweight children may be subject to an increased risk of developing this disease.

In 1997, the percentage of overweight children in the Netherlands varies between 7 and 16%, depending on age. The prevalence of severe overweight (body mass index ≥ 30) varied between 0.5 and 1.6% in boys and between 0.7 and 2.7% in girls (*figure 2.14*). The frequency of overweight also varied strongly from one ethnic group to another. Children of Turkish and Moroccan origin have been found to be overweight more often than children of Dutch origin (Brugman et al., 1995a). The problem of overweight in children is also becoming more serious in other European countries, such as the United Kingdom (Rudolf et al., 2001). Overweight in children is assuming epidemic proportions in America, where it has led to an increase in the number of new cases of type-2 diabetes mellitus in children (Sinha et al., 2002). There is reasonable consensus about the important role played by good eating habits and exercise in the prevention of overweight. Energy intake must be adapted to match energy consumption or vice versa, or a combination of these two measures must be adopted. This must be taken into account in advisory campaigns aimed at preventing overweight

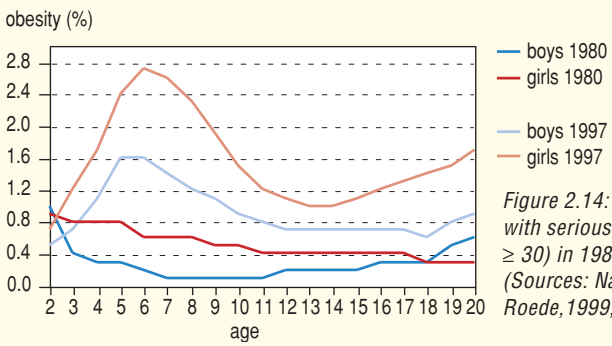


Figure 2.14: Percentage young Dutch people with serious overweight (body mass index ≥ 30) in 1980 and 1997 by sex and age (Sources: National Growth Studies (Cole & Roede,1999; Fredriks et al., 2000a, b)).

Table 2.8: The current situation in healthy behaviour among four specific groups in the Netherlands (in comparison with the general population) and the trend in this behaviour in the past decade [a] (Source: Jansen et al., 2002).

Determinant	Young people	The elderly	Low SES	Ethnic minorities
Smoking				
Current	Somewhat more favourable	More favourable	Much less favourable	More favourable [b]
Trend	Unfavourable	No change	Men: favourable Women: unfavourable	Unknown
Low vegetable and fruit consumption				
Current	Somewhat less favourable	More favourable	Less favourable	More favourable
Trend	Unfavourable	Favourable/ unfavourable [d]	Unknown	Unknown
High (saturated) fat intake				
Current	Somewhat more favourable	Somewhat less favourable	Less favourable	More favourable
Trend	Favourable	Favourable	Unknown	Unknown
Physical inactivity				
Current	More favourable	Less favourable	Less favourable	Less favourable
Trend	No change	Favourable	No change	Unfavourable [c]
Excessive alcohol use				
Current	Somewhat more favourable	More favourable	Unchanged	More favourable
Trend	Very unfavourable	No change	Unfavourable	Unknown
Drug use				
Current	Much less favourable		Unknown	Unknown
Trend	Unfavourable		Unknown	Unknown
Unsafe sex				
Current	Less favourable		Less favourable	Less favourable
Trend	Unfavourable		Unknown	Unknown

a) when the current situation is judged to be more favourable, this is in comparison with the general population. Nonetheless, there could still be an element of an undesirably high level of unhealthy behaviour.
b) varies from one ethnic group to another (sometimes actually less favourable than the total population).
c) based on data on participation in sport.
d) vegetables favourable trend, fruit unfavourable trend.

and the intake of (saturated) fat (see *table 2.8*). Furthermore, the behaviour of the elderly has become more healthy in the past ten years.

Conversely, the incidence of overweight, high total cholesterol and high blood pressure is less favourable among the elderly, partly as a consequence of their more advanced age. The incidence of overweight and high total cholesterol increases in line with age until about age 60 for men and 70 for women, after which the percentages decrease, although they remain substantial: approximately 52% of men above 60 and 40% of women above 70 are overweight and 15% of men and 27% of women have high total cholesterol. The incidence of high blood pressure rises (sharply) with age up to approximately 45% for 60 to 70-year-old men and women and approximately 58% for those above 70 (Sources: Regenboog and Doetinchem, 1998-2000; data processed by RIVM).

Finally, the elderly have an unfavourable score for one of the *social environmental factors*, namely 'social support', measured on the basis of self-experienced loneliness, which suggests a lack of social support. Approximately one in three elderly men and one in two elderly women say they have occasionally felt lonely or abandoned, compared with one in four adults of 18 years and over (Source: POLS health and labour, 1999; data processed by RIVM).

Lower socio-economic groups achieve a poorer score on major health determinants

We saw in *section 2.1* that people with a low socio-economic status (SES) have a poorer state of health. We observe the same picture for health determinants: people with a low socio-economic status (mostly measured according to educational level) exhibit unhealthy behaviour the most frequently (Jansen et al., 2002). For instance, almost half of all men in the lowest SES group smoke (compared with 37% in the total male population) and the percentage of this group that drink heavily is approximately 14%, compared with 9% in the highest SES group. A number of other lifestyle factors are also less favourable among the lowest SES group: physical inactivity and the intake of saturated fat. Accordingly, those with a low SES more often have an unfavourable score for several lifestyle factors simultaneously.

Furthermore, serious overweight and a low level of protective HDL cholesterol occur approximately twice as often among those with a low SES than in those at the upper end of this scale (Sources: Regenboog and Doetinchem, 1998-2000; data processed by RIVM). Finally, from 1995 to 1997, high blood pressure occurred more often in the low SES class (11.5%) than in the intermediate (5.8%) and high classes (4.3%).

Growing inequality in health determinants between socio-economic groups

Trend data for the lower SES groups exist only for smoking, excessive alcohol use and overweight. While the percentage of smokers in the total population has remained the same or has declined slightly in the past ten years, during the second half of the 1990s in particular there was an increase in the prevalence of smoking among women in the lower SES groups. This increase led to greater socio-economic differences in smoking behaviour among women. Conversely, the socio-economic differences in excessive alcohol use have become smaller in recent years, although this is based on an unfavourable development. The fact is that, over the past ten years, there has been hardly any change in the incidence of excessive alcohol use in the low SES group (Koning-Dalstra et al., 2000), whereas it has actually risen in the higher SES groups.

The situation with regard to overweight in the low SES group is also unfavourable. The rising trend in serious overweight is especially pronounced for men with a low SES. According to recent data for the period from 1998 to 2000, the SES difference in high blood pressure appears to be declining (Van Leest et al., 2002).

The picture among members of ethnic minorities is variable

The picture of the risk factors among members of ethnic minorities is clearly different on a number of points from that of indigenous Dutch people. Some *lifestyle factors* are more favourable for the members of ethnic minorities (nutrition, smoking, excessive alcohol use) while others are less favourable (drug use, safe sex, participation in sport) relative to people of indigenous origin (see *table 2.8* and *text block 2.11*). There are also significant differences between different ethnic groups. An accumulation of unhealthy living habits is especially common among Turkish men over 35 years of age. On the

Text block 2.11: Unsafe sex: consequences for health and trends

Health consequences of unsafe sex

Sexual behaviour can influence health in a number of ways. Here we will only consider the adverse effects of unsafe sex. Unprotected sexual contact (intercourse without a condom) increases the risk of urinary tract infections and sexually transmitted diseases (STD). Moreover, unprotected sexual contact without any other form of contraception increases the risk of unwanted pregnancies.

It has recently been found that STD is once again on the increase in the Netherlands. The number of cases diagnosed by municipal medical and health services and two outpatient clinics in 2001 was up by about a fifth compared with 2000 (Van de Laar et al., 2002). This disturbing development indicates a rise in unsafe sex.

The numbers of teenage pregnancies and abortions provide an indication of the number of *unwanted pregnancies*. Since it is more generally acceptable in some cultures to get married and have children young, however, the number of teenage pregnancies might lead to overestimation of the number of unwanted pregnancies. The number of abortions, on the other hand, leads to underestimation of this variable since not all unwanted pregnancies lead to abortion. Both the number of teenage pregnancies and the number of abortions in the Netherlands have risen in recent years. The number of teenage mothers has risen from somewhat more than 2,500 in the mid-nineties to 3,300 in 2000, of which 73% were unmarried. The number of abortions per thousand women of child-bearing age was 5.2 in 1990, and had risen to 8.0 by 2000. The abortion rate among women from ethnic minorities is from three to ten times higher, depending on the country of origin, than that among women of Dutch origin. The figure is highest among Antillean women, viz. 86.8. The main reason for these trends is that the group at greatest risk of unwanted pregnancies and abortions in the Netherlands, viz. teenagers and adult women from ethnic minorities, is increasing (Garssen & Sprangers, 2001).

Despite the above-mentioned unfavourable developments, the abortion rate in the Netherlands is still low compared with other countries. The figures in Germany and Belgium are comparable, but in the rest of Western Europe and America the abortion rate is two to three times higher (Rademakers, 2002).

Trends in sexual behaviour

The above-mentioned increase in the number of teenage mothers and abortions indicates less effective use of contraceptives. This indication is underlined by the drop in the number of sterilizations and the growing number of women who are not using any form of contraception (Rademakers, 2002). NISSO (the Dutch Institute for Social Sexological Research) has been studying safe sex and condom use in the 15-35-year age group in the Netherlands since 1987. Within this age group, the percentage of individuals with varying partners who always use condoms was lower in 2001 than in previous years (Bakker & Sandfort, 2001). The results of measurements in the coming years will show whether this is a temporary phenomenon or the start of a new trend. Contraceptive behaviour (use of condoms) within a steady relationship remained relatively constant between 1998 and 2001. Positive trends are observed in the knowledge about safe sex and STD, the attitude towards condoms and towards the undertaking of activities to avoid infection with the AIDS virus.

Research on a younger age group (school pupils aged between 12 and 18) showed, however, that their knowledge of AIDS and STD had not changed much between 1990 and 1995. Although their willingness to use condoms had increased, these young people did not actually use them in certain situations. As a result, the percentage of school pupils practising unsafe sex increased (Brugman et al., 1995b).

other hand, Moroccan women have a relatively healthy lifestyle (Dijkshoorn et al., 2001).

Regarding *personal risk factors*, there are indications that members of ethnic minorities have favourable scores on high total cholesterol, but unfavourable ones on high blood pressure and overweight. According to a survey of mainly self-reported data, Turkish people above 35 years of age are relatively frequently overweight and Turkish men are also more likely to have high blood pressure than indigenous people of the same age. There were also many overweight Moroccans, especially women. The overweight percentage increases with age, rising for Moroccan women to approximately 90%. Moroccan men likewise had high blood pressure relatively commonly. Surinamese and Antilleans were likewise overweight and had high blood pressure more often than indigenous Dutch people, here too especially among women (Van Leest et al., 2002).

Regional differences in the incidence of determinants

Healthy and unhealthy ways of living are not uniformly distributed in the Netherlands. For instance, the percentage of smokers (corrected for age and sex) per region varies from 27% to 41% (see *text block 2.12*). With the exception of Groningen, the southern part of South-Limburg and Eindhoven, the percentage of smokers has increased, especially in the major cities. This spread is in line with the distribution of socio-economic status in the Netherlands (see also *section 2.1.1*: regional differences in healthy life expectancy). A greater proportion of people with a low socio-economic status live in the major cities and in the northeast of the Netherlands than elsewhere, which may explain the higher percentages of smokers. However, this overrepresentation of low socio-economic groups in a region has not led as a matter of course to more unhealthy behaviour

Text block 2.12: More smokers in big cities

The percentage of smokers is above average (35%) in the four big cities (Amsterdam, Rotterdam, The Hague and Utrecht) (see *figure 2.15*). There are also more smokers in Groningen, Eindhoven and southern South-Limburg. Of these regions, southern South-Limburg has the highest percentage of smokers (41.4%). The regions with a lower percentage of smokers are situated mainly in the middle and the (south-)west of the country. There is also an area in the provinces of Drenthe and Limburg where fewer smokers are found. The lowest percentage of smokers (26.8%) is found in the Midden-Holland region.

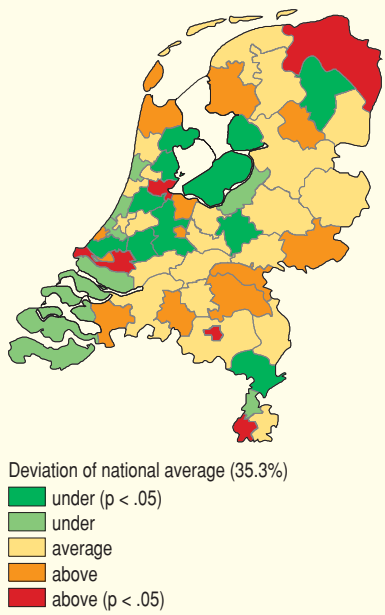


Figure 2.15: Smoking: percentage of the Dutch population (16 years and older) that smoke in the period 1995-1999, corrected for age and sex by GGD-region (Source: CBS-POLS, data processed by RIVM)

Text block 2.13: More overweight people reported in the northeast and south

More men appear to be overweight in Rijnmond, Den Bosch and South-East Drenthe

Forty-three percent of men in the Netherlands are overweight (body mass index of 25 or higher), according to their own report. There are marked regional differences in the reported male overweight percentages (see *figure 2.16*). South-East Drenthe (56%), Den Bosch (51%) and Rijnmond (48%) score higher than the national average while the regions around Arnhem, Amsterdam and West-Friesland have the lowest values, ranging from 32 to 38%.

More women overweight in Drenthe and Groningen

Thirty-sex percent of Dutch women are overweight (body mass index of 25 or higher), according to their own report. Just as in the case of Dutch men, there are clear regional variations in the reported figures (see *figure 2.16*). Values above the national average are found in Drenthe (47%) and Groningen (41%), while the lowest percentages are reported in Leiden (28%) and in Eindhoven and the North-West of the Veluwe region (both 29%).

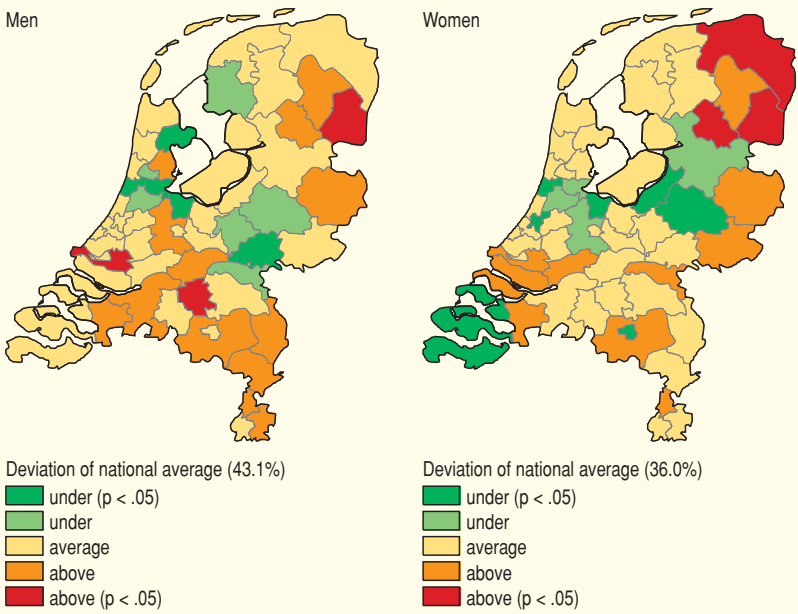


Figure 2.16: Percentage of the Dutch population older than 20 that report overweight a in the period 1995-1999, corrected for age and sex by GGD-region (Source: CBS-POLS, data processed by RIVM)

a) estimate probably too low, as people are inclined to underestimate their weight

or unhealthy personal risk factors. For example, although the percentage of people who consider themselves to be overweight is higher than average in the northeast of the Netherlands, the same does not apply in the major cities.

International comparisons are possible for a number of determinants

It was possible to make international comparisons for a number of lifestyle factors and personal risk factors using data from projects including MONICA. The percentages of people with unhealthy behaviour or having an unfavourable risk factor are based on data from several regions within the countries concerned. A comparison was made for three lifestyle factors (smoking, excessive alcohol use, physical inactivity) and three personal risk factors (high blood pressure, high total cholesterol, serious overweight) (see *figure*

2.17). Use was made predominantly of the prevalence figures for 35 to 65-year-old adults from various EU countries, and where possible also from Norway, Iceland and Switzerland. A wider age range was used only for excessive alcohol use and physical inactivity (18 to 64 years and 15 years and over, respectively).

Figure 2.17 presents spider graphs on how the Netherlands 'behaves' in comparison with the European average and the most extreme risk profiles in Europe. The outermost ring of the graph contains the countries with the most unfavourable prevalence for the determinant concerned. The further away from 0, the more unfavourable the situation. The innermost ring contains the countries with the most favourable level. The table below indicates which countries are associated with the points in the graph. The average was set at one and is referred to as the 'European *pool*'. This *pool* is determined by the countries for which reliable data is available for the determinant concerned.

Within Europe, the Netherlands achieves a poor score for smoking and drinking and a good one for exercise

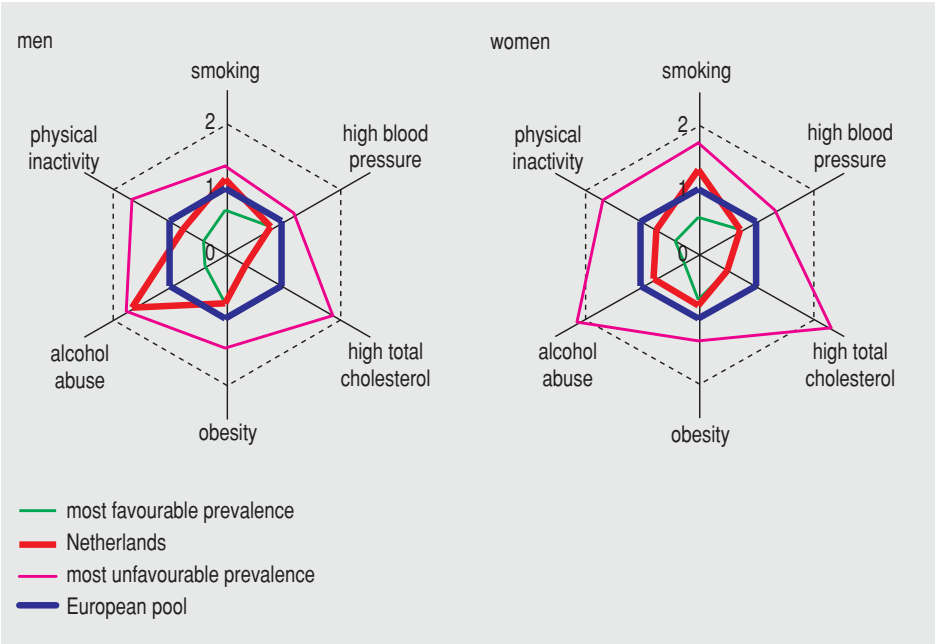
Compared with other countries in Europe, the prevalence of *smoking* in the Netherlands stands out unfavourably, with the Netherlands occupying fourth place in Europe. The difference between men and women, which has existed for some considerable time, is continuing to decline. The percentage of smokers among women is in Norway and Sweden even higher than among men (WHO-HFA, 2000). Women in the Netherlands are also well on their way to 'overtaking' the men. The fact that Dutch women have caught up with Dutch men in smoking through the 1970s and 1980s has clear consequences for developments in their life expectancy (see *section 2.1*).

Besides smoking, the Netherlands also achieves an unfavourable score for *excessive alcohol use* among men. Ten percent of Dutch men drink six or more glasses of alcohol a day, which brings them close to the prevalence among English men (14%), who are the front runners compared with men in Finland, France, Germany, Sweden and Switzerland (the ECAS countries). English women also have the highest score in these countries with four or more glasses of alcohol a day. Among Dutch women, only 1% drink more than four glasses a day, compared with 6% of women in the United Kingdom. Alcohol consumption has been declining since the 1990s in almost all of Europe. Only the United Kingdom and Ireland still show a clear upward trend (WHO-HFA, 2002). It can be stated in general that the drinking patterns of the various European countries are starting to converge in terms of per capita consumption and in terms of preference for beer, wine or sprits.

In contrast to the unfavourable picture for smoking and excessive alcohol use, the Netherlands actually compares positively with other European countries in terms of *physical activity*. Thirty-eight percent of the Dutch population engages in physical activity for more than five hours a week. The only countries with a higher percentage are Sweden, Austria and Finland.

Food patterns within Europe are converging

The graphs of *figure 2.17* do not include the food patterns in the various European countries. One major reason for this is that there are too few good sources for a broad international comparison to be made of consumption data for the total population. Nevertheless, estimates have been made on the basis of production, import and export figures of foodstuffs and some nutrients (excluding saturated fat). This trade data shows that vegetable and fruit consumption and fibre intake have increased in Southern Europe in the past twenty years, whereas fat intake, which was traditionally low, has increased. The



Men	Cut-off point	Most favourable	Least favourable
Smoking	current smokers	Sweden	Belgium
High blood pressure	systolic BP ≥ 120 mmHg	Denmark	Finland
High total cholesterol	≥ 7.8 mmol/l	Netherlands	Luxembourg
Serious overweight	≥ 30 kg/m2	Netherlands	Finland
Alcohol abuse	men: ≥ 4 glasses/day	Sweden	United Kingdom
Physical inactivity	0 hours per week active	Finland	Belgium
Women	**Cut-off point**	**Most favourable**	**Least favourable**
Smoking	current smokers	Finland	Denmark
High blood pressure	systolic BP ≥ 120 mmHg	Netherlands	Finland
High total cholesterol	≥ 7.8 mmol/l	Netherlands	Luxembourg
Serious overweight	≥ 30 kg/m2	Denmark	Finland
Alcohol abuse	women: ≥ 2 glasses/day	Sweden	United Kingdom
Physical inactivity	0 hours per week active	Finland	Belgium

Figure 2.17: Position of the Netherlands in Europe for a number of lifestyle determinants and personal risk factors. Relatively to the European average, Europe =1.

largest rise can be seen in France. Conversely, fat intake has decreased in Northern and Western European countries. International comparisons of food consumption among the elderly in general (Moreiras et al., 1996; De Groot et al., 1991) and among elderly men in particular (Kromhout et al., 2000) would suggest that this is possibly also true of the intake of saturated fat, with the consequence that the dietary patterns within Europe, which historically were highly varied, are starting to converge. A specific aspect of nutrition which still exhibits large international differences is the percentage of exclusively breastfed infants (see *text block 2.14*). The Netherlands is one of a group of countries in which relatively few infants are breastfed.

Text block 2.14: International comparison of breastfeeding practice

Breastfeeding protects both mother and child against various diseases

Breastfeeding protects the mother against breast cancer and possibly also against ovarian cancer and osteoporosis-related fractures. Moreover, babies who are breastfed run less risk of acute middle-ear infections, deficits in cognitive development and allergies. The strength of the latter relationship is currently under review, since some recent studies (Malcolm et al., 2002) found no clear correlation. These babies may also run less risk of food allergies, coeliac disease, infectious and inflammatory diseases, cot death, autoimmune diseases and diabetes mellitus. Opinions in the literature are divided about a number of protective effects in the medium term (e.g. against overweight) and the long term (e.g. against cardiovascular diseases) (Thijs & Anten-Kools, 2002).

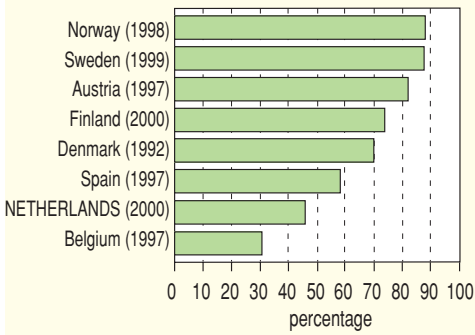


Figure 2.18: Percentage of newborn babies being breastfed at 3 months (both solely breastfed and in combination with bottle-feeding) in selected European countries (Source: WHO-HFA, 2002).

The percentage of Dutch babies receiving mother's milk rose sharply during the nineties. Seventy-five percent of Dutch mothers breastfed their child immediately after birth in 2000, as compared with 70% in 1996. About 32% were still exclusively breastfeeding three months later. Five years before, the comparable figure was only 17% (Burgmeijer & Reijneveld, 2001; Lanting et al., 2002).

Despite the health benefits involved, the Netherlands is low on the EU league table for breastfeeding

The Netherlands still lags behind other European countries as far as breastfeeding is concerned, despite the health benefits and despite the fact that more and more Dutch mothers are breastfeeding their babies for ever longer periods of time (SZB, 2002). The Scandinavian countries in particular, which are generally comparable with the Netherlands as regards health status and health care, score appreciably higher in both frequency and duration of breastfeeding. In 1992, no fewer than 92% of 3-month-old Norwegian babies were exclusively breastfed as compared with 32% in the Netherlands (SZB, 2002).

In Europe a number of factors influence the decision as to whether to breastfeed or not. Many of these factors are interrelated. For example, a NIPO survey revealed that 84% of Dutch women who had received a higher education breastfed their newborn babies as compared with 52% in the group of women with a lower educational level. A similar effect has been reported in other Western European countries, such as Great Britain (Department of Health, 2001). It has also been found that single mothers and younger mothers in European countries are less likely to breastfeed (Eurodiet, 2000).

The Netherlands belongs to a group of European countries which have relatively few seriously overweight people

Although serious overweight in the Netherlands is becoming increasingly common, the Netherlands, together with the Scandinavian countries, still appears to belong to the group of European countries that have a relatively low percentage of seriously overweight individuals (see *figure 2.17*). For instance, a relatively low percentage was found in the Netherlands (12% among men and 13% among women), just as for the 35 to 65-year-old residents of selected regions of Denmark (13% among men) and Sweden (12% among women). Relatively high percentages were actually found for Finnish men (23%), German men (19%) and for Finnish and Spanish women (both 27%). Otherwise, the Netherlands is not one of the most favourable countries in terms of moderate overweight (body mass index (BMI) 25-30), but is in the average band.

In addition, the Netherlands is one of the more favourable countries in terms of the prevalence of high total cholesterol. Fewer than 5% of the Dutch population from 35 to 65 years of age have a total cholesterol percentage above 7.8 mmol/l, which puts the Netherlands at the same level as Italy and France for total cholesterol. The Netherlands also fares relatively well with respect to high blood pressure, with a significantly lower prevalence than in countries such as Finland, Germany and Italy.

Data from MONICA and other studies was used for the international comparison in this section (see *appendix 2*). This data is based on a few selected regions within a country and therefore gives no more than a general indication of the overall picture of the international differences.

2.2.3 Contribution of determinants to burden of disease and cost of health care

Lifestyle makes a significant contribution to mortality

One way of making the significance of a healthy lifestyle visible is by calculating how much loss of health can be ascribed to unhealthy behaviour. This can be done using Population Attributable Risk (PAR). The PAR is based on the prevalence of the determinant in the population and a measure of the strength of the connection between the determinant and the disease, usually the relative risk.

PAR calculations reveal the following. More than 140,000 people died in the Netherlands in 2000, of which almost 15% (21,000 people) died from a smoking-related disorder (see *table 2.9*). Lung cancer is one of the major causes, but coronary heart disease, COPD and stroke make a very significant contribution as well (see *figure 2.19*). It is striking that the number of deaths through smoking and alcohol among men is more than twice as high as among women.

In addition, other lifestyle factors contribute to mortality, including physical inactivity and an unhealthy diet. Much mortality, including from colon cancer and coronary heart

disease, can be prevented by promoting a healthy lifestyle. It is difficult to put a precise figure on the reduction in disease and mortality involved because of the uncertainty concerning the degree to which some determinants protect or promote health. A cautious estimate is that a dietary pattern characterized by sufficient vegetables and fruit (according to the 'Good Nutrition' guidelines) yields a reduction of 3,000 deaths from neoplasms and more than 5,000 deaths from coronary heart disease (Klerk et al., 1998).

In comparison with PHSF-1997, there are a number of differences in the contribution of determinants to mortality, which are chiefly attributable to differences in the calculations and only to a limited extent to changes in the prevalence of the risk factor. The new calculations use age-dependent relative risks (RRs) for smoking, high blood pressure and high total cholesterol. As a result, the calculations now produce lower values for these factors than was the case in the past. Different, more realistic, cut-off points have been used for excessive alcohol use, excessive saturated fat and too few vegetables and fruit (see *appendix 2*). Furthermore, for overweight, additional RRs of three diseases deemed to have a sufficiently well-established connection with overweight have been included. Additional RRs have also been included for vegetable and fruit consumption for certain forms of neoplasms. Otherwise, there is no complete consensus on the latter RRs (Van Leer et al., 1999).

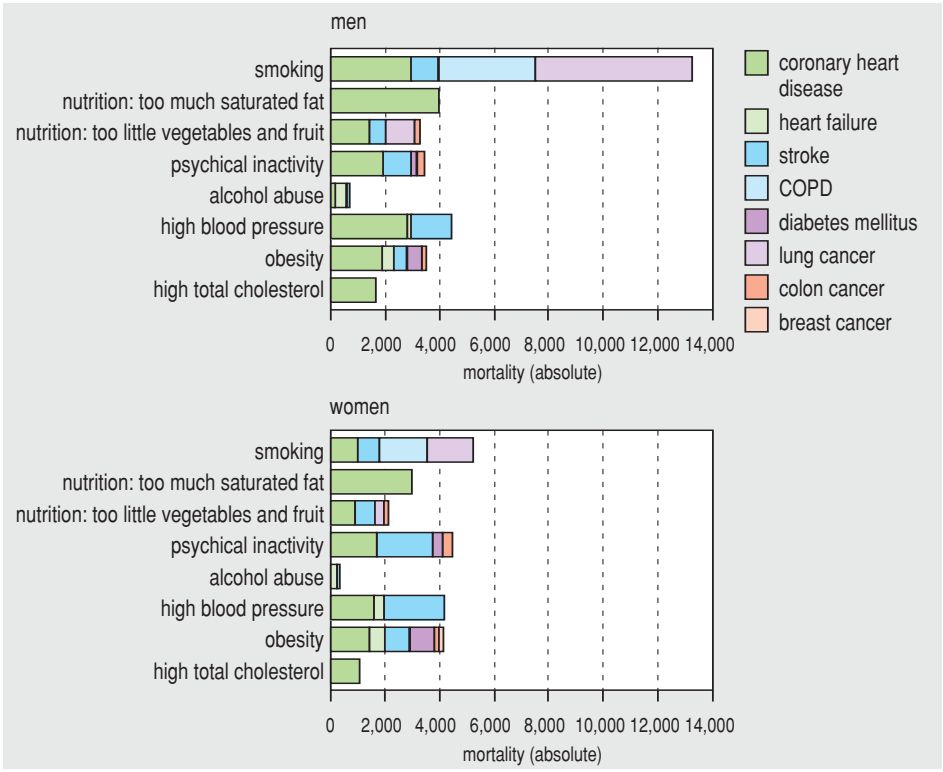


Figure 2.19: Contribution of important lifestyle factors and personal risk factors to mortality by eight causes of death in absolute numbers in 2000 (by sex). Total Dutch mortality in 2000 was 140.000. Dutch population 15.9 million.

Excessive alcohol use is the major determinant for loss of quality of life

Lifestyle factors and personal risk factors not only contribute substantially to mortality, but also lead to a considerable number of years of ill health and consequently to a loss of quality of life. In calculating this loss we again made use of Population Attributable Risk (PAR). Loss of quality of life is expressed in years lived with disability (YLD), which reflects the incidence and the severity of diseases (see also *text block 2.5*). The calculation reveals that smoking is not only the major cause of premature mortality, but also of much loss of quality of life, mainly through COPD and coronary heart disease. However, excessive alcohol use is associated even more strongly with loss of quality of life (see *table 2.9*), especially through alcohol dependence, stroke and coronary heart disease. Physical inactivity, hypertension and serious overweight cause coronary heart disease, stroke and diabetes mellitus, and entail, in addition to mortality and years of life lost, a relatively large loss of quality of life.

The disability-adjusted life-year (DALY) combines mortality and loss of quality of life (see also *text block 2.5*). This identifies smoking as the determinant that is associated with the greatest loss of health, followed by excessive alcohol use, hypertension and serious overweight. Otherwise, there are large differences between men and women. Almost 20% of the total burden of disease among men can be attributed to smoking, compared with 10% among women. The differences are even greater for excessive alcohol use: 12.5% of the burden of disease among men and 2.3% among women.

A 'male' lifestyle causes a stagnation of the increase in life expectancy among Dutch women

Now that the increase in life expectancy among women is stagnating (see *section 2.1*) the Netherlands is following in the footsteps of Denmark, where a similar stagnation of life expectancy was observed in women as long ago as the late 1980s. Further research pointed to smoking as a major causative factor, but also to a complex of factors that

Table 2.9: Contribution (in per cent) of eight significant determinants to mortality, loss of quality of life and burden of disease (disability-adjusted life-year (DALY)) [a] in the Netherlands.

	Mortality [b]	Loss of quality of life [c]	DALY [c]
Smoking	14.9	8.0	14.7
Nutrition: too much saturated fat	4.9	3.3	4.6
Nutrition: insufficient vegetables and fruit	4.7	1.9	3.9
Physical inactivity	5.7	3.2	4.5
Excessive alcohol use [d]	1.5	8.6	6.6
Increased systolic blood pressure	6.1	4.5	6.4
Serious overweight	5.7	4.5	5.7
High total cholesterol	1.9	1.8	2.5

a) percentage of loss of quality of life (in years lived with disability (YLD)) and burden of disease (in DALYs) relates only to the 53 diseases selected for PHSF.
b) the percentage contribution of determinants to mortality deviates somewhat from that presented in PHSF 1997: for an explanation see the text above *figure 2.19*.
c) for an explanation of the various health measures: see *text block 2.5*.
d) excluding accidents.

coincide with an increasing participation of women in the labour market and the assumption of a more 'male' lifestyle in general. Smoking, together with excessive alcohol use and high total cholesterol, has a strong influence on the number of years of life lost, and therefore also on life expectancy, because the associated diseases (lung cancer, coronary heart disease, disorders resulting from alcohol use) often occur at a young age (see *section 2.1*). These developments in women's lifestyles have led to a sustained decline in the traditional difference in life expectancy between men and women (Van der Wilk et al., 2001).

Environmental factors: a contribution of between 2% and 5% to the total burden of disease

The sections above were concerned mainly with lifestyle factors and personal risk factors, but environmental factors can also have an impact on people's health. On the basis of current knowledge of the health risks of environmental factors, it is estimated that the burden of disease attributable to the physical environment contributes approximately 2% to 5% of the total burden of disease in the Netherlands, where air pollution, noise, the indoor environment and microbiological food contamination play a relatively large part (De Hollander et al., 1999; Melse & De Hollander, 2001). We discuss the contribution of these factors to loss of health below, as shown in *figure 2.20*.

The loss of health through particulate matter and ozone is largely associated with respiratory diseases. People with a sensitive respiratory tract use asthma medication more frequently when they have a higher exposure to particulate matter (Pope et al., 1995; Katsouyanni, 1996). In the case of people with a highly sensitive respiratory tract, exposure to particulate matter leads to more general practitioner consultations and hospital admissions, and (in a few cases) results in premature mortality (Verhoeff et al., 1996). There are indications that particulate matter not only has an impact on people with a sensitive respiratory tract, but that it also raises the probability (for the entire population) of cardiovascular disease and pulmonary disease, and thereby shortens life (Hoek et al., 2002). Ozone is the most reactive and toxic component of smog. Smog also causes an increase in the severity, duration and frequency of respiratory symptoms among people with a sensitive respiratory tract, with a corresponding increase in the number of general practitioner consultations and hospital admissions.

Damp in housing causes a relatively high exposure to dust mite and fungus. For people with a sensitive respiratory tract, the higher exposure to this environmental factor leads to asthmatic symptoms and respiratory tract infections. The loss of health through the radioactive substance radon is largely caused by lung cancer. It is estimated that between 100 and 1,200 lung cancer cases in the Netherlands annually are caused by exposure to radon. On average, there are 800 cases a year (Health Council (GR), 2000a). The risk-enhancing effect is especially strong in combination with smoking.

With respect to noise, *figure 2.20* shows only the loss of health as a result of stress-related symptoms, such as high blood pressure, coronary heart disease and hypertension in pregnancy. Furthermore, exposure to a high noise load at work or through pop music,

possibly for a period of years, can cause damage to hearing. Finally, noise can diminish people's sense of well-being (noise nuisance) and interfere with their proper functioning (disturbed sleep, diminished cognitive performance).

The loss of health through *microbiological food contamination* results from food-related infection and intoxication. Chemical food contamination is not included in *figure 2.20*, because the short-term health consequences are limited and the long-term consequences will not manifest themselves within a human lifetime and/or are impossible to express quantitatively.

Social environment: the relative contribution to burden of disease was estimated only for labour

Little is known about the relative contribution to ill health in the Netherlands of a number of selected social environmental factors (see *table 2.7*), such as work stress and limited social support. However, for the sum of physical and social labour-related factors, it has been estimated that they are responsible for 7% of the total mortality (Nurminen, 2001). It would appear, moreover, that between 10% and 40% of the Work Incapacity Benefits (WAO) intake is associated with the labour situation (Gründemann & Nijboer, 1998).

Among the possible consequences of psychosocial factors in the labour situation, such as work stress and unfavourable labour relations, are generalised stress, burn-out,

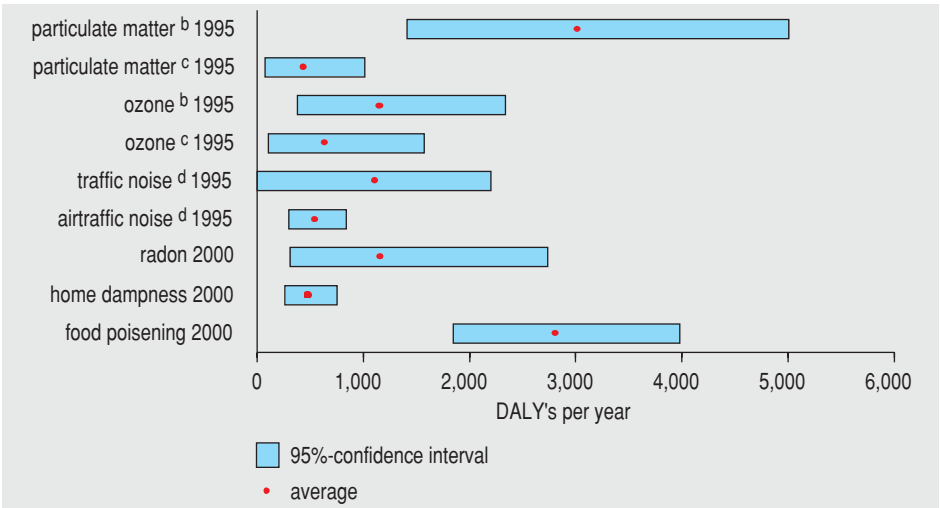


Figure 2.20: Health loss attributable to a selection of environmental factors in DALY's per year [a] for the Netherlands (Source: RIVM/CBS, 2001).

a) estimates of % of DALY's attributable to environmental factors are made in a different way then for lifestyle factors (see *figure 2.19* and *table 2.9*). Although a comparison is therefore difficult, it may be assumed that the order of magnitudes are comparable.
b) all described health effects
c) only premature mortality and hospital admissions
d) only cardiovascular diseases

depressive symptoms and cardiovascular diseases. Social support also appears to have an effect on health. Someone who enjoys some degree of emotional support (for example, by being able to talk to others about problems, to feel that they are understood and have a source of comfort), has a smaller probability of contracting or dying from cardiovascular diseases and has a better prognosis in the event of neoplasms. Social integration, or the existence of social relationships, is also associated with a smaller probability of contracting or dying from cardiovascular diseases and may have a better prognosis in the event of neoplasms, as well as a smaller probability of physical impairments (Hemingway & Marmot, 1999; De Boer et al., 1999; Garssen & Goodkin, 1999; Seeman, 2000). A link has also been found between a greater degree of support from social relationships and a lower heart rate, lower blood pressure, lower total cholesterol, better immune reactions and fewer stress reactions (Seeman, 2000).

Furthermore, support from social relationships can lead to improved mental health, because people feel more valued and more help is available in emergencies. Conversely, little support and much criticism or quarrels are associated with the development and progress of depression (Finch et al., 1999; Seeman, 1996). A lack of a sense of reciprocity in relationships increases the probability of such things as burn-out, depression and absence from work through sickness (Buunk & Schaufeli, 2001). Loneliness can be considered to be a perceived deficiency in social support. A Dutch study has revealed that less loneliness, more emotional support and more practical support go together with a smaller probability of mortality among the elderly (Penninx et al., 1997).

It has been established furthermore that unfavourable factors in the immediate living environment have a negative impact on health (see also *text block 2.3*), although it is not known precisely which factors are involved. For instance, it appears that living in a deprived area in a major city has an independent influence on the state of health. The probability of dying before the age of 65 in a deprived area is 50% greater than in wealthier neighbourhoods, which can be explained in part by the social-demographic composition of the neighbourhoods, but in addition there is an independent effect of living in a deprived area. Apparently, the urban deprived area is not only the location but also the cause of substandard health, and various environmental characteristics may play a part. A fairly substantial role is probably set aside for the social environment in the neighbourhood, for example, the quality of the contacts between individual residents (Van der Lucht & Verkleij, 2001).

Smoking, high blood pressure and overweight are significant cost items

Health care costs can be attributed in part to a number of personal risk factors and lifestyle factors. In the first place comes the cost of the care that is brought to bear to eliminate unfavourable levels of certain risk factors, for example, the medicinal treatment of high blood pressure and high total cholesterol. In the second place is the cost of disorders related to the determinants. It goes without saying that not all costs of, for example, cardiovascular diseases, can be attributed to high blood pressure and high total cholesterol. Most diseases and disorders usually have multiple determinants, and, what is more, these are only partly known or quantifiable. The cost of disease (see *section 2.4*)

is therefore partially allocated to determinants, to the extent that the quantitative relationship between the determinants and the prevalence of disorders is known. Here use is made of the population attributable risk (PAR) method, which was modified for this purpose in order to eliminate overlap in the costs (because of the simultaneous presence of multiple determinants for an individual person).

It was possible to allocate more than 1.5 billion euros of the total cost of care in 1999 to three personal risk factors: high blood pressure, high total cholesterol and serious overweight (see *table 2.10*), which is equivalent to 4.8% of the total cost of health care in 1999 for people aged 20 and above. It was possible to allocate 6.2% for men, and 3.8% for women. The most significant component of the cost is related to high blood pressure.

It was possible to allocate an approximately equal amount, almost 1.4 billion euros (or 4.2%), to five lifestyle factors (see *table 2.11*). Men's more unhealthy lifestyle is clearly visible in this table, for all lifestyle factors but particularly for smoking, and alcohol and drug use. The partial coincidence of personal risk factors with lifestyle factors (for example: overweight and physical inactivity), made it impossible to sum the figures from *table 2.10* and *table 2.11*.

The amounts in *table 2.10* and *table 2.11* should certainly not be used as an answer to the question 'how much expense could have been avoided with a properly healthy lifestyle?'. There are various reasons for this:

- A risk factor (an unhealthy behaviour or an unfavourable personal risk factor) can often not be eliminated completely.
- People live longer on average as a result of eliminating risk factors by taking up a healthy lifestyle, so that later in their lives they may succumb to (other) diseases that also (and possibly even more so) demand care (substitution and postponement of diseases).
- Population attributable risks (PAR) are based on observational investigation and there is therefore no certainty that the effect of eliminating a risk factor will be equal to the PAR.
- Prevention also costs money.

Table 2.10: The cost of health care allocated to three personal risk factors for Dutch men and women in 1999 (millions of euros) (Source: Polder et al., 2002).

	Men	Women	Total
High blood pressure	359.4	352.5	711.9
Elevated total cholesterol	194.5	122.2	316.7
Serious overweight	257.9	247.4	505.4
Total	811.8	722.1	1533.9
Contribution to the cost of health care of those aged 20 and above (%)	6.2	3.8	4.8

Total health care costs for the Netherlands in 1999. For men: 11.7 and for women: 16.0 billion euros. Total population of the Netherlands 15.9 million.

Table 2.11: The cost of health care in the Netherlands allocated to five lifestyle factors according for men and women in 1999 (millions of euros) (Source: Polder et al., 2002).

Lifestyle factors	Men	Women	Total
Smoking	334.1	174.6	508.7
Physical inactivity	111.0	89.4	200.4
Insufficient vegetables and fruit	86.5	55.0	141.5
Excessive alcohol and/or drugs	225.8	86.2	312.0
Too much saturated fat	126.5	73.7	200.2
Total	884.0	478.8	1362.8
Contribution to the cost of health care of those aged 20 and above (%)	6.8	2.5	4.2

On the basis of current knowledge, we conclude that limiting health risks is very important in terms of population health status. However, this will yield little or no savings in the cost of health care. In addition to the cost of prevention as such, the development of substitute disease may become important.

2.2.4 Finally: the provision of information needs to be improved

The current information base is deficient

Various systems exist in the Netherlands for continuously gathering data on health determinants. Data on the *lifestyle factors such as smoking, drinking and exercise* comes mainly from Defacto, the Trimbos-institute, Statistics Netherlands (CBS) and the trend report on exercise ('Bewegen'). These figures provide a basis for studying the trends and breaking them down into socio-economic groups. However, any attempt to study the interrelationship between risk factors and/or trends in time is hampered by the fact that different sources and/or methods of data gathering were used. The Second Dutch National Survey of General Practice does measure these lifestyle factors simultaneously with personal risk factors and health problems in general practice, but this survey is not continuous in nature. Available trend data from surveys of *drug use* (Trimbos-institute, CEDRO) and *sexual behaviour* (NISSO, TNO) constitutes only a cautious indication of the behaviour concerned, because of the generally low and/or selective response and the likelihood of being given socially acceptable answers. Data on lifestyle among members of ethnic minorities originates largely from one-off studies, which provide no insight into how lifestyle factors are developing over time.

Following the end of the MORGEN project in 1997, the monitoring of *personal risk factors*, such as blood pressure and overweight, was continued (to a very limited extent) by the 'Regenboog' (Rainbow) project. The Regenboog project was terminated in 2001 because of the inadequate number of subjects in the study, which caused a gap in the provision of information on personal risk factors.

Data on *environmental factors* originates from a variety of sources. Furthermore, the lack of data on the percentage of people exposed to *environmental factors* means that it is often necessary to resort to indicators, such as self-reported nuisance or locations with relatively high exposure. Monitors still contain hardly any questions on *social environmental factors*, partly because little is known about the link between specific environmental factors and health.

New monitor will provide better lifestyle information

Starting in 2003, the Local and National Public Health Monitor, which is an initiative of GGD Nederland and the RIVM, will be a good information source, especially for *lifestyle factors*. This involves coordination with national and international initiatives. Optionally, data will be gathered on *environmental factors* and *personal risk factors*, in addition to lifestyle factors.

Other examples of broadly-based monitor initiatives of this kind are those for environmental factors, such as the Environmental Balance (Milieubalans) (RIVM, 2002) and the Environmental Data Compendium (Milieucompendium) (RIVM/Statistics Netherlands (CBS), 2001), and for labour-related physical and social environmental factors (Statistics Netherlands (CBS)-POLS).

There is as much room for improvement in the determinants as there is in the health status, in terms of the availability and comparability of *international health information*. This is especially true of social environmental factors and personal risk factors, but also of most lifestyle and environmental factors.

Further research is necessary into health differences in neighbourhoods and determinants of behaviour

Further research is necessary to establish which specific *environmental factors* or combinations of factors in the immediate living environment contribute to health differences in neighbourhoods. Likewise, investigation is necessary into the *behavioural determinants* in the general population and in particular among specific groups such as young people, the elderly, people with a low socio-economic status and members of ethnic minorities. Too little is currently known about environmental behavioural determinants (factors that form a constraint on healthy behaviour) in particular. The same is true of individual behavioural determinants (knowledge, attitude, self-efficacy). Some examples of environmental determinants of healthy behaviour are the structure of the neighbourhood or dwelling, social pressure, transport facilities, the availability of other facilities (including those for recreation and care) and safety.

2.3 What do prevention and care mean for our health?

Unhealthy behaviour is the greatest challenge for prevention
Considerable health gains have been achieved in the past with prevention in the broadest sense. However, the public sector must continue to strive to maintain these achievements (for example, through vaccination, health protection and health promotion). Theoretically, the greatest opportunities for further gains currently lie in the improvement of unhealthy behaviour. However, the prevention of unhealthy behaviour is hampered by a number of obstacles: insufficient embedding of prevention in care; the approach to unhealthy behaviour is insufficiently integrated; there is too much ad-hoc project funding and too little structural support for prevention programmes; insufficient use has been made of local settings (school, neighbourhood, workplace) to develop successful programmes, or of the opportunities to make the surroundings stimulating for healthy ways of living; there is too little effective communication on health risks; there is far too little systematic evaluation of the efficacy of preventive interventions. What is required, in brief, is a long-term view and corresponding support.

The quality of cure and care is stagnating through a shortage of innovation and investment
Care contributes to better health by being effective, safe and accessible to everyone. New interventions in this area can still yield health gains. Here too, however, interventions are hampered by a number of obstacles, particularly in the stagnation of substantial care reforms and a considerable gap that has developed recently between the demand for and the supply of care. In concrete terms, the following points are involved: an inadequate implementation of successful trial projects on safer or more integrated care; obstinately long waiting times in some specializations and in the care sector; shortages of medical personnel and educational facilities; a changing and increasing demand for care. In principle, there is equal accessibility of care for different population groups, but deprived groups would appear to require additional care capacity. All these points need to be addressed in the design of a new care system, from the perspective of optimum health gain.

In comparison with other countries, the Netherlands presents a variable picture
Some of the data on efficacy, safety and accessibility of prevention and care lends itself to international comparison. For such preventive activities as breast cancer screening and vaccination, the Netherlands achieves a favourable score within the EU. However, the Netherlands achieves an average or below average score for the outcomes of care/prevention, such as breast cancer survival and perinatal mortality. The frequency of percutaneous angioplasty, appendix operations and Caesarean sections is average or below average, which appears to be reasonably adequate. Taking resistance to antibiotics as a hallmark of safety, the Netherlands is among the best in Europe. All the above notwithstanding, the Netherlands has almost the lowest number of doctors per inhabitant in the EU.

To measure performance, information on prevention and care is needed
Information on the efficacy, safety and accessibility of prevention and care is fragmented. In order to measure the performance of prevention and care, practical parameters must be developed and selected through specific studies. In addition, structures must be developed for regular data gathering, both within the Netherlands and at the international level (see further *chapter 4*).

2.3.1 Prevention and care for improved health

Prevention and care help, but could things be better?

What lessons can we learn from the successes of prevention and care and where do the obstacles lie? How should we tackle the job of assessing this? In PHSF 1997 this subject focused on the *efficacy* and *effectiveness* of interventions, which relates to the effect of an intervention under ideal conditions or in practice. The following questions were raised: which interventions are effective? Why are some interventions less effective in practice than we might expect on the basis of the efficacy in ideal conditions? In answering these questions, a list of obstacles has been identified for both prevention and care, which revealed that success depends not only on the choice of certain interventions but also on the associated organizational context. In other words, were the right interventions applied in the right way at the right time on the right groups of people? And if not, why not?

These findings led us to opt for a broader perspective in this report than one that is based strictly on the efficacy of interventions. The underlying assumption is that the objective of the system of prevention and care is to maintain or improve the state of health of the population, to reduce undesirable health differences, and to cure and care for people with diseases or infirmities (see *chapter 1*). The questions that then arise are as follows:

- What requirements must be imposed on prevention and care in order to best achieve these objectives? This question relates not only to the efficacy of prevention and care, but also to other aspects of quality, such as safety and accessibility.
- To what extent have these objectives already been realized? Where can examples of successful interventions be found and what lessons can be learned from them?
- Where are the obstacles and opportunities for improvement? How can we derive recommendations for the future?

Prevention: different criteria for categorization

Prevention can be categorized in different ways. This report mainly uses the three traditional categories: disease prevention, health promotion and health protection (see *text block 2.15* for an explanation and reference to other catagorization schemes). These three operate overall on different types of determinants and use a variety of methods, which is indicated clearly in the conceptual model determinants (*text block 2.9*). Each of these three types of prevention has its own approach, target groups, opportunities and dilemmas. Our expectation of all types of prevention is that they should not only be effective, but also safe (no undesirable side effects) and accessible (to everyone). These concepts are mainly used within the framework of care, but are equally applicable to prevention.

Text block 2.15: Different kinds of prevention

The classical approach to the classification of prevention activities is:

- *Disease prevention*: aiming at personal characteristics or latent disease, e.g. using vaccination, screening or targeted medication;
- *Health promotion*: aiming at lifestyle factors and 'healthy' environmental characteristics, e.g. using information campaigns or coordinated social action;
- *Health protection*: attempts to prevent exposure to hazardous (environmental) factors, e.g. by means of legislation and law enforcement.

A more methodological classification of prevention activities has been introduced in PHSF 1997 based on five prevention methods (vaccination, screening, medication, health education and legislation). These five methods can easily be fitted into the threefold classification given above. In addition, there is the well-known classification into primary, secondary and tertiary prevention, which provides another dimension largely by following the phases of the disease process. Other classifications are based on disease groups or target groups (Gunning-Schepers & Jansen, 1997). Finally, in mental health care a distinction is made between universal, selective, indication-based and care-based prevention (Bohlmeijer & Cuijpers, 2001).

Care: what do we expect of it and what do we call that?

Care can be subdivided into *curative care*, which focuses on curing (the *cure*), and *nursing and residential care*, which does not generally involve healing (the *care*). According to the conceptual model (*text block 2.9*), care operates primarily to influence health status. The terms *effective*, *safe* and *accessible* were mentioned above as essential characteristics of care. These are only some of a series of related concepts, which are often drawn together under the heading of 'quality and accessibility of care' (*text block 2.16*).

Text block 2.16: What are quality and accessibility of care?

The term *quality* covers not only the effectiveness and safety of the measures taken, but also such concepts as *appropriateness* (tailoring the care to the patient's needs), *continuity* (effective coupling of different parts of the care process) and *customer-friendliness* (proper approach to patients and demand-oriented attitude). These terms show a certain degree of overlap. The term *accessibility* refers mainly to the timely availability of care, geographical spread and the need to make health care affordable for everyone. The criterion *solidarity* also applies here. The term *effectiveness* (which refers to the need to achieve the above-mentioned health aims within acceptable cost restraints) is generally considered to be relevant as well. This extra dimension is considered in *section 2.5*.

Prevention, cure and care cannot be strictly separated

Prevention, cure and care are generally successive actions in the disease process: prevention takes place before the development, appearance or aggravation of the disease, followed by cure to heal the disease, and finally care, which is more concerned with improving or maintaining the quality of life than with healing (see *figure 2.38*). What is more, there is a greater emphasis on the collective aspect in prevention, and more on the individual in cure and care, although it is often impossible to distinguish between them. Much prevention is embedded in the care system, in a collective sense (for example, breast cancer screening) or an individual sense (lifestyle advice following myocardial infarction or depression). The latter situation in particular illustrates that the distinction between prevention and care is often a difficult one to make, on top of which such a distinction is also undesirable and counterproductive. A number of the examples presented

below show that coordinated prevention and care, as components of the same process, are precisely what is needed to yield a considerable health gain (RVZ, 2001a). For example, an integrated approach incorporating both prevention and care (as well as other social aspects) can be important when dealing with socio-demographic groups with health deprivations (Mackenbach & Verkleij, 1997; Van der Lucht & Verkleij, 2001).

A common theme illustrated by examples

The field of prevention, cure and care, and their significance for health, is too broad to cover here with any pretence of completeness. Furthermore, the availability of good data on the subject is fairly patchy. We have therefore opted to present examples in this section that:

- are characteristic of different fields of prevention, cure and care, and
- illustrate recent and relevant developments, or
- show interesting geographical differences.

These examples are described in *text blocks 2.17-2.39*. We have attempted to identify a common theme out of these examples.

This section emphasizes that the achievement of a health gain is the central underlying goal of prevention and care. This means that all the examples examine health *outcomes*, or, by way of proxy, *process* characteristics that have a sufficiently clear or plausible relationship with health outcomes. Such proxies will often be used where there are practical difficulties in ascribing certain health outcomes unambiguously to a given intervention, or where it is anticipated that there will be a substantial delay before an effect on health becomes apparent.

2.3.2 Prevention

Chapter 1 stated that considerable health gains have been achieved in the past 150 years through what we now refer to as prevention, together with the general development in prosperity. PHSF 1997 concluded that interventions directed at healthy behaviour still have considerable potential to achieve health gains at the present time. That report identified the following points for improvement:

- increased efforts directed at reaching the intended target group;
- more combined intervention strategies;
- more involvement of the medical profession in the implementation of interventions;
- more collaboration between players and authorities;
- better evaluation of programmes and interventions.

The question that we now have to ask is whether any progress has since been made on these points. We investigated this by means of a number of examples, categorized as described above into *disease prevention*, *health promotion* and *health protection*. In general, we can state that although there have been many (often fragmented) initiatives in recent years, there has been very limited *structural* investment in prevention, in contrast to the considerably increased expenditure on care (see also *section 2.4*).

Text block 2.17: Screening for breast cancer: efforts continue unabated despite debate

Screening for breast cancer started in the Netherlands at the end of the eighties, after the effectiveness of this procedure had been demonstrated in international trials. It was claimed that the screening of women in the age-range 50-70 years with a coverage of 70% would lead to a drop in deaths due to breast cancer by about 17%. Danish publications have however recently cast doubt on the validity of these trials. The Dutch *Gezondheidsraad* (Health Council) concluded in response to these claims that while the favourable effect of screening may be lower than initially thought, this is no reason to stop the screening programme. It went on to say that the programme should be subjected to thorough evaluation. It may be noted that mortality due to breast cancer has shown a downward trend since screening started in 1988, despite some fluctuations (estimated reduction of 7-13% in the period 1997-1999 for the 55-74-year age group). It is assumed that the screening programme has contributed to this reduction. The improvement of the 5-year survival rate for breast cancer has also been attributed in part to screening (see *text block 2.26*). The Netherlands compares quite favourably to other EU countries as regards participation in breast-cancer screening (see *figure 2.21*).

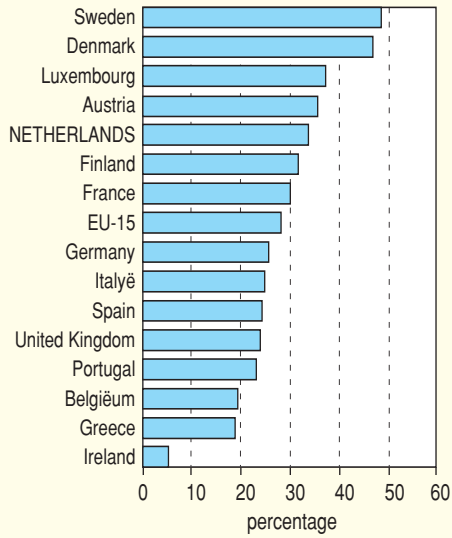


Figure 2.21: Percentage of women over 45 reporting having undergone mammography at some time in 15 EU countries (Source: Eurobarometer survey, 1998; data processed for RIVM on request)

Disease prevention: permanent evaluation remains necessary

The issues of 'reaching the target group' and 'evaluation' are still as topical as they ever were (see the examples in *text blocks 2.17* and *2.18*). Disease prevention in the form of breast cancer screening illustrates the balancing of positive and negative effects of an intervention at the population level. While screening gives a chance of earlier and consequently more successful treatment, it also generates an enormous amount of anxiety during the process, especially in the event of indeterminate and false positive results. The balance is currently favourable, in spite of recent doubts (*text block 2.17*).

Another form of disease prevention is the national vaccination programme (NVP), the health gains of which are due, in particular, to the programme's continuity (*text block 2.18*). A more critical attitude to vaccination programmes has also developed recently outside orthodox-religious or anthroposophic circles. This development indicates that a different balance is sometimes struck between protection and the probability of disease on an individual level than the efficacy applicable at the population level. People who opt out of vaccination will enjoy protection as long as people in their surroundings are vaccinated. However, in the case of a further decline in coverage, the efficacy of the national vaccination programme (NVP) may rapidly be undermined. It is therefore important to view the national vaccination programme (NVP) not only as a success story from the past, but also as a programme that needs sustained effort to maintain the health gain that has already been achieved. This must also be communicated clearly to

the target group. However, it is necessary to evaluate the current research results critically in terms of the motives for opting out of vaccination, such as the assumed relationship with increasing allergy. The Netherlands does not have a monopoly on this sometimes irrational resistance to vaccination programmes, as this is also encountered in other Western countries.

Disease prevention in general practice: a source of dilemmas

It is extremely difficult to give the counterpart of the population approach, which is known as the high risk approach, a permanent place within the current health care system (see the example in *text block 2.19*). The major problem area is the *involvement of the medical profession*. The dilemma is that the additional work stress will be much more clearly visible than the health yield in the short term. RVZ recently stated that there is a wide variety of reasons (work stress, funding structure) for why the practice of care is not structured to incorporate prevention, whereas an improvement in this respect could yield a considerable health gain. One step in this direction would involve a more prominent place for prevention in medical education (RVZ, 2001a).

An example of the consequences of this type of prevention is the recent increase in the application of cholesterol-lowering medicines (*text block 2.20*). It marks the beginning of a potentially enormous development, prescribing medicines to individuals or groups with a given risk profile. This profile can be determined by lifestyle factors, and the question that arises is how far we should go along this path of 'compensating' unhealthy behaviour with medicines. What is more, in future, such a risk profile can be based on a genetic profile (predictive medicine; see *section 3.3*). A question that is asked increasingly often is whether the screening of high risk groups within the care sector should be imposed because of the general interest (in other words, a public health imperative) or should it be more a matter of informed individual choice; Marteau & Kinmonth, 2002). The role of the insurers in possible risk selection is crucial here.

Health promotion needs an integrated approach and continuity

As indicated in *section 2.2*, a considerable health gain can still be achieved on the point of promoting healthy behaviour (see also the examples in *text blocks 2.21-2.23*). At the same time, however, people seem to be less susceptible to the prevention message. Prevention would be more effective if interventions not only tackled people *personally* on their behaviour, but also changed their *physical and social environment* in such a way as to support such behaviour (which is known as making the healthy choice the easy choice). The PHSF theme report 'Time for healthy living: health promotion for specific target groups' (Jansen et al., 2002) gives many practical examples. The key words concerned are *support* and *participation* for the target group, *empowerment* (making people better able to stand up for themselves) and *customization.* This last key word refers to a package of interventions tailored to the situation and target group as an alternative to dipping into the standard protocols. Other conditions for a successful approach to health promotion are as follows: an *integrated approach, use of multimedia (ICT) and multi-intervention* strategies*,* utilizing *existing networks* and *infrastructure*, and, above all, *continuity*: sufficient *time* for a result, through structural as opposed to project funding.

Text block 2.18: National Vaccination Programme (NVP) updated but subject to critical review

The National vaccination programme (NVP), introduced in the Netherlands in 1957, has in the intervening period led to the virtual disappearance of most of the diseases vaccinated against. Coverage of more than 95% has been achieved for all NVP diseases. The NVP is currently being updated and extended, with special reference to expected health gain, cost-effectiveness and practical feasibility. An additional whooping-cough vaccination for 4-year-olds was introduced in the autumn of 2001 to prevent recurrence of this disease after this age. This measure may also reduce the risk of infection in susceptible infants. Vaccination against meningitis C was introduced in 2002, in response to a recent rise in the number of cases (a nearly fourfold increase in 2001, to 275, with a mortality rate of roughly 10%) and the recent availability of a very effective vaccine. In 2003, hepatitis B vaccination will be added to the programme for the children of parents from regions where this disease is endemic. Another planned introduction is pneumococcal vaccination in infants (the vaccination of individuals in the 65+ age group is still under discussion).

Now that infectious diseases and their complications are less in the public eye thanks to the success of the NVP, greater concern is being expressed about the side effects of vaccination. A total of 1,142 reports of suspected side effects were made in 2000, out of a total of nearly 2.5 million vaccinations. Depending on the type of vaccine and the nature of the clinical picture involved, it was estimated that there was an association of 80% on average between the reported complaint and the vaccination (Vermeer-de Bondt et al., 2002).

The present average vaccination rate of more than 95% is enough to prevent epidemics. There are however certain socio-geographic clusters of parents who refuse to have their children vaccinated, mainly on ideological or religious grounds. There are certain groups of strict Protestants where the vaccination coverage is no more than about 30%. *Figure 2.22* shows that the vaccination rate for MMR (measles, mumps, rubella) in municipalities with a high proportion of such groups could fall below 80% (according to the data reported for 1 January 1999), and that the lion's share of the reported cases of measles during the epidemic of June 1999 – May 2000 were concentrated in the same areas. Of the 3,292 reported cases, 94% were not vaccinated (Van den Hof et al., 2001). This confirms the effectiveness of the MMR vaccine in protecting against the diseases in ques-

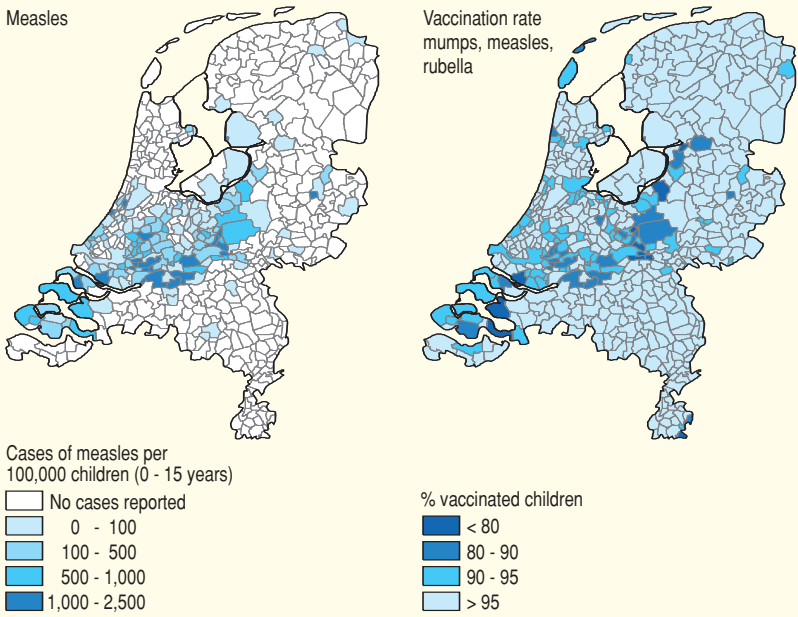


Figure 2.22: Regional spread of the Dutch measles epidemic 1999-2000 and coverage of mumps, measles, rubella vaccination (Source: ISIS; IGZ, 2000).

An integrated approach is one of the most important success factors for effective interventions in the area of a healthy lifestyle and a healthy environment. This involves collaboration between various parties, such as different sectors of government policy (health policy and policy in other sectors, 'intersectoral policy'), the commercial sector, interest groups, cultural facilities, local government and, of course, the individuals concerned. Promoting a healthy lifestyle and a healthy environment is definitely not confined to health policy alone. The contribution from all of the above parties also makes it self-evident that a multimedia and multi-intervention approach should be adopted, and that existing structures should be used. Local government can help boost all of the above. Continuity, or great patience, is perhaps the most essential aspect, not only because the working structure required is complex, but more especially because a sustainable behavioural change can be realized only through long-term investments. Otherwise, parties with different interests will pass the buck rather than cooperating (see the alcohol example in *text block 2.21*).

Settings as a key to health promotion

An integrated approach to health promotion, involving participation and customization, can be put into practice by approaching people through various 'settings', such as at school, in primary health care, at work and in the neighbourhood (see also *text blocks 2.22* and *2.23*). This approach was also advocated in a comprehensive report on the 'The Evidence of Health Promotion Effectiveness' (IUHPE, 1999), on the basis of an extensive literature survey. For instance, this report states that in the *school health policy*, the presentation of health topics must fit in with the sum of learning objectives, and not be directly oriented to changing behaviour. Here too, efficacy appears to depend strongly on the continuity of the programmes. In addition, the report demonstrates convincingly that behaviour-directed interventions from *primary health care* are particularly effective with respect to smoking and alcohol. For other lifestyle factors, the evidence is less clear (IUHPE, 1999; see also *text blocks 2.23* and *2.19*).

Furthermore, the IUHPE report mentions the importance of health promotion in the *workplace* (GBW), where much health gain can be achieved. In 1998, for example, almost a quarter of employees stated that work stress had caused them to suffer physical or psychological symptoms. In addition, one third of the people who end up with a Work Incapacity Benefit (WAO) suffer from psychological symptoms (see *section 2.1*). Evaluations have shown that stress prevention programmes can lead to a reduction in absence through sickness and that health promotion in the workplace (GBW) programmes can have a positive effect on health awareness and healthy behaviour within companies (see also *text block 2.22*). On balance, programmes of this type can save costs. Especially with the current trend towards ever higher productivity, this perhaps makes the workplace the setting of choice for working preventively on health improvement.

The literature is rather contradictory in terms of the efficacy of *community-based* interventions, which in the Dutch translation is often referred to (not entirely correctly) as the *neighbourhood-oriented* approach. Analyses of the causes of these contradictions

(continue text block 2.18)

tion.
Recently, there has been a tendency to adopt a more critical attitude towards vaccination, as reflected in the increased level of debate concerning side effects and the possible adverse long-term effects of the tendency to vaccinate babies at an earlier age. There may have been a slight drop in the national vaccination coverage for babies in the period 1998-2001, though the overall vaccination rate is actually better than it was ten years ago. A local drop of a few percent has, however, been observed in Amsterdam and Rotterdam (among both ethnic minority groups and groups of Dutch origin). It is not yet clear whether this is mainly a case of postponement to a later date or whether it represents a decision not to have the children in question vaccinated at all (IGZ, 2002a; Van der Wal et al., 2001).
International comparison shows that the vaccination rate for measles in the Netherlands is relatively high: in 1999, half of the EU countries had a coverage of less than 90% while three countries showed a coverage of less than 80% (WHO-HFA, 2002).

Text block 2.19: Cardiovascular disease prevention programme in primary health care stopped although proven effective

It was stated in PHSF 1997 that active targeting of the population group with the highest absolute risk of cardiovascular disease would provide a more effective means of preventing this type of disease than screening the whole population for blood pressure and cholesterol levels. A pilot project along these lines was started in 1998, under the title 'Tailored prevention of cardiovascular disease', at the primary health care level. About 15% of all Dutch GPs participated in this project, with support from preventive medicine professionals. The project was aimed at the systematic registration of additional risk factors (in particular blood pressure and cholesterol level) in patients who were regarded as being at high risk of developing cardiovascular disease on the basis of a number of indications (age, diabetes mellitus, overweight and family history). This information would provide a basis for an individual prevention strategy involving e.g. lifestyle advice or the use of medication to lower the cholesterol level and/or the blood pressure.

This pilot project was successful: two years after the start of the project, the number of high-risk patients (on the basis of age (60+) and other selected risk factors) for whom a reasonably complete risk profile had been recorded, had increased appreciably, to about 70% of all participating patients, and the number of targeted preventive actions had also increased strongly. Most of the GPs who participated in the project found the procedure to be feasible, and appreciated it. Despite these encouraging results, the *Landelijke Huisartsen Vereniging* (National Association of Dutch GPs) decided to stop the campaign, and not to implement this approach on a national scale. The main reasons given were that the work involved placed an excessive load on GPs, and that it was insufficiently remunerated.

Text block 2.20: Preventive use of cholesterol-reducing medication: effectiveness versus costs

The medical profession is traditionally reluctant to prescribe medication for people who do not show any signs of disease. It was however proposed a number of years ago that cholesterol-reducing drugs (statins) should be prescribed for healthy people with a high risk profile for cardiovascular disease instead of simply for those with high cholesterol levels (see *text block 2.19*). This advice was based on intervention studies which showed conclusively that cholesterol levels could be reduced by up to about 30% in this way. On the basis of these new guidelines, 180,000-360,000 people at high risk of cardiovascular disease would become eligible for such treatment in the Netherlands (Gezondheidsraad, 2000b). It was further advised that the medication should be combined with a change to a healthier lifestyle. In practice, however, it is easier to swallow a pill than to change one's lifestyle; these drugs could thus easily be used to compensate for unhealthy behaviour. If all the smokers in the risk group were to stop smoking, at least 150,000 fewer people would require the treatment (CBO, 1998). The *College voor zorgverzekeringen* (CVZ) (Dutch Health Insurance Funds Council) recently recommended that smoking should not be used as a criterion for reimbursement, but that this topic should be the subject of widely based discussion (CVZ, 2002).

Practical effectiveness is a specific problem with medication of this type: statins only work when

indicate that the approach definitely offers opportunities for success, provided that the conditions mentioned above are fulfilled (such as participation, customization, an integrated approach, intersectoral action and continuity; Van Assema, 1993; Jansen, 1999) (see also the example in *text block 2.23*). The PHSF theme report 'Health in the cities' (Van der Lucht & Verkleij, 2001) also deals with this subject extensively, with recommendations such as: 'take care to provide an integrated approach to health in deprived areas (living conditions, behaviour, care)'; 'incorporate health explicitly in the major cities policy (GSB)'; 'spread knowledge of the results of intervention projects in the major cities'.

Evaluation is also an essential part of health promotion

The efficacy of interventions in health promotion is determined by many different factors, which makes it all the more important for programmes to be set up and executed according to a plan (Brug et al., 2000). Thorough evaluation is an essential part of this plan-based approach but such evaluations are still more the exception than the rule, which is one of the greatest obstacles to gaining an insight into the efficacy of interventions. As a result, we miss opportunities to learn from our experiences. In 2001, the WHO published a report on evaluation in health promotion, in which it strongly urged that sufficient financial resources be made available for these evaluations (WHO, 2001b). This report also emphasized the importance of including measures of both process and outcomes in evaluations, and the importance of training the evaluators.

It is clear for health promotion too that the validity of the points for improvement from PHSF 1997 is undiminished, and they have since become underpinned even more securely. In addition to a higher priority for evaluation, these are: attention to the target group, a multi-intervention approach and intersectoral action. One point of improvement that is new is the emphasis on customization, the local approach and continuity. Our understanding has therefore improved since PHSF 1997, but we note that there is a reluctance to proceed with actual implementation. A European study into the implementation of eight preventive interventions that appeared to be effective and generally accepted, reveals that, in other countries too, the implementation of the interventions is often disappointing (ECAHI, 2001). In all trends towards a decentralized and local approach, powerful support from central government therefore remains essential, through prioritization, structural funding and continuity in observing the constraints.

Health protection: risk assessment and regulations

Health protection is concerned with averting the health risks of external factors through collective measures, such as rules (and their enforcement) for environmental pollution, the safety of food and drinking water, housing and working conditions and traffic safety (De Hollander, 1993; Gunning-Schepers & Jansen, 1997). Measures taken in this area in the past have been most effective in yielding health gains. The dilemmas involved here are different in nature from the other two types of prevention, and they revolve around the word *risk*. This concept combines the probability of damage to health with the severity of the damage.

(continue text block 2.20)

they are taken continuously over a long period. On the one hand, this demands that the individuals for whom the medication is prescribed should follow the regime faithfully (not easy if they are basically healthy), while on the other the effects of the therapy are by definition not traceable at the individual level. The discussion proposed by the CVZ is all the more urgently needed in view of the high cost of statins (total costs of use of this medication in the Netherlands were 255 million euro in 2001; it is not known how much of this total was accounted for by the costs of the above-mentioned prevention programme at primary healthcare level). This treatment can in principle lead to a reduction in mortality of up to 30% in the high-risk group, or to a drop in the incidence of coronary heart disease in the general population of 1-2% (Rutz et al., 2002).

Text block 2.21: Prevention of alcohol related problems and smoking: health education supported by legislation

It has been found that the most effective way of preventing excessive alcohol use involves the combined application of various measures, in particular health education combined with (legislative) control of the environment in which alcohol is consumed. It appears from the literature, both in the Netherlands and elsewhere, that reducing the number of sales outlets, raising the statutory minimum age at which alcoholic drinks may be purchased, changing the layout of cafés and bars and in particular raising the price are effective options (Lemmers, 2000; Van den Broucke, 1998).

The *Drank- en Horecawet* (Dutch Alcoholic Beverages and Catering Establishments Act) was amended in 2000. It has been estimated that the package of measures originally proposed (raising the minimum age for the purchase of alcoholic drinks from 16 to 18 and prohibiting the sale of alcohol at petrol stations, staff canteens and snack-bars) would lead to a drop in the average consumption of alcohol in the Netherlands by 1.5% and hence to a reduction of 1.7% in the number of excessive drinkers (VWS, 2000).

One measure was dropped from this package, viz. the raising of the age limit for the purchase of beverages with a low alcohol content. The age limit for the purchase of beer and wine remained at 16, while that for spirits was raised to 18. Moreover, maintaining the age limit was found to be difficult in practice, even after the increase in the stringency of the legal regulations. More than half of those under the age limit stated that they could easily get an older friend to buy alcohol for them (Bieleman et al., 2002). As a result of these factors, the reduction in alcohol consumption is doubtless less than calculated above.

Since it was moreover found that most of the licensees responsible for the sale of alcohol did not know the regulations, the *Keuringsdienst van Waren* (Dutch Inspectorate for Health Protection and Veterinary Public Health) decided to check compliance with the new legislation more strictly. The number of inspectors was increased by 40 to this end. Licensees are liable to a fine of from 220 to 11,250 euros, or to loss of their licence, in case of violation (representatives of the catering trade, on the other hand, argue that it is the consumers who should be punished). The *Platform Verkoop Alcoholhoudende Dranken voor Thuisverbruik* (Platform for Sale of Alcoholic Beverages for Home Consumption) has started an information campaign for supermarket personnel to promote compliance with the age limits there. An evaluation study will be carried out in 2003 to determine the extent to which the expected drop in alcohol consumption has been realized.

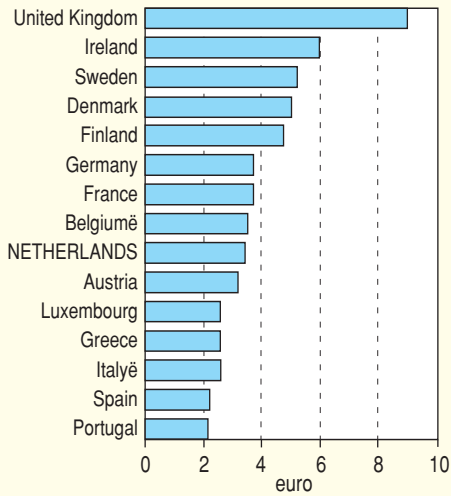


Figure 2.23: Price of a packet of 25 cigarettes in euro's in 15 EU countries (Source: EC, 2001).

A sizeable academic discipline is occupied with estimating health risks, for example through exposure to certain pollutants. A large-scale system of (European) regulations is being drawn up on the strength of the results. These regulations are usually based on permissible levels, for example a maximum of one death per million people per year from a given cause (such as a chemical substance). In many cases, however, much uncertainty surrounds the probability of exposure and the nature or severity of the health consequences. Moreover, the choice of type of health effect (mortality, morbidity, consequences of nuisance) involved in the assessment is sometimes arbitrary. These uncertainties in the scientific risk estimates generally lead the authorities to err on the side of caution when establishing standards for acceptable levels.

Apart from the above, standards and rules on protection against risks also have to be observed and enforced. A prevailing belief that everything is well organized easily leads to an erosion of inspection and enforcement, as illustrated in the Netherlands by the recent disasters in Enschede (firework explosion), Volendam (fire in a bar) and Bovenkarspel (Legionella).

In the case of traffic injuries, in contrast to many other areas, directly demonstrable and considerable risks are involved (*text block 2.24*). It would appear that these risks can be reduced by a combination of regulations and infrastructural measures, together with improvements in behaviour and enforcement, where the environment (infrastructure) reinforces behaviour (see also *text block 2.21*). Unlike most other areas of prevention, this area has in the Netherlands been the subject of structural investments in safety (by the Ministry of Transport and Water Management), and this has not been without result.

Risk perception is associated with many factors

As outlined above, there are already considerable uncertainties in the *objective* assessment of risk. In addition, the perception and judgement of risks by the public also determines the ultimate picture. This subjective judgement depends on many factors. For example, health risks are considered to be less acceptable the less they are taken voluntarily, or the more they are perceived to be uncontrollable, or are accompanied by mistrust of a remote party (industry, government).

On the one hand, public opinion may be swayed by risks that are tiny according to a quantitative estimate, while on the other hand simply accepting risks that are orders of magnitude greater. The general picture is that the public is demanding ever more sweeping safety ‘guarantees’ from the government (inspired by the belief that, whatever the issue, there is always a ‘fix’), while reserving complete freedom to take sometimes considerable risks. This dilemma is also highly visible in traffic safety: we invest millions in safe roads, but ultimately the limits are determined by individual driving behaviour (*text block 2.24*).

These differences in perception are also expressed in the amounts that society is prepared to spend on health measures. *Section 2.5* goes into this subject in greater depth and gives examples of the cost per QALY (Quality-Adjusted Life-Year) gained, which

(continue text block 2.21)

Legislation can also support education when it comes to controlling smoking behaviour. Of the available options, it seems certain that at least the price of cigarettes can influence consumption (Jansen et al., 2002). *Figure 2.23* shows the price of a package of cigarettes (including duty and VAT) in the 15 EU member states in 2001. The European Commission wants to reduce the differences in taxes between the various countries. The provisions of the new Dutch Tobacco Act include the prohibition of tobacco advertising, an age limit of 16 for sales, fines for contravention of this requirement and an extension of smoke-free environments. In particular the first of these measures is expected to have an appreciable effect. Good evaluation will be needed to check the precise results of this package of measures in the Dutch situation.

Text block 2.22: Health promotion in the workplace: health works!

More and more companies are adopting a policy aimed at health promotion in the workplace (HPW). While 9% of Dutch companies had a HPW policy in 1996, this figure had risen to 30% by 2002. HPW uses a combined approach to the worker and the work environment to promote the health of employees. In most companies, HPW policy is mainly concerned with smoking (69%), alcohol consumption (22%), physical activity (22%) and RSI (19%) (NIPO, 2002).

The information available about the efficacy of HPW measures is mainly related to absence through sickness. A European study showed, for example, that absence through sickness fell in 18 out of 23 companies that had adopted a combined approach to this issue. Other effects of a combined HPW policy included improvement in employees' problem-solving ability, motivation, involvement and health awareness. There are also several examples of cases where investment in HPW led not only to improved health for employees but also to a reduction in costs. In one campaign, each euro invested in HPW was found to yield a profit of 2.5 euros in two years through a reduction in absenteeism (Vaandrager et al., 2002).

Text block 2.23: Heartbeat Limburg: sustainable cooperation leads to success

A large-scale regional collaborative campaign aimed at the prevention of cardiovascular disease was started up in the Maastricht region of the Dutch province of Limburg in June 1998 under the motto 'Heartbeat Limburg, healthy together'. The vision underlying this project was that sustainability, collaboration, adequate scope and content were the necessary conditions for effective health promotion. Heartbeat Limburg combines a community approach via the media and other public channels with direct targeting of the high-risk group via the medical circuit.

Within the framework of the *community project*, nine local 'healthy life working groups' were set up. These working groups covered four neighbourhoods in Maastricht and five smaller municipalities from the surrounding region. Each working group comprised volunteers from local organizations and target groups together with a health education officer, a welfare worker and a local government officer (from the department of sport and welfare). They worked together to organize health promotion activities at neighbourhood level aimed at the target group selected, such as 'Food for Health' guided tours of supermarkets, lectures on healthy lifestyles or food parties in participants' houses with all kinds of games. In the *high-risk project*, GPs and cardiologists, in cooperation with the municipal medical and health service, trace people who are at high risk of contracting cardiovascular disease. Four health advisers can then offer support for these people in the achievement of a healthier lifestyle.

In the period from mid-1998 to mid-2002, the *community project* generated more than 430 health promotion activities and the placing of more than 380 press releases and articles in the local media. While many of these activities received support from national health promotion campaigns run by such bodies as the Dutch Olympic Committee and the Dutch Sport Federation, *Defacto (Dutch anti-smoking NGO)* and *Voedingscentrum/Stuurgroep Goede Voeding* (the Dutch Dietary Centre and Steering Group for a Healthy Diet), an increasing number of initiatives were also taken by members of the target groups themselves.
A total of more than 3000 patients have joined the

can vary by up to five orders of magnitude. For example, on the one hand there are vaccination programmes or the mandatory wearing of safety belts (cheap) and on the other hand there are measures to eliminate Legionella in water pipes or to reduce exposure to benzene (expensive).

Food safety, another major topic in this context, is the subject of extensive EU regulations. An effect of the rapid globalization of the foodstuffs trade is that contamination sometimes has large-scale consequences (the dioxin affair), and the effective inspection of food quality is of undiminished importance. The above-mentioned *perception gap* is manifest in the contrast between the often less healthy choice of food (fast food, few vegetables and fruit, see *section 2.2*) and the critical attitude towards possible contamination where the calculated risk is minimal. This is complicated even more by the many sometimes contradictory publications on nutrition and the entanglement of economic and health interests (hormones in meat, BSE). A PHSF theme report on this subject is scheduled for 2003.

Health protection policy should take account of both the estimated efficacy of interventions in terms of health gain and the widely differing risk perceptions in society. An important basis for such a policy would be to make risks of a various nature transparent and comparable with respect to both the scientific calculations, with their assumptions and uncertainties, and the crucial elements of public perception.

The living and working environment influences health: intersectoral policy

The environment has already been mentioned above as a stimulating factor for unhealthy or healthy behaviour and as a setting for enhancing the efficacy of health-promoting activities. What is more, however, the *living and working environment* itself may constitute a major determinant of health and well-being, quite aside from the question of whether it supports a healthy lifestyle. Policy in the area of housing, education, working conditions and social security (intersectoral policy; see also above under health protection) has yielded much health gain and is still of great importance in this regard. The WHO has recently reiterated (2002) that poverty and its consequences form the major threat to health. The relevant factors in the Dutch situation are economic position, social context in the working and living environment, and the often related physical living and working environment, which together with a less healthy lifestyle are responsible for considerable health deficits (Van der Lucht & Verkleij, 2001; RIVM, 2002). The Socio-economic Differences in Health Programme committee (SEGV-II, 2001) therefore recommended, in addition to policy directed specifically at healthy behaviour, that health differences be reduced through the following measures: educational policy, income and poverty policy, social policy to reduce the exclusion of chronically ill people, improvement of working and housing conditions, incorporation of health in the major cities policy (GSB) and improvement of the efficacy and accessibility of care for deprived groups (see also *section 2.3.3*).

(continue text block 2.23)

high-risk project via a cardiology out-patients' clinic and 25 participating GPs' practices. Preliminary analysis of the data from 1085 of these subjects yield a favourable impression. Sixty six percent reported having adopted a healthier lifestyle soon after the provision of the guidance offered by this campaign, while 87% regarded this guidance as a useful supplement to the support they were already receiving.

The *success factors* of the Heartbeat Limburg campaign are in particular the cooperation (intersectoral, public/private and transmural), the involvement of the various partners, the creation of an adequate management platform and sustainable financing (the role of the initial main sponsor, the Dutch Heart Foundation, has in the meantime been taken over by the municipalities and the health-care insurer). These success factors give a clear indication of the reasons why many other similar initiatives fail. The main new insight generated by the appraisal of this project is the importance of good management in such a complex cooperative undertaking (Ruland et al., 2001; Steenbakkers & Ruland, 2000).

Text block 2.24: Continued investment in traffic control measures – but behaviour remains the key factor

The number of victims of traffic accidents in the Netherlands continues to fall, thanks to massive investment in traffic infrastructure and vehicle safety. The Netherlands compares well with other EU countries in this respect (see *section 2.1*). This success is due in part to the joint pressure of the authorities and consumers on the automotive industry. Apart from this, massive investment in traffic accident prevention is set to continue: the National Traffic and Transport Plan (Dutch abbreviation NVVP) envisages spending six billion euros in order to reduce the annual number of fatalities to less than 750 by 2010 *(Dutch population in 2000: 15.9 million*), and the number of injured admitted to hospital per annum to below 14,000 by the same time (this represents reductions of 30% and 25% respectively). The approach set out in the NVVP involves regional analysis of risks and traffic characteristics and the development of appropriate scenarios, leading to the formulation of appropriate traffic safety measures such as infrastructural improvements, legislation and measures to ensure compliance with this, education and technological measures (V&W, 2001). Specific possibilities for further improvement of traffic conditions include adapting the traffic infrastructure to take account of more elderly drivers, complete prohibition of the use of mobile phones while driving, or the use of 'alcohol sniffer' locks which do not allow the car to be started if the driver is over the limit. At the same time, it is recognized that the lion's share of accidents are due to human error, while only 25% of the six billion euros to be spent within the framework of the NVVP is earmarked for education and traffic monitoring (SWOV, 2001, 2002).

Text block 2.25: Treatment of coronary heart disease: technology reduces mortality

The rapid development of new medical technology (which can be very expensive) is increasing the ability of medical care to save and prolong life. The treatment of coronary heart disease is one clear example of this trend. For example, an American study shows that the mortality within 30 days following acute myocardial infarction has fallen from 27% in 1975 to 17% in 1995 (Heidenreich et al., 2001). According to this study, about 70% of this improvement in survival rate can be ascribed to technological changes and improvements in prevention and treatment possibilities such as the prescription of aspirin and the introduction of thrombolytic agents and dotter procedures. The remaining 30% is associated with changes in lifestyle (e.g. smoking habits) and improvements in diagnostic procedures making it possible e.g. to recognize mild heart attacks as such and hence to treat them. Another study covering 31 different populations from four continents during the period from the mid-eighties to the mid-nineties showed that 56 to 72% of the drop in mortality due to coronary heart disease could be explained on the basis of the increasing use of therapies that had proved to be effective (Tunstall-Pedoe et al., 2000). It may be noted in this connection that the spectacular improvement in the survival of patients with coronary heart disease was partially balanced by the subsequent death of such patients due to competing causes such as stroke.
There are large differences in the extent to which

Central theme: effective, safe and accessible prevention

The central theme for all the examples of prevention discussed is the efficacy of prevention and its evaluation. Safety is especially relevant to screening on a population level, and the balance between health gain and negative effects such as the consequence of early case-finding and false positive results (*text blocks 2.17* and *2.30*). The accessibility or reach of prevention is important in all population programmes: additional effort is sometimes necessary to extend the reach in all target groups (*text blocks 2.17-2.19, 2.22* and *2.23*).

Ethical dilemmas in prevention

The health gain that remains to be achieved is linked largely to healthy or unhealthy behaviour. How prescriptive or coercive should we be with our approach to influencing behaviour (see Klazinga, 2001)? Are people becoming resistant to the *pedantic* prevention approach?

These dilemmas can be resolved by promoting the ability of people to make their own well-informed choices, as well as promoting healthy behaviour. On the one hand, this approach places demands on the capacity to sift through and assess information. On the other hand, the government must feel responsible for an effective and balanced package of information (Verweij, 1999). Such choices are also involved in connection with the improvements in recognizing genetically determined risks. The fact is that we can also opt *not* to know (see also *text block 2.30* and *section 3.3*).

All this demands education and support directed towards *empowerment*. As people themselves start to give more direction to their lives (autonomy), they will probably find more satisfaction and happiness, which in its own right will promote health (De Regt, 2001). Maybe they will then also make more conscious choices on health, not out of a fear of a particular disease, but more as an expression of an attitude to life.

2.3.3 Health care: cure and care

Alongside prevention and socio-economic developments, medical care has also contributed in the past to extending (healthy) life expectancy, albeit on a more modest scale, and especially in more recent years (Mackenbach, 1996; Bunker, 2001).
We presented an overview of the efficacy and effectiveness, under ideal conditions and in practice, of contemporary and new interventions in care for ten major diseases in PHSF 1997 (Van der Meer & Schouten, 1997). The main conclusions were that the *efficacy under ideal conditions* of most interventions has already been demonstrated, but that much less is clear about their *efficacy in practice*. Obstacles exist in each of the following five steps that have been identified in the individual care process: contact with the care sector, diagnosis, determining the indication, treatment and patient compliance. The recommendations were as follows: to spread knowledge on the efficacy and effectiveness of interventions under ideal conditions and in practice; to implement guidelines and standards on this basis; to evaluate interventions in practice; and to create the asso-

(continue text block 2.25)

effective therapies are used in different places. For example, *figure 2.24* shows the number of dotter (PTCA) procedures performed per 100,000 head of population in a number of countries in 1999 (these figures are not standardized for age and gender). The large differences shown in this figure do not reflect large differences in the incidence of myocardial infarctions. The use of PTCA has shown a substantial increase in many countries, exceeding that of bypass operations. The increased use of these procedures has been associated in various countries with a rise in the survival rate one year after a myocardial infarction. It may be noted, however, that survival in the USA is no greater than that in the more successful EU countries, despite the threefold greater use of these procedures in the USA (Jacobzone, 2002).

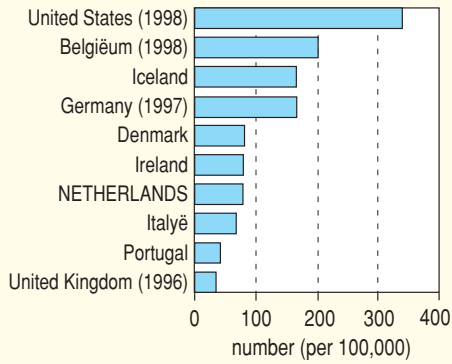


Figure 2.24: Number of dotter procedures (PTCA) per 100,000 inhabitants in selected countries in 1999 (Source: OECD health data; for the Netherlands: Prismant, LMR).

Text block 2.26: Breast-cancer survival increases by treatment and screening

The effectiveness of methods of treatment for cancer can be assessed e.g. by considering the survival rates For example, the 5-year survival rate for breast cancer showed an average increase of more than 5% in the EU countries in the period from 1979 to 1988 (year of diagnosis) (see also *text block 2.17*). This increase is ascribed in part to the effect of screening programmes, since the drop is correlated with the shift in the time of diagnosis to an earlier point in the tumour development process (Sant et al., 2001). Another contributory factor is the fact that diagnosis has become more accurate thanks to the use of mammography and the increasing application of MRI and DNA diagnosis (see *section 3.3.2*). The major factor here is that early detection allows treatment to be given at an earlier stage, thereby increasing the chances of a successful outcome. There has also been a rise in the post-operative use of chemotherapy or hormone therapy in recent years (see also *text block 2.17*). *Figure 2.25* shows the 5-year survival rate in ten European countries (or, in most cases, in certain regions within these countries). The Netherlands occupies an intermediate position in this ranking.

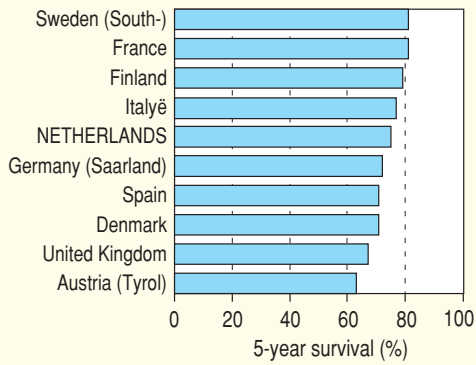


Figure 2.25: Five-year survival rate after breast cancer in ten EU countries (Source: Eurocare-2; Berrino et al., 1999. Dutch data collected by IKZ.)

ciated support within the framework of quality improvement in care. The interventions discussed were concerned mainly with the cure (treatment oriented to healing) and to a much smaller extent with care (residential care, nursing). We again have to ask ourselves whether we have made any progress in the meantime. As with prevention, we investigated this subject by reference to examples (*text blocks 2.25-2.39*).

Innovative interventions in care are helping

The use of more effective interventions has increased, which in some areas has yielded a health gain (see the examples in *text blocks 2.25, 2.26* and *2.29-2.31*, for coronary heart disease, breast cancer, perinatal mortality and care and the use of pharmaceuticals, respectively; see also Council for Public Health and Health care (RVZ), 2001b).

We mentioned certain initiatives in the above section on prevention, and the desirability of giving prevention a more prominent place in care. For instance, prevention can support curative care or help to postpone its use. A strict separation of prevention and care is therefore not helpful. In other words: preventive interventions must form an explicit and integrated part of care.

Some researchers think that new interventions and technologies are not being introduced rapidly enough in the Netherlands, partly as a result of organizational obstacles (Council for Public Health and Health care (RVZ), 2001a, c, d; NYFER, 2002). Nonetheless, careful consideration is called for in this area. Not all technology that is new, or effective in trials, actually leads to better care in terms of better health (see the examples of Van der Meer & Schouten (1997) and *text block 2.31*). Under conditions of equal efficacy, renewal must at least lead to a saving in costs. The application of medical technology assessment (MTA), pharmaco-economic guidelines and post-marketing surveillance must lend satisfactory support to this process. Currently, there is insufficient coordination and support during MTA investigations (see *section 3.3.5*).

Measuring the effectiveness of care: outcomes and process parameters

In order to investigate whether the care sector fulfils its primary goal, it is often argued that health gain should be measured as an assessment criterion for quality, and more specifically the effectiveness of care (see *chapter 1*). The awkward question that remains is: which health outcomes must we measure in order to assess efficacy or success of our care interventions in practice ('performance', see also *chapter 4*)? The question of whether we wish to use the information on a macro level (comparison of countries or regions), or on a meso or micro level (comparison of care institutions or individual care providers) is also important in this regard.

We will deal with the macro level first. There are two trends. On the one hand, the general state of health (for example life expectancy) is presented, possibly implicitly, as an 'outcome' of the care system (for example in WHO (2000); Ministry of Social Affairs and Employment, SZW (2000); Council for Public Health and Health care (RVZ) (2001b)). On the other hand, there is an effort to identify highly specific parameters that provide valuable information about the performance of the care system, for example,

Text block 2.27: Variation between primary care practices as an indicator of quality of care

In an ideal health care system, where high-quality service is accessible to all, any geographical differences in the level of care provided would be slight (after correction for differences in the incidence of the various diseases) assuming that all health care staff work according to generally accepted, evidence-based, best practices. In reality, however, differences do occur; the observed variations between the services provided in different primary care districts can be used as an indicator of the quality of care.

In New England for example, it was found that for women reaching the age of 75 the chance of having had a hysterectomy varied from 25 to 70% in neighbouring care districts (Wennberg & Gittelsohn, 1982). Comparable differences were later found in other countries, and for other aspects of health care such as the probability of being admitted to hospital and the duration of hospitalization; such differences were also found in the Netherlands (Mackenbach, 1990; Van Oers et al., 1997; Westert, 2002). Local variations in working practices between different doctors often appear to be due e.g. to differences in working conditions or in access to knowledge of the best practices (Westert, 1996). Research has shown, moreover, that the transition from local standards to generally accepted (or national) standards can be rather difficult (Lomas et al., 1989). The use of financial stimuli would seem to be essential if one wishes to introduce best practices into the health care system. One good example of advances made in the Dutch situation is a growing acceptance of the guidelines laid down by the NHG (Dutch College of General Practitioners) for the treatment of type 2 diabetes mellitus as a professional standard, which has led to a reduction in the variation of care provided to this class of patients (Tacken et al., 2001). Another example is the reduction in regional differences in the number of appendectomies in the Netherlands, around a reasonably stable national average (*Figure. 2.26*; Westert, 2002).

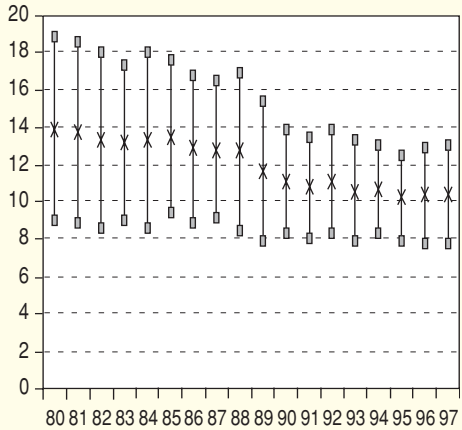


Figure 2.26: Regional variation (highest, mean and lowest) in the number of appendectomies per 10,000 head of population in the Netherlands (corrected for age and gender), in the period from 1980 to 1997 (Source: Prismant, data processed by RIVM).

Data from seven EU countries (Belgium, Finland, Ireland, Italy, Luxembourg, Portugal and the Netherlands) (1998-1999; OECD health data) shows a variation in the number of appendectomies per 10,000 head of population between 9.5 and 22.4. The Netherlands has the lowest value with about 9.6, while most other countries show values of around 15 or higher than 20 (Luxembourg). There is a trend towards a slight decrease with time in most countries. The differences within Europe are thus greater than within the Netherlands. It is difficult to interpret this data without further research, in view of the fact that the observed differences and trends cannot be corrected for differences in incidence.

cancer survival, avoidable mortality, or the prevention of complications in diabetes mellitus. The approach of the OECD (2000a, 2001) goes much further in this direction.

We take the *specific* approach in this section because the *general* approach does not provide sufficient information of value about the current performance of the care sector. Provisionally, only a limited number of parameters would appear to be in any way suitable for, for example, international comparisons (see *text block 2.26* (breast cancer survival) and *text block 2.29* (perinatal mortality)). In practice, in the absence of more good *outcome* parameters, *process* characteristics with a sufficiently clear or plausible relationship with health outcomes are often studied, (see also *section 2.3.1* and the *text blocks 2.25* (application of PTCA), *2.27* (practice variation) and *2.34* (antibiotic resistance)).

A large number of outcome or process parameters suggest themselves for comparison on a meso level (comparison or benchmarking of care institutions). RVZ (RVZ, 2001b) argues for a 'care result analysis' based as much as possible on health outcomes, measuring many highly specific medical parameters. It is precisely this aspect of medical-technical quality that is missing in recent publications on the comparison of care institutions. We will return to this point later in this section.

The reduction of practice variation and the use of standards: how far should we go?

An interesting measure for assessing the quality of care is practice variation or inter-doctor variation, which generally becomes smaller the more that generally accepted 'best practices' or standard guidelines are adhered to. There would appear to be a favourable trend in this respect for appendix operations in the Netherlands (*text block 2.27*). It is much more difficult to interpret the significance of differences between countries, because there are probably large variations in disease incidence. The example of Caesarean sections (*text block 2.28*) shows quite a different problem: the choice between what in principle are equally effective 'treatment' options can be made on grounds somewhat removed from health. What does the number of such interventions then say about the effectiveness of the care?

The general use of standards enhances the quality and efficacy of care, for example, by discouraging the use of outdated and less satisfactory practices. But how universal are 'best practices'? 'Best practices' have tended to differ between countries both in the past and more recently (Payer, 1988; Bernstein et al., 2002). In theory, moreover, setting down 'best practices' in guidelines and standards can conflict with a rapid adoption of new technologies or other care-reforming experiments (see text block 2.33 and Post & Stokx, 1997). It would appear that the two elements, renewal and standardization, are not fundamentally incompatible, and it should be possible to combine them in a demand-oriented approach.

Text block 2.28: Variation between primary care districts and differences in medical culture: caesareans

Some forms of treatment show a more extreme regional variation than others (see *text block 2.27* and Payer, 1988). One striking example is the frequency of caesarean sections, which varies much more from one country to another than the regional variations within the Netherlands. In 1997, the number of caesareans per 1,000 births in the Netherlands varied from about 90 (in southern South-Holland and Overijssel) to about 120 (North-Holland, Drenthe, Zeeland, South-Gelderland and North-Limburg). The overall variation of about 20% is distributed in a fairly arbitrary manner throughout the country (Source: Prismant, LMR). Within the EU, however, the 'leaders' in this field such as Portugal and Italy show values of about 300-350 caesareans per 1,000 births, i.e. three times as many as in the Netherlands (*figure 2.27*). While differences do exist in the incidence of risk factors for perinatal complications (where, it may be remarked, the position in the Netherlands is not particularly favourable; see *text block 2.29*), the variations in the number of caesareans seems to be mainly due to cultural differences in the preferences of women and doctors and to different considerations regarding operation planning and safety. It goes without saying that this has consequences for the costs of care.

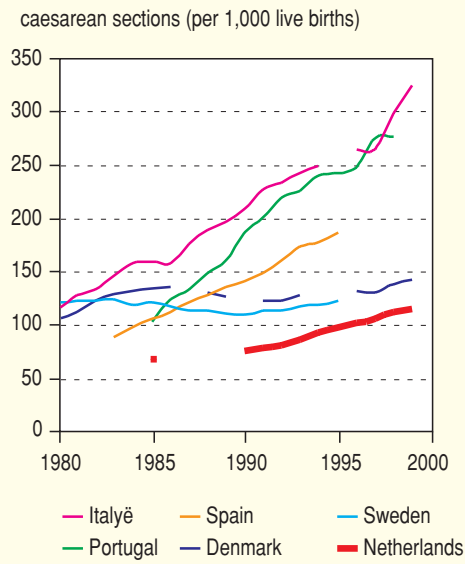


Figure 2.27 Trends in numbers of caesarean sections per 1,000 births in six EU countries (Source: OECD health data, 2001).

Text block 2.29: Perinatal mortality as an example of 'avoidable mortality': regional and international variations

'Avoidable mortality' is that part of mortality that may in principle be prevented by good care (and/or preventive measures). A high 'avoidable' mortality in a particular area provides a signal that care may be suboptimal there. Hence, variations in avoidable mortality are sometimes used as an indicator of the quality or effectiveness of care or preventive measures (Rutstein et al., 1976). If differences are found, further research is required to point the way to possible improvements. Perinatal mortality is chosen here by way of illustration, since this is often used as an indicator of the quality of (neonatal) preventive and curative care.

Regionally: Significant variations in perinatal mortality were found between the various Dutch provinces in the period from 1984 to 1994. Zeeland was the best, with a perinatal mortality equal to 0.76 of the national average, while Limburg was the worst, with 1.16 times the national average. The trends in this mortality also varied, Brabant and Limburg showing a more marked drop than the other provinces. No relationship was found between the mortality and various care-related factors such as the place of delivery or the presence or absence of specialized neonatal care. Further, no consistent relationship was found between mortality and socio-demographic factors (Treurniet, 1999).

Internationally (see *figure 2.28*): Perinatal mortality has fallen almost everywhere during the past few decades. This decrease has, however, been less marked in the Netherlands than in many surrounding countries. I should be noted, however, that the differences between the various EU countries have become much smaller. The stagnation of the figure for the Netherlands is related among other things to a relatively sharp rise in the risk factors for a number of perinatal complications, such as a higher average age of mothers at the time of delivery, the percentage of first children, the number of multiple births and the percentage of children whose mother comes from an ethnic

Renewal by integrated care

Integrated care, or chain care, is a form of care that arranges for and supervises the best possible path through the care circuit from the point of view of the *individual patient* (see *text block 2.33*). Another key word here is *continuity* of care, in which both cure and care are often involved. Clear improvements can be observed in this area relative to the traditional approach in strictly separated sectors, in terms of both health and the most effective use of resources. This shows that demand-oriented care can pay. The Social and Cultural Planning Office (SCP, 2002) gives several other examples of considerable improvements in both quality and productivity. Why, then, are only isolated cases involved? Specific initiatives would appear to be necessary, which would be difficult for the system itself to achieve (given its present operational structure of separate sectors and subsectors), even though individual care providers may be more than willing to do so.

A safe health care system

Safety is the other side of efficacy: the medical treatment must have no undesirable adverse effects on health (iatrogenic effects). Nonetheless, effects of this type do occur in practice. For instance, it has been estimated that 'adverse events' in care in the United States, including medical errors, account for a loss of life expectancy of 6-12 months (Bunker, 2001). In the Dutch situation, medical errors are said to be involved in approximately one to four deaths per 1,000 hospital admissions (Baan et al., 2001; see also Treurniet, 1999).

More specific examples can be derived from studies on the undesirable consequences of medicine use (*text block 2.32*) or the appearance of resistance as a consequence of the liberal use of antibiotics (*text block 2.34*). Trial projects have demonstrated that a targeted approach can produce spectacular reductions in adverse effects. Examples are postoperative wound infections (up to 50% reduction of the risk; Geubbels, 2002) and decubitus ulcer (a reduction in prevalence of 16% in university hospitals and 33% in nursing homes to less than 5%; Decubitus Ulcer Steering Group 2002). Some of these specific parameters can be used to compare countries on a macro level (resistance to antibiotics). The registration of medical errors falls mainly within the scope of the quality systems on the level of the individual care provider and the institutions. It is also a focal topic for the Health care Inspectorate. An investigation is currently under way to determine how inspection can be organized rationally in the Netherlands, to avoid any undesirable consequences of medical action (or its omission) as effectively as possible (Baan et al., 2001).

An accessible health care system

In the above sections, we discussed the quality of the care process, which we approached mainly by considering the extent to which medical interventions contribute to an improvement of the state of health (efficacy and safety). We indicated that achieving this goal requires that care must also be accessible to everyone. The main factors in accessibility are the timely availability of care (waiting lists, waiting times), its geographical spread, and whether it is affordable for everyone. The criterion of solidarity is

(continue text block 2.29)

minority. Another factor is smoking behaviour during pregnancy (Achterberg et al., 2001). The results of an international comparative study into the role of shortcomings in perinatal care as a causative factor in perinatal mortality (Vredevoogd et al., 2001) indicate that such shortcomings are not found more frequently in the Netherlands than in other EU countries: Finland and Sweden are the only two EU countries where the situation is better.

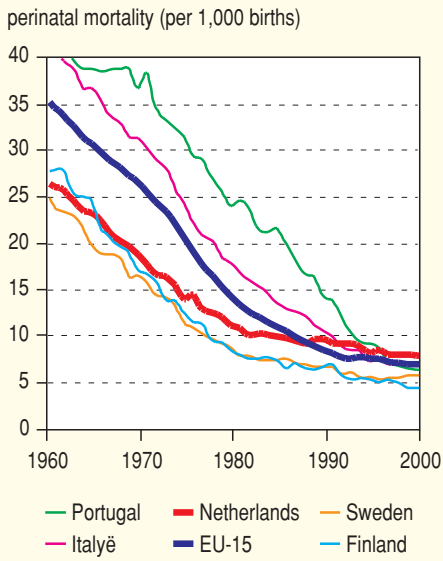


Figure 2.28: Trends in perinatal mortality in Europe, 1960-1997 (Source: OECD health data, 2001).

Text block 2.30: How far should perinatal care go?

Perinatal mortality in the Netherlands has fallen during the past few decades. The main reasons for this are better perinatal care and improvements in living conditions and lifestyle (see *text block 2.29*).

One of the main causes of the improvement in perinatal care is the increasing availability of modern facilities derived from advances in medical technology. This improvement is reflected e.g. in the growing number of premature (and very premature) babies who are kept alive (sometimes only for relatively short periods) (WBC-LNR, 1998; Gezondheidsraad, 2000c). It may be noted that those who survive by this means often suffer from appreciable problems in later life (e.g. neurological dysfunction, poor social functioning, high consumption of medical care and poor performance at school) (Theunissen et al., 2000).

Serious perinatal problems also lead to dilemmas in the field of medical ethics, related for example to the question of whether further medical intervention makes any sense in some of such instances (Gezondheidsraad, 2000c). There are clear differences in insight between care providers in various European countries as regards the limitations to be placed on the use of intensive care (Rebagliato et al., 2000). Dutch physicians appear to be more reluctant than many of their colleagues in other countries to initiate intensive treatment in a hypothetical case if the prognosis for the child is very poor (De Leeuw et al., 2000). Dutch and English physicians appear to be readier to take the wishes of the parents into account in such situations.

Less use is made of the possibilities for prenatal screening in the Netherlands than in other European countries. In 1998, only 45% of pregnant women aged 36 or above underwent a floccculation test or amniocentesis. Evidence for Down's syndrome was found in 1% of these cases, and 95% of the mothers concerned opted for termination of the pregnancy (Rutz et al., 2002). The percentage taking part in this screening in 1990 was higher, viz. 56%. This reluctance to undergo screening may explain why the Netherlands has a relatively high percentage of newborn children dying of neural-tube defects compared with other countries (Achterberg et al., 2001).

also relevant, between rich and poor, between the healthy and the sick, and between young and old.

The link between accessibility and health outcome is less obvious than it is with *efficacy*. However, inadequate contact with the care sector is one of the reasons why active interventions can be less effective in practice (Van der Meer & Schouten, 1997). Obtaining direct proof that loss of health results from long waiting times, for example, is no simple matter. Deaths are merely the tip of the iceberg in this case. The effect will usually take the form of pain or diminished mobility, for example, and absence from work while waiting for an operation, or stress through uncertainty about the significance of symptoms, while waiting for a diagnostic investigation.

A positive point is that the Netherlands has a comparatively extensive package of care provisions amounting to almost 10% of GDP (or 8% according to the OECD definition). What is more, accessibility is reasonably uniformly distributed across different population groups (*text block 2.37*). Furthermore, the provisions have a reasonable regional distribution (although several locations fail to satisfy the accessibility norm for acute outpatient and emergency care; see Van der Veen et al., 2001; the National Atlas of Public Health), and there have been additional initiatives to reach non-Dutch speakers. Nonetheless, there is a case for investing even more in care for deprived groups in neighbourhoods, incorporated in an integrated approach to health (*text block 2.37, see also section 2.3.2*).

In spite of the above reasons for optimism, the problems with accessibility of care have recently increased. This is due to deteriorating shortages of capacity in almost all sectors, organizational compartmentalization with (at least until recently) excessively tight budgets combined with supply control and a changing care demand behaviour. There is therefore a discrepancy between supply and demand, combined with a rigid structure (see also SCP, 2002). These problems manifest themselves in the waiting lists (*text block 2.35*) and the personnel shortages (*text blocks 2.36* and *2.38*).

Since 1998, annual budget growth in the care sector has increased from 1.3% to 2.4%, partly on the basis of the PHSF 1997 forecasts (Post & Stokx, 1997). The government that took office in July 2002 raised this amount slightly to 2.5%, and made a number of additional investments (VWS, 2000b). Various analyses have shown that the extra resources deployed since 1998 have brought about a genuine improvement in production, but that, for a variety of reasons, they have not yet led to a reduction in waiting times.

Accessibility and changing demand for care

The assertive citizen is demanding an increasing number of guarantees from the government and others in order to be protected against undesirable risks (see also *section 2.3.2*). The care client has also changed. Expectations are high and there is less acceptance of the fact that the doctor is unable to solve all problems, and this is exacerbated by the publicity given to numerous success stories about medical breakthroughs. On

Text block 2.31: medication use: higher expenditure but also more effective

Medication is an important treatment option for nearly all the 53 diseases dealt with in this report. The supply of pharmaceuticals in the Netherlands has grown strongly during the past few decades, between 25 and 35 new active agents being added to the list each year (Egberts & Leufkens, 2001). The costs of pharmaceutical aid (excluding self-medication and the medication used in hospitals and nursing homes) show a higher annual rise than the overall costs of health care, amounting to 10 to 11% per annum in the period from 1998 to 2001. The rising costs are due both to increases in the price of the medication concerned and to increases in the amounts consumed. A particularly large rise is seen, for example, in antidepressants, cholesterol-reducing agents (see *text block 2.20*) and gastric-acid inhibitors.

Does this mean that pharmaceuticals are making a greater contribution to the health gain? Broadly speaking, this is probably so (see e.g. *text block 2.26*). The detailed picture is more varied, however. On the one hand, pharmaceuticals are only licensed for use when their effectiveness has been demonstrated in clinical trials. On the other, this does not mean that they are always effective and safe enough in practice, or that they are better than existing medicinal products.
We will illustrate this with reference to a few examples (see also Timmerman & Van den Berg Jeths, 2001):

- Antibiotics have been available since the 1940s, and have made a substantial contribution to the rise in life expectancy since then. However, the effectiveness of existing antibiotics is being reduced by the development of resistant organisms (see also *text block 2.34*).
- Insulin has saved the life of many patients with type 1 diabetes mellitus. The many oral antidiabetic drugs have made a substantial contribution to delaying the onset of complications in type 2 diabetes mellitus.
- Opinions are strongly divided as to whether a new generation of antidepressants, the selective serotonin reuptake inhibitors (SSRIs) is more effective than the older tricyclic antidepressants (TCAs) (Bijl & Verhoeven, 2002).

Text block 2.32: Adverse effects of the use of pharmaceuticals can be limited

The use of pharmaceuticals may have undesired and unintended adverse effects on health as well as positive effects. Apart from the known and 'accepted' side effects of such substances, these adverse effects can be due to individual variations in patient characteristics, interaction between various agents and incorrect use or dosage.
Despite prolonged research during the development of pharmaceuticals, it is not always possible to predict such effects in advance. Good post-marketing surveillance can however help to deal with some of these problems (Egberts & Leufkens, 2001).

A number of studies of hospitalization or death due to side effects or undesired effects of medication have been carried out since the 1980s, especially in the USA and Australia. It was calculated in a recent meta-analysis of 64 studies (Beijer & De Blaey, 2002) that if the findings were extrapolated to the Netherlands this would indicate that about 8% of all hospitalizations (or a total of 131,000 admissions) could be ascribed to this cause. The proportion is several times higher in the elderly, while it is estimated that about 30% of these cases are avoidable.

One possible way of improving this situation involves a more active role for the pharmacist. A recent study of 142 pharmacies showed that 4.3% of doctors' prescriptions were changed by the pharmacist on such grounds as dosage problems, risk of interaction with other medication, contraindications or double medication. Twenty-two percent of the changes could have had a clinical effect (Buurma et al., 2001). The pharmacist can play a particularly important role in cases of multiple medication, e.g. in the treatment of heart failure (Bouvy, 2002).

average, the citizen is better informed on health and new medical technology than in the past, but has yet to develop a satisfactory care demand behaviour. On top of this comes the political trend towards demand-driven care and customer orientation. All these tendencies make for a rising demand for care. Okke & Lamberts (2000) identified three categories of practice in the current 'post-traditional medicine': (a) 'evidence-based', (b) non 'evidence-based' but still medically justified, and (c) neither of the above two. The doctor is increasingly expected to act according to (a), but the client is increasingly demanding (c). If we wish to continue to foster a demand-driven system, we have no choice but to attempt to channel the flood of medicalized life problems in some way or other (Kooiker, 2002).

Accessibility and opinions

There is considerable public and political interest, and substantial dissatisfaction, with deficiencies in the care sector. This trend is not yet clearly visible in care sector public satisfaction surveys, but the Netherlands achieves no better than an average score with respect to the accessibility of extramural care (*text block 2.39*). A relatively recent Social and Cultural Planning Office (SCP) survey (SCP, 2002) revealed that a significant percentage of the Dutch population find the quality of care to be mediocre or poor (varying according to sector: from over 20% for medical care to more than 60% for care for the elderly). For all sectors, those who see a deterioration outnumber those who see an improvement. The main factor behind this assessment seems to be dissatisfaction with waiting lists. Care users are far more positive, particularly on expertise and customer orientation, but not on the continuity of care. Moreover, a majority is not prepared to pay more for care (SCP, 2002).

A Health care Inspectorate (IGZ) and VWS survey of the causes of the persistent gap between supply and demand identified rising demand and personnel shortages, in addition to organizational and financial obstacles (Bon & Van der Maten, 2002). This survey was based on semi-structured interviews with a large number of care sector employees (see also *text block 2.33*). The survey also mentioned an unsatisfactory personnel policy. These observations are consistent with analyses made by RVZ (2001a). Some respondents in the VWS study even stated that many of the waiting list problems could be solved rapidly through better logistics and planning. A recent survey by Elsevier among medical personnel also painted a picture of growing dissatisfaction with the scope for practicing the profession satisfactorily (Van Leeuwen & Wansink, 2002). The solutions identified by respondents include improvements to working conditions and more extensive training. They considered the enhancement of market operation through the active intervention of insurers to be far less important.

The specific place of nursing and residential care

Much of the above is applicable to both *cure* and *care*. However, special attention is appropriate for the *care* sector, because the ageing of the population and the reprieve from premature mortality and morbidity is causing a shift from *cure* to *care*. *Care* now accounts for a very considerable proportion of the total costs in the care sector (*section 2.4* and *chapter 3*).

Text block 2.33: Local examples of care chains for stroke

The term 'care chain' (or integrated care) is used to denote situations where the planning and execution of care for individual cases extends over several care sectors. Trials of integrated care for stroke are under way in various parts of the Netherlands. One study covering six different regions showed that the Delft region offered the best conditions for an effective care chain. It was further found that this region had the fewest shortcomings in the care offered, as regards both content (adequate diagnosis and therapy, rapid availability of a hospital bed) and organization (transfer of dossiers, multidisciplinary involvement), which might be thought to have an influence on recovery. Finally, the study showed that the patient group in the Delft region was the healthiest (in terms of limitations on activities of daily living (ADL) and self-perceived quality of life). The following elements, among others, were mentioned as crucial to the success of this project: the presence of a specialized stroke unit in the hospital, early anticipation of the need to transfer the patient from the hospital to the next stage in the care chain, which is made ready in advance (thus reducing the duration of hospitalization) and the presence of a transmural nurse who has contacts with all the institutions involved and is thus able to prepare and offer guidance for implementation of a solution tailored to meet the needs of each patient (Huisman et al., 2001).

Text block 2.34: Antibiotic resistance: strict policy bears fruit in the Netherlands

A total of 2,218 cases of infection by invasive strains of *Staphylococcus aureus* were reported in the Netherlands in 2001. *S. aureus* is one of the main causes of infection in hospitals, and can spread easily. *S. aureus* infections were originally treated with ß-lactam antibiotics (including methicillin), but it did not take long for methicillin-resistant *S. aureus* (MRSA) strains to develop. The rise and spread of MRSA is facilitated by poor hygiene in hospitals and high levels of usage of antibiotics.

Data on the prevalence of MRSA in hospitals in the period from 1999 to 2001 shows large variations between different European countries, from less than 3% in the Netherlands and the Scandinavian countries to more than 30% in most Mediterranean countries, England and Ireland. During this period there was a particularly sharp rise in the prevalence of MRSA in Germany (from 10 to 18%) and England (from 33 to 45%). England thus currently has the doubtful honour of heading the MRSA league table in Europe. Strict anti-MRSA measures taken in the Netherlands and Scandinavia, involving such steps as the active isolation of infected individuals and appropriate hygienic measures in hospitals (two aspects of quality of care) have clearly borne fruit. Nevertheless, the Netherlands was not as 'clean' in 2001 as it was in 1990: during this period, the number of cases of MRSA among hospital staff and patients has roughly tripled, to about 400 (including non-invasive infections) (Rutz et al., 2002).

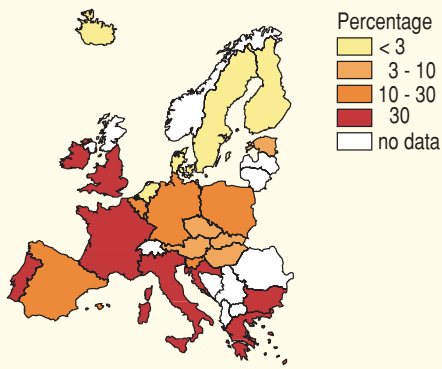


Figure 2.29 Percentage methicillin resistant Staphylococcus Aureus, 1999-2001 (in Malta: more than 30%, not visible) (Source: EARSS, 2001)

For a related infectious agent, *Streptococcus pneumoniae*, which can give rise to meningitis or bacteraemia as well as to respiratory tract infections (responsible for 5,100 invasive infections in the Netherlands in 2001), a clear relationship was found in ten EU countries between penicillin resistance and the use of ß-lactam antibiotics (including penicillin).
The Netherlands scores lowest on both these counts. Spain uses antibiotics five times as much as the Netherlands and shows a thirty-fold higher prevalence of resistance (34%) (EARSS, 2001; Bronzwaer et al., 2002).

In the case of *care*, the relationship between interventions and health gain is even more difficult to establish than for *cure*. The issue is by definition not so much one of healing, but of improvement (or postponement of deterioration) of quality of life. Measurable standards do not always exist here and the matter comes down to a perception of what constitutes a minimum of dignified care. However, some points of departure do exist. The fact that healthy life expectancy without disabilities exhibits a compression of morbidity that is not reflected in a reduced incidence of disease suggests that people with impairments are making more effective use of devices (*section 2.1*). According to the Social and Cultural Planning Office (SCP) report on individuals with a disability (De Klerk, 2002), there has been an increase in participation in many forms of leisure-time activity, especially cultural activities, on the part of those with a disability.

However, with respect to accessibility, the situation in *care* is at least as great a cause for concern as in *cure*. The length of the waiting lists and the capacity shortages in nursing and residential care persist (*text blocks 2.35* and *2.38*), in spite of the recent expansion of capacity. Sometimes acute cases are also involved here, such as the chronic care that is necessary following a hospital admission for a fractured hip. In this connection, we would also like to mention the inspiring example of the integrated care for stroke (*text block 2.33*).

Initiatives for comparing care institutions

There is a recent trend for comparing the quality of care institutions and providers through the transparent presentation of *quality indicators*, to enable consumers and insurers to make well-informed choices. Such comparisons have recently been published by the Consumers' Association (Sluyters, 2002) and Elseviers Weekly (Van Leeuwen & Wansink, 2002), in the form of report figures and rankings for a large number of hospitals in the Netherlands. The assessments were based almost completely on the opinions and experiences of patients or medical personnel and were mainly concerned with aspects of patient orientation, accessibility or (internal) organization. They were not based on the measurement of medical-technical quality.

It is likely that, for the time being, consumers will be influenced mainly by patient orientation and accessibility. On the other hand, those in the medical field and insurers actually do want data to be available on medical-technical quality (outcome or process). Indicators therefore need to be developed for this very area in the interests of balanced benchmarking (Council for Public Health and Health care (RVZ), 2001b; see also a worked example for mental health care: GGZ-Nederland, 2000).

Various authors draw a distinction between indicators for internal use, which are oriented on quality improvement within the organization, and indicators for external use, which are relevant for consumers, insurers and the Inspectorate (BMG, 2002; Berg & Schellekens, 2002). The use of 'internal indicators' for drawing up 'public' league tables can easily undermine the quality of that data, thereby leading to a failure to achieve the desired quality improvement. The question is, what are our objectives here? Do we want to point the finger at the 'less well performing' or, conversely, to create a positive stimu-

Text block 2.35: Waiting lists and waiting times: political hype or sign of a failing system?

Waiting lists have always been a feature of the health service, and to a certain extent they serve a useful purpose. However, they have been growing longer in recent years and people have become more critical of the delays involved; as a result, waiting lists have become a social and political issue (VWS, 2001). Since 1997, records have been kept of the waiting lists in virtually every hospital in the country. Records have also been introduced for some other sectors of the health care system. *Table 2.12* gives an overview of the results for the period from October to December 2001.

The table shows that in all cases, more than half the number of people on the waiting list at a given point in time have been waiting for longer than is considered acceptable. This does not mean, however, that more than half of all patients actually had to wait so long, since people who receive treatment quickly may not appear on the waiting list at all. Most of the waiting in hospitals is for orthopaedic surgery, general surgery, plastic surgery and ophthalmological treatment. If the figures are related to the total numbers of admissions (to give a clearer picture), we see that plastic surgery produces most delays, followed by orthopaedics. On an annual basis, per 1000 clinical admissions, approximately 700 people are on the waiting list for plastic surgery at any given point in time, while the corresponding figure for orthopaedic treatment is 250. On the (hypothetical) assumption of equal waiting times for all patients, this comes down to a waiting time of about six months for plastic surgery and two months for orthopaedics (Nienoord-Buré & Talma, 2002). In the care sector, the number of people waiting without interim care is particularly high for home care (more than 50%) with large regional variations from less than 10 per 1,000 head of population aged 75 or above in the northern Dutch provinces to 60 in the central part of the country.

What we would really like to know is what percentage of the patients treated in a given period had to wait longer than is acceptable. In the case of the care for the intellectually disabled, it can be calculated that 70% of those treated had to wait longer than the period of 13 weeks which is considered acceptable. Limitations imposed by the available data, however, mean that this kind of calculation cannot be made for most other sectors.

Comparison with previous data for October 1998 and 1999 shows that overall waiting lists and waiting times for hospitals and for the care sector have increased or remained stable, despite a rise in the level of resources available and in productivity. The care of the intellectually disabled (on a day-admission and residential basis) is one sector where waiting lists became shorter in the period from 1999 to 2001 (VWS, 2001, 2002c). Home care showed a similar fall between May 2000 and March 2001, but not thereafter (Taskforce, 2002).

Table 2.12: Waiting list data in four care sectors (Source: Polder et al., 2002).

Care sector, type (maximum acceptable waiting time)	Number on the waiting list*	Number on the waiting list for longer than the standard time
Hospitals, clinical (7 weeks)	74,600	42,700
Hospitals, outpatients (6 weeks)	85,100	43,800
Mental health care, extramural (6 weeks)	16,900	11,200
Care of the disabled, dwelling (13 weeks)	5,000	3,300
Nursing home care (4 weeks after indication)	11,400	9,100
Home-care services (4 weeks after indication)	40,000	29,100

* Dutch population in 2000: 15.9 million.

Text block 2.36: Few physicians per head in the Netherlands; growing shortage in the primary care sector

According to the OECD database (2002 edition, data for 1999), the Netherlands has a very small number of physicians working in the care sector compared with the rest of the European Union. This applies to both GPs and specialists (*figure 2.30*). While problems exist concerning the comparability of such data between countries (it should be noted that strenuous efforts are being

lus? If we wish to create a stimulus, we will have to exercise great care when selecting the information for use in a public comparison of institutions. We note that experience in the United States has shown that the influence of their extensive disclosure of information still has a limited effect on the behaviour of the consumer, and that it is no more powerful than confidential information as a stimulus for quality improvement among care providers (Geubbels, 2002).

2.3.4 Finally: conclusions and provision of information

Prevention: dilemmas are prompting an integrated approach and structural investments

The recommendations of PHSF 1997 for further evaluation of preventive interventions still apply. Furthermore, the efficacy of many promising prevention initiatives has still to be properly investigated. Recent experience lends more weight to the necessity of an integrated approach that is customized for the target group and which incorporates continuity. The dilemmas have to do with the tension between collective interests and individual choice, and the need to view prevention in a long-term perspective, in an era that focuses on short-term results. If we take the unfavourable trend in the prevalence of risk factors as a criterion (*section 2.2*), the success of prevention in recent years has been modest, in spite of a multitude of initiatives. Therefore, it is high time to translate what we have learned into integrated action, supported by structural investment, in order to prevent loss of health in the future. *Chapter 4* makes a number of relevant, firm recommendations.

Care: closing the gap between supply and demand by both investment and innovation

The emphasis on health gain as an objective of care gives direction to renewal in the care sector, which is necessitated by the widening gap between supply and demand. Renewed interventions must be *more effective* (and/or more efficient, see *section 2.5*) than existing ones. Integrated care can be more effective and better targeted to demand than in sectors of segmented care. *Safety* can be enhanced by better implementation of 'best practices', by learning lessons from successful trial projects, by specific registration in quality systems and a matching model for inspection. In terms of *accessibility*, the growth in capacity of medical personnel is lagging behind other countries, and is even showing signs of stagnation. The solution lies in a combination of additional investments and the removal of organizational obstacles. *Chapter 4* covers this subject in greater detail.

The provision of information and the measurement of performance

We stated above that the efficacy of care can be measured by outcome or process parameters. Similar information is also necessary for the safety and accessibility of care, as well as for prevention with respect to the same aspects. This information is necessary in order to compare countries (macro level), or institutions (meso level), over time.

(continue text block 2.36)

made to resolve these problems), it is very unlikely that the low score for the Netherlands is an artefact. It may further be noted that the figures say nothing about the numbers of FTEs (full-time equivalents). The relationship between the total number of physicians working in the care sector and the number of full-time equivalents is influenced among other things by the proportion of woman doctors (many of whom work part-time). This proportion varies appreciably across Europe, from less than 30% in Luxembourg, Switzerland and Italy to more than 50% in Finland. The Netherlands occupies an intermediate position, with more than 34% (Eurostat New Cronos, 2002).

The present situation is largely determined by the long-standing policy of restricting the number of university students admitted to medical training, despite the fact that employment surveys have been indicating for a number of years that shortages could be expected in this field (Capaciteitsorgaan, 2001). It has recently been announced that a considerable extension of the number of medical training places has been planned (VWS, 2002b).

The number of GPs working in the Netherlands rose by 5.4% between 1996 and 2001, reaching 7,763 (Dutch population in 2000: 15.9 million) as of 1 January 2001 (Kenens & Hingstman, 2001). The number of training places has also been increased. Nevertheless, a growing shortage of family doctors is to be expected. The reasons for this include a growing number leaving the profession, a rise in the proportion of woman doctors (60% for the 2000/2001 cohort) coupled with an increasing desire to work part-time (expressed by both male and female GPs) and a rising demand for care. The *Capaciteitsorgaan* (a body set up by the minister of Public Health, Welfare and Sport to provide advice about future requirements for GPs, specialists and dentists) recommended on the basis of calculations by Nivel that the annual inflow of new GPs should be raised to 670 by as early as 2001 (Capaciteitsorgaan, 2001; Van der Velden & Hingstman, 2001). The Ministry of Public Health, Welfare and Sport has recently announced that it aims to extend the capacity of training courses for GPs by more than 50%. This will only bear fruit in the long term, however. In the meantime, the number of unoccupied practices is growing: the Dutch Association of GPs (Dutch abbreviation LHV) estimates that half a million inhabitants of the Netherlands are already without a GP (see the Association's own website, www.lhv.nl). Nivel is currently carrying out a study to identify the regions with the greatest shortage of GPs.

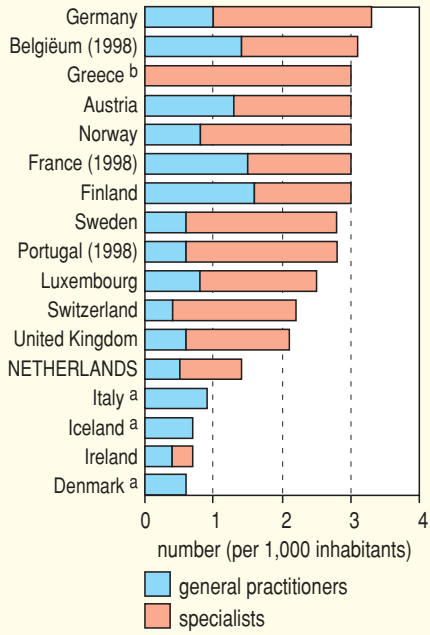


Figure 2.30: Number of general practitioners and specialists per 1,000 inhabitants in European countries, 1999 (Source: OECD health data, 2002).

a) no data for specialists
b) no data for general practitioners

Text block 2.37: Relatively equal access to care for different socio-economic groups in the Netherlands

The aim in the Netherlands is to achieve equal access to health care (for those with a specifically defined level of health) for all. A longitudinal study of the use of health care services carried out in the environs of Eindhoven has shown that groups with lower socio-economic status (as determined on the basis of educational level, but corrected for state of health) make relatively intensive use of the services of GPs, but relatively little use of the services of specialists. The remaining high intensity of use of GPs' services can be explained solely on the basis of differences

(continue text block 2.37)

in the tendency to request care. This is in agreement with the results of studies performed in other countries. Most of the major ethnic-minority groups in the Netherlands show a similar pattern of behaviour, though the under-utilization of the services of specialists is sometimes even greater (Stronks et al., 2001). When affected by chronic diseases, members of groups with low socio-economic status tend to make less adequate use of health care services (and to modify their lifestyles less adequately). The health care given to groups with lower socio-economic status may also be less effective (Van der Meer, 1998). An American study has shown that prejudice and other barriers to effective consultation can lead to less adequate care for minority groups (Smedley et al., 2002). In comparison with other countries, socio-economic differences appear to have relatively little effect on the frequency of surgery in the Netherlands, though some under-utilization by lower socio-economic groups cannot be excluded (Westert et al., submitted for publication). It has been suggested on the basis of such data and by the persistent socio-economic differences in health (Programmacommissie SEGV-II, 2001) that a higher level of uptake of health care services by lower socio-economic groups might be justified.

A number of trial projects based on this approach have already been set up. Of these, the local multidisciplinary and multisectoral health care networks in Rotterdam seem to have been particularly successful, largely thanks to the fact that the services offered were tailored to the needs of the users by integrating preventative measures with care and adopting the same preconditions as in community intervention projects (see also section 2.3.2). In other countries, there is often less equality in the uptake and availability of care; this is especially true in the USA (Smedley et al., 2002; Wagstaff & Van Doorslaer, 1999). In a league table set up by the Ministry of Social Affairs and Labour (SZW) in 2000, the Netherlands scored well as regards the effect of income bracket on both health differences and differences in the accessibility of care.

However, such information is largely unavailable, and even less internationally comparable. From the viewpoint of data gathering, a distinction can be drawn between the efficacy/safety of interventions and the extent to which they are actually applied. As stated above, the major problem area is the absence of evaluation studies for *prevention*. Recent studies are shedding new light on a more flexible evaluation method, involving a broader range of assessment criteria (WHO, 2001b). A recent initiative, the Quality of Interventions (QUI) project, sets out to coordinate and improve data on the effects and the application of prevention projects, on a national basis. For *care*, data on efficacy under ideal conditions and in practice is gathered by the Cochrane Collaboration (Van der Meer & Schouten, 1997). Part of the data on the application of care is maintained in medical registrations (Prismant). The sector reports issued by the Ministry of Health, Welfare and Sport (VWS) will make an increasing contribution (for prevention, see Rutz et al., 2002). Much of the data, for example on personnel and facilities, is difficult to compare internationally because of differences in the organization of care systems. However, comparability is being improved within the framework of the 'system of health accounts' (OECD, 2000b).

Chapter 4 presents a framework for measuring performance on a macro level. Its example-based contents are evidence of the fragmented nature of the availability of data on outcomes and relevant process characteristics of prevention and care, which are also comparable internationally to a certain extent. A great deal of specific data is required at the diagnosis or treatment level if performance and costs in care and prevention are to be measured at a meso level. Furthermore, patient-level information on the process through the entire care system is required to facilitate insights into the effects of chain care. We deal with this topic in more detail at the end of *section 2.4*.

Text block 2.38: Capacity problems in nursing and care

In a recent report on dementia by the *Gezondheidsraad* (Netherlands Health Council), it was calculated that an extra 1,300 places per annum would be needed in nursing homes to deal with this problem up to 2010. This calculation was based on data for 2000, when there was already a shortage of such places. Informal care (see *text block 2.41*) does not offer a solution to this problem, as it runs counter to current labour market trends, to demographic changes and to the aim of the Ministry of Economic Affairs to raise the level of participation in the labour market (Gezondheidsraad, 2002a).

The capacity problems in nursing and care are also mentioned in the evaluation report 'Zorgen in de zomer' (Care in the summer) (IGZ, 2002b), about care in nursing homes and old people's homes. In 2001, indicators of unacceptably low levels of care were established which were intended to 'set alarm bells ringing'. Seventy-one reports of such unacceptably low levels of care, passed on via five different channels, were generated on this basis. The conditions most frequently reported were:

- structural departures from personal care plans;
- consequences of such deviations involving decubitus, incontinence and mobility;
- shortages of qualified personnel, in particular nurses;
- lack of supervision in psychogeriatric wards.

Another recent report by the 'Comité Zorg voor iedereen' (Care for All Committee) entitled 'Waar een rijk land arm in is' (Islands of deprivation in a rich country), concerning shortcomings in care reported by staff in old people's homes collected during a one-week survey (Helmer & Palm, 2002) gives moving and sometimes harrowing anecdotal evidence of low levels of care similar to those covered by the above-mentioned IGZ report.

Text block 2.39: WHO survey of 'Level of prompt attention'

WHO has developed a questionnaire dealing with the responsiveness of national health systems. This questionnaire covers seven specific topics, one of which is 'prompt attention'. Detailed questions are asked about the distance travelled to reach extramural care centres and the promptness with which the patient gains access to the care provider. A preliminary publication (Evans, 2002) gives results for 20 European countries in 2000-2001. On a scale from 0 to 100, the 'prompt attention' scores range from 25-35 (Italy, France, Sweden) to 50-60 (Denmark, Austria, Switzerland, Ireland). With a score of about 38, the Netherlands is in the bottom half of the table.

This score is appreciably worse than that achieved by the Netherlands for general satisfaction with the health care system, as expressed in the Eurobarometer survey. This is based on an annual review of the answers given to the question, 'Are you very / fairly / not very / not at all satisfied with our health care system?' (This is the formulation of the question put in 1999, which differs slightly from that used in 1996). More than 70% of respondents in the Netherlands were fairly to very satisfied in 1996 and 1999 as compared with less than 30% in Portugal, Italy and Greece and about 50% in England and Ireland. On the basis of recent developments, it would not be surprising if the Dutch scores were to show a downward trend. The percentage score for 1999 and the ranking of the Netherlands among the 15 EU countries surveyed (*table 2.13*) do not yet give any clear evidence of the existence of such a trend, however.

NYFER (2002) cites a drop in satisfaction from 7.9 to 6.6 (on a scale of 10) between 1999 and 2001. According to the website of this (restricted-access) source, this information was derived from an 'executive survey' exploring the responses to the question 'does the health infrastructure meets the needs of society?'

Table 2.13: Percentage of people claiming to be 'very/fairly satisfied' with the national health care system. (source: Eurobarometer, 1999).

Austria	83.4	THE NETHERLANDS	73.2	Ireland	47.7
France	78.2	Luxembourg	71.6	Spain	47.6
Belgium	77.0	Sweden	58.7	Italy	26.3
Denmark	75.8	United Kingdom	55.7	Portugal	24.1
Finland	73.3	Germany	49.9	Greece	18.6

2.4 How much care is used, what is it used for and by whom?

Chronic disorders are responsible for a significant part of health care use
Most care is used in connection with chronic disorders, such as intellectual disability, dementia, stroke and mental disorders, and not with major causes of death such as neoplasms. The health care use of patients with neoplasms can be high to extremely high per individual case, but because of the relatively short duration of disease (lung cancer) or the low incidence (oesophageal cancer), the proportion of neoplasms in the total cost of care is limited.

Health care use increases rapidly after the sixtieth year of life
As people become older, health care use increases ever more rapidly. This is true for both men and women, although the average health care use is higher for women than for men, which is connected not only with the medical care surrounding pregnancy and birth, but more particularly with women's higher life expectancy. Otherwise, the gender difference in health care use in the Netherlands has declined slightly since 1994, as a result of the increase in life expectancy among Dutch men, but also of developments specific to individual diseases.

Health care use differs from one region to another
With the data available, it is impossible to map out the complete health care use per region, but sectoral analyses point to striking differences. Health care use in some regions is proportionally very high, and in others low. It also appears that substitution between forms of care plays a role. For instance, more home-care services are provided in regions where the hospital bed occupancy is lower than average. Further investigation is necessary to identify the precise causes of the differences between regions, oriented to aspects of efficiency and complementarity of provisions, but also in relation to regional differences in health status.

From an international point of view, the Netherlands is somewhere in the middle
In comparison with surrounding countries, health care use in the Netherlands is at an average level, which applies both to the scale of health care in terms of gross domestic product and for the average cost of care per capita. It appears that growth in the cost of care per capita has been lower than in the surrounding countries in past decades.

From health status to health care use

The health status of the population, and particularly ill health, gives rise to a need for care that leads subsequently to health care use via the balance between demand for care and care provision. In practice, this is a complicated process involving subjective elements such as the readiness to complain alongside more objective elements such as determining the indication and assigning care (*text block 2.40*). The need for care is therefore not automatically identical to the demand for care. Expectations of care may be too high, causing people make excessive demands on care providers. Poor understanding can also cause demand to be smaller than the need for care, or may deviate

Text block 2.40: From health status to health care use

The relationship between health status, the need for health care and health care use is visualized in a variety of models and diagrams in the literature. This variety is related to the care sector for which models have been developed and to the different theoretical approaches used to explain health care use. In the development of the PHSF conceptual model, it was decided to include only a limited number of concepts in the 'Health care use' block of the flow diagram.

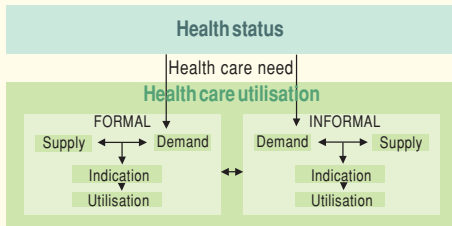


Figure 2.31: The conceptual model of PHSF: elaboration of the block 'Health care use' (Source: Ruwaard & Kramers, 1997).

from it in some other way. Furthermore, the demand from specific individuals may deviate from society's demand for care. Preventive care may be mentioned in this connection, as well as compulsory admissions to mental hospitals, for example.

This section covers health care use in greater detail. Rather than emphasizing the interactions of supply and demand and the process through which care is effected, it addresses questions such as: how much care is used and how is health care use distributed across diseases and disorders? Which disorders make the greatest demands on the care budget and what is the cost per case of disease? What are men's and women's share in the cost of care and how does the cost relate to age? What trends have taken place in recent years? Are there any regional differences in health care use and how does the Netherlands perform relative to other countries?
Health care use is extremely heterogeneous and comprises numerous facilities and activities. Accordingly, in this section, we describe it in terms of cost of care as a unifying measure. High costs point to substantial health care use, whereas low costs indicate limited health care use, with respect to formal care as it is delivered within the context of Dutch health care. Informal care is only indirectly involved (*text block 2.41*).

This section consists mainly of key statistics with a short explanation. More extensive information can be found in the PHSF theme report *Kosten van Ziekten in Nederland (Cost of Illness in the Netherlands)* (Polder et al., 2002) and the associated website (www.costsofillness.nl).

Text block 2.41: Informal care in the Netherlands
(Source: De Boer & De Klerk, 2001)

About 2.5 million people active in the informal care sector
In the Netherlands, caring for those who need it in one's own social network on a voluntary, unpaid basis is still taken for granted. This form of care is often known as informal care. It is generally given to the sick or disabled. In the period from 1997 to 1999, more than 20% of the population aged 16 years or over (about 2.5 million people) gave such help. This corresponds to about 10% of the total annual provision of health care, but the proportion does seem to be falling.
Informal care is generally provided to individuals with chronic diseases (9%), those with short-term diseases (15%) and the terminally ill (6%). Some of the informal carers provided support (mainly in the form of domestic help but sometimes also personal care and supervision) to more than one

(continue text block 2.41)

person.
Women and individuals in the 45-65 age group are relatively more active in the informal care sector, as are persons with a partner who needs such help and those within easy travelling distance of the person requiring help. Participation in paid employment has no influence on whether one provides informal care or not.

One in ten households receives help from the informal circuit
About 10% of Dutch households receive informal care in the course of a year. The recipients are mainly those with physical disabilities, the elderly (and very elderly), those living alone and the elderly living in rural areas. Little is known about the position of the elderly from ethnic minorities, but qualitative studies indicate that this group does make relatively frequent use of this form of assistance.

Waiting lists in the care sector place extra load on informal carers
Long waiting lists for home care and intramural care place an extra load on informal carers. Informal carers often pay a high price for the help they give, in the form of a lack of free time, inability to meet obligations and fatigue. An overloaded social network or a shortage of informal aid may ultimately force those requiring such aid to move into a home. This is particularly true of elderly individuals: 37% of the occupants of old people's homes and 70% of those in nursing homes (for somatic complaints) gave the absence of sufficient informal care as the reason for moving to the home. An effective social network can thus delay or even prevent the move to a residential home.

Forms of support for informal carers
Since 1997, home-care services have been able to offer informal care support in cases where a given person receives both informal care and home care. This support may take the form of psychosocial guidance, advice, instruction and information for the informal carers. Other ways of lightening the burden on informal carers include the provision of temporary care to allow the informal carer to take a break and activity centres for those requiring care. In June 2001, the Dutch cabinet created a structural fund of more than ten million euros for support to informal carers.

Costs of informal care
In principle, informal carers are not paid. Since 1995, however, individuals with an appropriate indication can be given a client-linked budget, that can be used to pay informal carers, but only a small part of the overall informal care is paid for in this way. Most informal carers do it out of the goodness of their hearts. If all informal care were paid for, the amount involved would at a very rough estimate be between four and five billion euros (the total 'formal' health care expenditure in the Netherlands was 36 billion euros in 1999).

Health care comprizes almost 10% of the Dutch domestic product

Dutch society expends a considerable proportion of its annual gross domestic product (GDP) on health care. In 1999, the amount involved was 36 billion euros, which is equal to 9.6% of GDP, a significant portion of which was for *cure* provisions such as hospital care (29.2%), primary health care (3.0%) and medicinal products (10.1%) (see *table 2.14*). *Care* sectors such as nursing and residential care (20.7%), care of the disabled (8.4%) and mental health care (7.1%) represented a substantial part of the total care budget. The scale of preventive care (3.9%) would appear to be limited, especially considering that half the amount referred to relates to occupational health care. However, many preventive activities are also carried out within other health care sectors and are therefore not identifiable as such in the cost figures.

Table 2.14 is based largely on the 2001 policy document on care from the Ministry of Health, Welfare and Sport (VWS). Every year, the ministry outlines a coherent picture of health care in a policy document, which includes developments and policy proposals. The 1999 policy document refers to a total amount of 32.7 billion euros of care expenses, but is nonetheless incomplete. For instance, it did not include dental care for adults,

self-care pharmaceuticals, spectacles and contact lenses, medical children's homes and infant day-care centres, occupational health care and facilities within the framework of the Services for the Disabled Act (WVG). Altogether, these add up to an additional 3.3 billion euros. *Table 2.14* and the remainder of this section do include this additional amount, bringing the total costs of health care in 1999 to 36.0 billion euros.

As mentioned earlier, we have restricted ourselves here to the costs of health care alone. However, many diseases cause numerous other expenses, which are referred to as 'indirect' and 'social' costs. Examples are absence through sickness and the costs of a wide variety of ailments connected with the disease. These indirect and social costs mean that the public cost is considerably higher than the cost of care.

Mental disorders demand the most care, followed by cardiovascular diseases

More than 82% of the total cost of care can be attributed to diagnostic groups, part of which can also be attributed to several risk factors (see *section 2.2*). The pattern for the 17 main groups of ICD-9 is roughly the same for men and women: high costs for mental disorders, cardiovascular diseases and disorders of the digestive system; low costs for diseases of the blood, congenital abnormalities and infectious diseases (*figure 2.32)*. A

Table 2.14: Cost of health care in the Netherlands in 1999. The costs of sectors in millions of euros and share (per cent) of the total (Source: Polder et al., 2002).

	Costs (millions of euros)	Share (%)
Hospital care	10,514	29.2
Primary health care		
- primary health care and health centres	1,074	3.0
- dental care	1,029	2.9
- paramedical care	778	2.2
- obstetric and maternity care	260	0.7
- social work (AMW), social and women's shelters	264	0.7
Medicinal products and medical aids		
- medicinal products 3,627 10.1 87	3,627	10.1
- medical aids & devices	1,599	4.4
Mental health care	2,550	7.1
Care of the disabled	3,015	8.4
Nursing and residential care		
- nursing homes	2,827	8.0
- residential care homes	2,916	8.2
- home-care services	1,626	4.5
Preventive care	1,406	3.9
Transport	820	2.3
Care insurance administration	1,646	4.6
Total	36,033	100.0

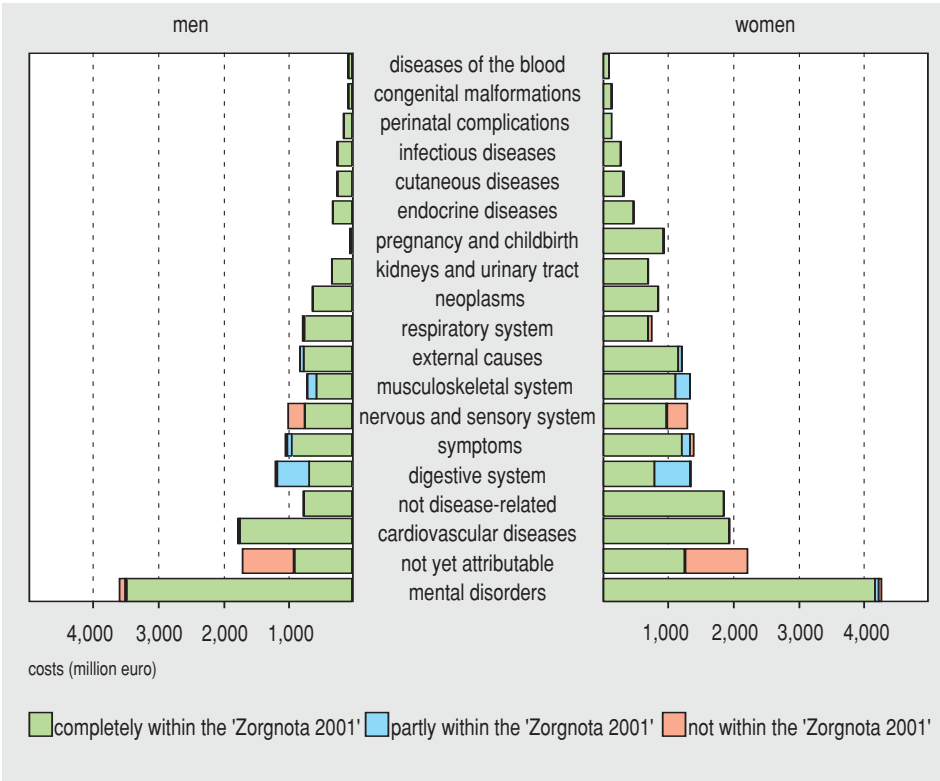


Figure 2.32: Costs of Healthcare in the Netherlands in 1999 by ICD-chapter and sex with an indication of the costs that are not or only partially featuring in the official healthcare policy framework (Zorgnota, 2001) (millions of euro's). Total costs in 1999: 36 billion euro's for 15.9 million Dutchmen. (Source: Polder et al., 2002).

striking observation is the relatively low cost associated with neoplasms (cancer). Accordingly, it is frequently occurring disorders with an intensive care requirement and a chronic nature that impose an especially severe burden on the total care budget, rather than the major causes of death.

Figure 2.32 shows the costs for various health care sectors and parts of sectors. This also includes costs that are mentioned only partially or not at all in Dutch ministerial health care policy documents, such as those for spectacles and contact lenses (nervous system and senses) and for dental care (digestive system).

Major differences in health care use between individual diseases

The pattern of *figure 2.32* can be elaborated according to the disorders selected for PHSF, both for the total costs and for the average costs per case of disease. This also indicates that major differences exist between different diseases in terms of health care use and costs. Diseases that make a great demand on the care budget often demand long-term and intensive care for large numbers of patients, such as intellectual disability (7.7% of the total costs), dementia (4.9%) and stroke (2.9%). Conversely, the total costs

for disorders that demand relatively little (expensive) care, such as eczema (0.3%) and most infectious diseases, are low. The public cost of diseases which demand substantial and expensive care, but which occur relatively infrequently, is also low, so total demand on the care budget remains limited. Examples are decubitus ulcers (0.2%), oesophageal cancer (0.1%), HIV and AIDS (< 0.1%).

Health care use by women is higher than by men

In the total cost of Dutch health care for 1999, the portion for men was 42%, and that for women 58%. The difference is caused by the care surrounding pregnancy and birth, and in particular by the higher life expectancy of women, which causes that the highest age groups comprise many more women than men (*figure 2.33*). Furthermore, Dutch women live more years in ill health than men and they more often live alone. All of these factors cause that Dutch women make greater demands on health care and that the average costs are higher for women than for men (see *section 2.1*).

Apart from these differences, it is the same disorders that generate a high degree of health care use for both men and women. This is true for total health care use and for care per disease case. The five disorders with the highest total cost are the same for men and women, except that the ranking is slightly different (*table 2.15*). This is also true for five disorders with the highest average cost per disease case (*table 2.16*). Slight differences occur between men and women within the five disorders with the lowest cost. These differences include work, sport and domestic accidents and urinary tract infections, with lower and higher average costs per disease case, respectively, for men.

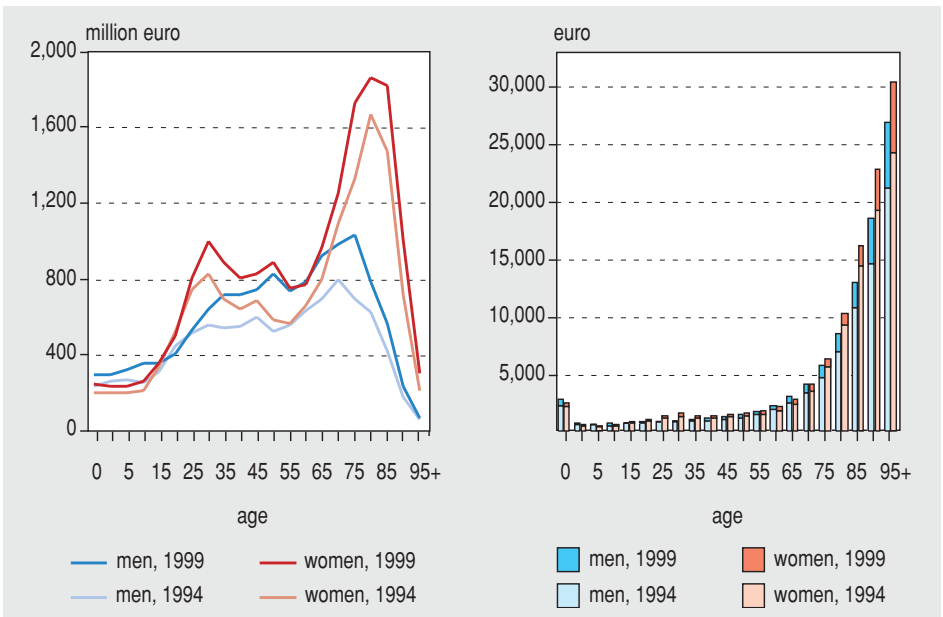


Figure 2.33: Total costs of Dutch health care (left, millions of euro) and average costs per head (right, euro) by age and sex in 1994 and 1999.

Table 2.15: Five disorders with the highest and lowest cost of care for Dutch men and women in 1999 (millions of euros and portion of the total costs for each sex in per cent) [a] (Source: Polder et al., 2002).

Disorders with the highest total cost of care	Millions of euros	%	Disorders with the lowest total cost of care	Millions of euros	%
Men					
Intellectual disability	1,554	10.3	Congenital abnormalities of the central nervous system	4	<0.1
Coronary heart disease	548	3.9	HIV and AIDS	10	0.1
Dementia	448	3.0	Congenital abnormalities of the cardiovascular system	10	0.1
Stroke	417	2.8	Osteoporosis	11	0.1
Work, sport and domestic accidents	368	2.4	Infectious diseases of the gastrointestinal tract	13	0.1
Women					
Dementia	1,313	6.3	HIV and AIDS	5	<0.1
Intellectual disability	1,226	5.9	Congenital abnormalities of the central nervous system	5	<0.1
Work, sport and domestic accidents	704	3.4	Oesophageal cancer	8	<0.1
Stroke	612	2.9	Congenital abnormalities of the cardiovascular system	10	<0.1
Coronary heart disease	345	1.6	Meningitis	12	<0.1

a) disorders for which it was impossible or irrelevant to calculate costs per case have been ignored to allow a pure comparison with *table 2.16*. This involved dental abnormalities in particular.

Table 2.16: Five disorders with the highest and lowest average cost of care per disease case for Dutch men and women in 1999 [a,b] (Source: Polder et al., 2002).

Disorders with the highest average cost per case	euros [c]	Disorders with the lowest average cost per case	euros [c]
Men			
Intellectual disability	26,000	Infections of the gastrointestinal tract	100
Dementia	25,000	Infections of the upper respiratory tract	130
Oesophageal cancer	23,000	Eczema	230
Hip fracture	21,000	Infections of the lower respiratory tract	270
Schizophrenia	14,000	Work, sport and domestic accidents	270
Women			
Dementia	33,000	Infections of the gastrointestinal tract	80
Intellectual disability	29,000	Infections of the upper respiratory tract	110
Hip fracture	27,000	Urinary tract infections	120
Oesophageal cancer	21,000	Eczema	210
Schizophrenia	13,000	Infections of the lower respiratory tract	270

a) the cost of collective prevention was not included, because it is unrelated to incident and prevalent cases of disease.
b) the cost was calculated on an annual basis. This means that for disorders with an average duration shorter than one year, the cost is the total cost, but for chronic disorders the cost is only that of one year. For these disorders, the cost per case of disease in terms of 'life-time costs' are therefore higher or much higher. This is true, for example, of intellectual disability, dementia and stroke.
c) rounded to 10, 100 or 1,000 euros.

Average health care use per head increases sharply with age

Health care use varies according to age (*figure 2.33*). The figure on the left confirms the above-mentioned pattern that the high total cost for Dutch women is attributable mainly to pregnancy and a higher life expectancy. The pattern for the average cost per resident is similar for men and women, and is determined completely by age (right hand figure). The cost per head is relatively high around birth, low and stable during childhood and adulthood, and rises increasingly sharply from 65 years of age. From the age of 70, the average cost for women is consistently higher than for men.

Demand for care shifts during life from cure to care

The elderly use so much care that they are the major source of the demand for care within almost all health care facilities and care sectors. However, if we examine the age groups for their relative share of the various sectors, interesting differences are revealed. For infants below one year of age, hospital care is by far the largest care sector, and for the oldest age groups the corresponding sector is nursing and residential care. This shift in health care use throughout life from *cure* to *care* is clearly visible in *figure 2.34*.

The cost increase is most marked in high age groups

In the period from 1994 to 1999, the cost of health care rose by 4.6% per year. The cost increase is shown in *figure 2.33* according to age and sex. In absolute terms, those age groups that had high costs in 1994 seem to show the greatest rise. The cost increase in this period has therefore followed the pattern of the cost distribution. The growth base of the cost per resident appeared to show no clear age pattern and was roughly equal, within a wide margin, for all ages.

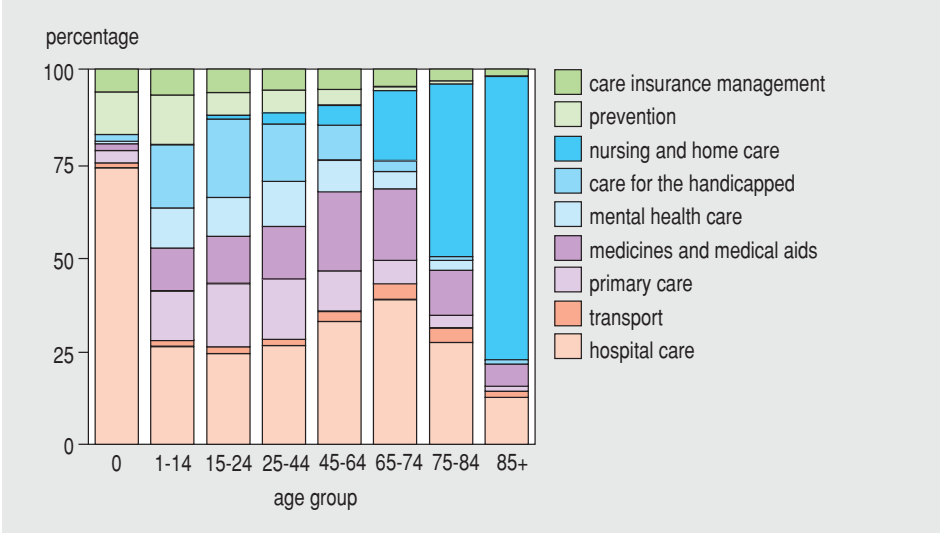


Figure 2.34: Share of healthcare sectors in total Dutch health expenditure by age group in 1999 (percentages). (Source: Polder et al., 2002).

The figure on the left relates to total cost development, including the demographic component, which can be deduced from the shift of the cost peak from 45 to 50-year-olds in 1994 to 50 to 55-year-olds in 1999. The figure on the right shows an increasingly pronounced age pattern in the average cost per resident of the Netherlands in this period.

In the period from 1994 to 1999, demographic changes caused costs to rise by 1.1% per year. It is striking that the cost for men has risen more sharply than that for women (4.4% as opposed to 3.5%), which means that the difference in health care use between men and women has declined slightly, particularly in the highest age groups.

Trends in health care use differ per diagnostic group

The developments in health care use and cost differ not only according to age and sex, they also differ greatly between different diagnostic groups. *Table 2.17* shows the five major ICD groups with the greatest increase in cost and the five with the least increase, or even a decrease. An investigation of this data reveals that, except for diabetes mellitus (endocrine diseases), no characteristic diseases of ageing are mentioned among the disorders with the greatest cost increase. However, this is partly a result of the heterogeneous nature of the ICD chapters. For example, the mental disorders chapter contains both dementia (a disorder of old age) and intellectual disabilities (which mainly occur among the younger age groups). Another example concerns disorders of the nervous system, which include both Parkinson's disease and epilepsy (*table 2.17*).

The costs of pregnancy, delivery and childbed and of disorders in the perinatal period rose considerably in the period from 1994 to 1999, particularly as a result of increased hospital care. A wide range of factors can be mentioned in this context: the increasing cost of fertilization treatments, a higher number of births in 1999 and an increase in the number of multiple births and premature infants. What is more, an increasing number of first children were born and Dutch women gave birth to their children at a higher average age (Achterberg & Kramers, 2001).

Table 2.17: Five disorders (ICD chapters) with the highest and lowest increase in cost for Dutch men and women in 1994-1999 (Source: Polder et al., 2002).

	Men	Women
ICD chapters with the greatest cost increase	Symptoms	Pregnancy
	Endocrine diseases	Symptoms
	Perinatal disorders	Perinatal disorders
	Infectious diseases	Diseases of the blood
	Diseases of the blood	Endocrine diseases
ICD chapters with the lowest cost increase	Congenital abnormalities	Skin diseases
	Musculoskeletal system	Congenital abnormalities
	Nervous system and senses	Nervous system and senses
	Kidneys and urinary tract	Musculoskeletal system
	Digestive system	Digestive system

The increase in health care use for the endocrine disorders diagnostic group is almost entirely attributable to diabetes mellitus, and is accounted for mainly by higher expenditure on medicinal products. This growth is even larger among men than among women, especially because they made more frequent use of hospital care. The underlying major trends in the cost increase for diabetes mellitus are the increase in the number of diabetes patients (resulting from better diagnosis, population growth and ageing) and the increasing number of overweight people (see *section 2.1* and *2.2)*. The more intensive treatment also plays a role (Herings et al., 2000; Lutterman, 2001).

The costs associated with infectious diseases and parasitic diseases have also increased by more than the average, somewhat more strongly among men than among women. This is mainly attributable to diagnostic groups with relatively low costs, such as meningitis and sepsis for both sexes, and HIV/AIDS among women. For HIV/AIDS, the costs of pharmacotherapy in particular have increased greatly.

Care for disorders of the nervous system underwent only a limited increase in the period from 1994 to 1999, both among men and women, especially through the declining cost of epilepsy in hospitals, which is partly the result of a different distribution of registered diagnoses in the specialist hospitals. It is unclear whether substantial trends are involved here, or simply changes in the recording of care.

Finally, health care use for disorders of the musculoskeletal system and the digestive system has increased slightly, which appears to be linked to restrictive measures in dental and paramedical care. However, the nature of the available data means that it cannot confirm whether these and other developments are genuine trends in health care use.

New insights through regional differences in health care use

Health care use differs not only according to disorder, age and sex, but also according to region. However, the data currently available does not allow an elaboration of the complete description above according to regional patterns, although it is possible to illustrate regional health care use for a number of specific forms of care. *Figure 2.35* maps out admissions and hospital bed occupancy, as well as the use of pharmaceuticals and home-care services per region. An examination of this figure reveals a number of points. Firstly, health care use in the Delft region is far lower than average, except for pharmaceuticals. Health care use is highest in the Breda region, except for home-care services. Furthermore, health care use in major cities such as Amsterdam and Rotterdam is also higher than the average. As a general pattern, it is noticeable that regions with a lower hospital bed occupancy have a higher than average use of home-care services, and vice versa. The Twente and North Limburg regions are an exception to this general trend.

We can pose several general questions in response to this overall survey. For example: does a given region exhibit extensive health care use because the state of health there is relatively poor, or because of the care provision available? It would appear that the relatively extensive use of hospital facilities and home-care services in the province of Limburg coincides with a relatively low healthy life expectancy (see *figure 2.4*).

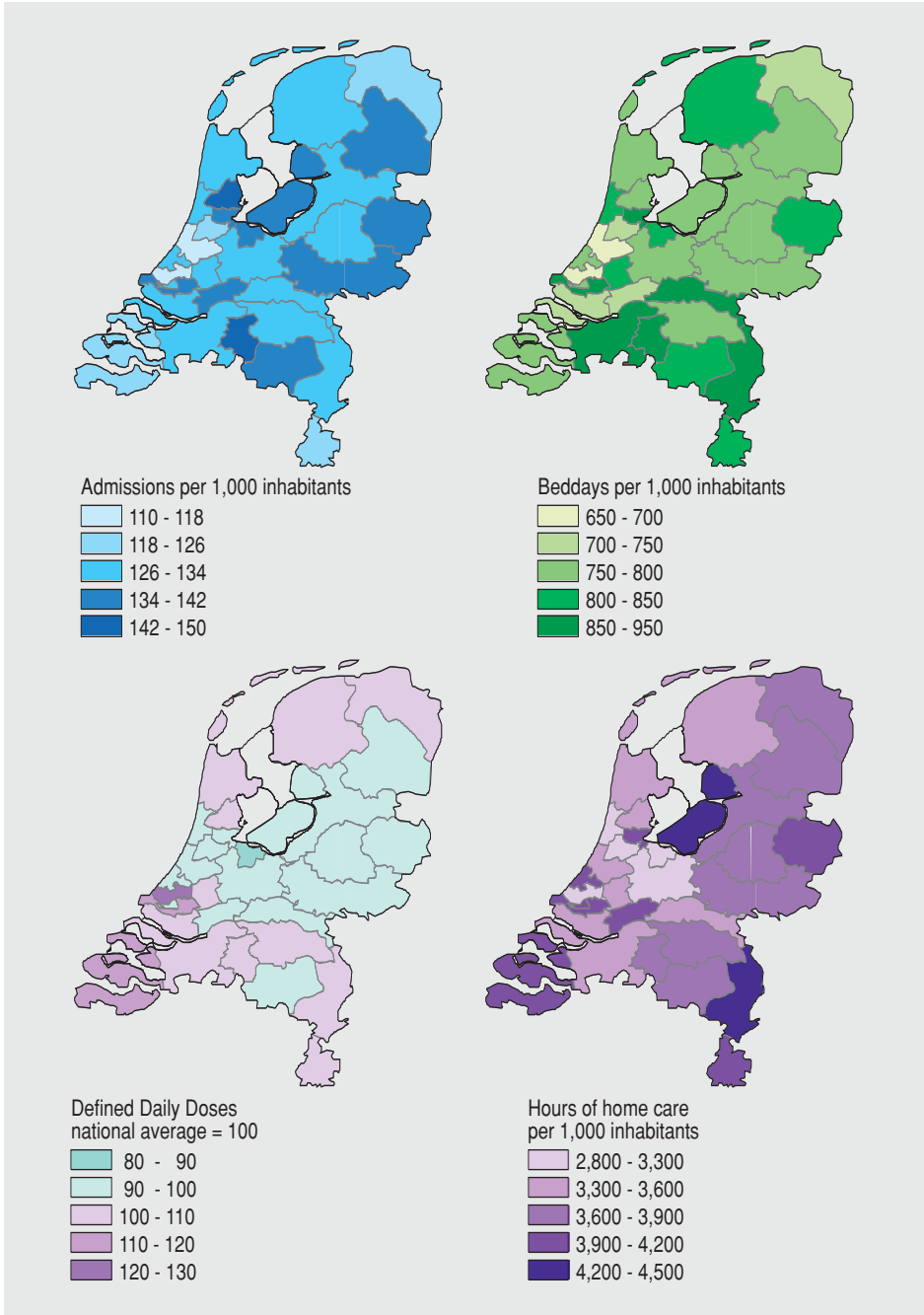


Figure 2.35: Regional differences in health care utilisation (corrected for age and sex) by AWBZ-regions. Number of hospital admissions, beddays and hours of home care per 1000 inhabitants in 1999 and prescribed medicines in 2000 (Sources: Polder et al., 2002; Van Batenburg-Eddes et al., 2002).

Conversely, however, it is also possible that high health care use leads to a better state of health. Another question is whether genuine regional differences are involved, or underlying factors such as socio-economic differences. Other questions are concerned with the organization of care. For example, can any conclusions be drawn about the possibility of substitution between forms of care, purely on the basis of regional differences? Do the patterns provide any clues about the efficiency and quality of care?

However, the currently available data gives rise to more questions on regional health care use than can be answered. What is clear, however, is that it is an important field of research with good prospects for generating new insights. The care maps constitute a useful instrument in this respect.

The Netherlands occupies a middle position in the proportion of gross domestic product

Health care use differs between countries, among other things because the demand for care also comprises a sizeable cultural component. The latter can be seen in terms of factors such as the use of pharmaceuticals, which is substantially lower in the Netherlands than in the surrounding countries. Large international differences also exist in the supply of care (see *text blocks 2.28* and *2.36*). For example, Germany has proportionally many more dentists than the Netherlands. Belgium has more pharmacies, but they are different in nature from those in the Netherlands, which is also true, for example, of nursing homes in Britain. There are also major differences in the way in which care is organized and funded. For example, Germans are able to approach a medical specialist directly, whereas in the Netherlands a referral from a general practitioner is required.

The OECD has made the total cost of care reasonably comparable by correcting for international differences in the definition and scope of health care. This is why the amount assumed for the Netherlands is lower than is usual within the Netherlands itself, and lower than that used in the previous examples in this section. *Figure 2.36* shows the contribution of health care to a number of countries' gross domestic product since 1975. The countries have been selected so that the graph shows the entire bandwidth for all OECD countries and also includes the countries surrounding the Netherlands. The United States has the greatest contribution of health care to GDP, at approximately 13%. Luxembourg's contribution of more than 6% is not even half as large. The Netherlands is in the middle of the spectrum.

The cost of care per inhabitant in the Netherlands is lagging behind that of other countries

Figure 2.36 shows the scope of health care measured against the prosperity of the country and not against the state of health or even against the size of the population. This is a clear disadvantage. It is therefore advisable to examine the cost per capita of the population as well (*figure 2.37*), which reveals two points. Firstly, there were large differences in the cost per resident in 1998. The United States had by far the highest cost, almost twice as high as in the Netherlands, despite having the largest group of uninsured people (who receive little care and generate only modest costs in that country). In Germany,

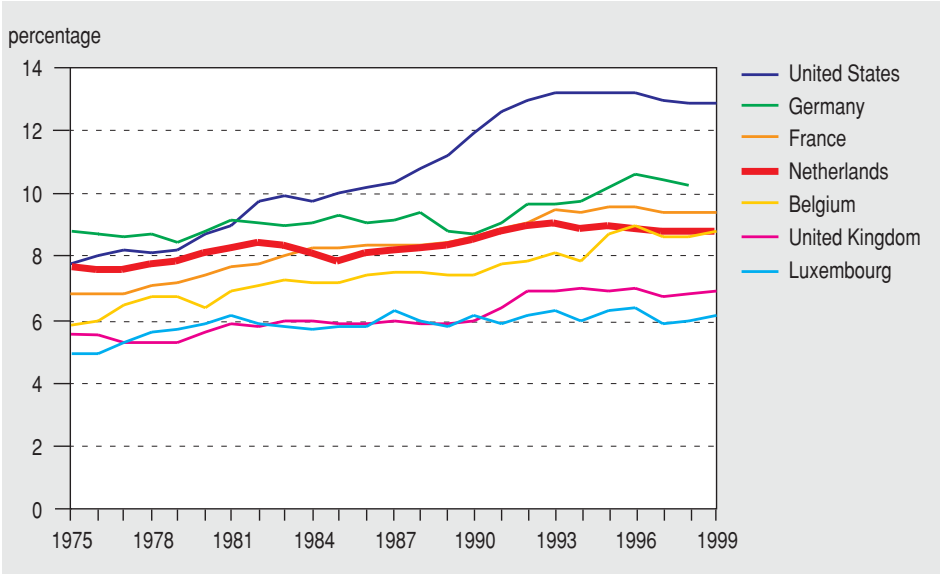


Figure 2.36: Health care costs as percentage of GDP in seven countries over the period 1975-1999 (Source: OECD Health Data).

France and Luxembourg, the expenses per capita were also higher than in the Netherlands, which indicates that in Luxembourg, unlike the United Kingdom, the low contribution of care costs to GDP is not associated with low health care use, but with high prosperity.

The gradient of the curves in *figure 2.37* shows how the costs per resident have developed in recent decades, relative to the 1998 level. This would appear to indicate that the Netherlands has undergone the lowest growth. The per capita cost of care in France, Belgium and Luxembourg has risen significantly faster. The same is also true for the United Kingdom, in spite of the fact that the level continues to lag behind the Netherlands. The fastest rise in the cost per resident has occurred in the United States, where by 1998 it was more than 90% higher than in the Netherlands, as against a mere 14% in 1975. Note that the above is not directly visible in the graph, which is based on 1998 and not 1975.

As long as there is no additional information or better comparable data on health care use in the various countries, we can only guess at the causes of these differences. One of the causes could be that the Netherlands' trailing growth figure is related not only to budgeting and other government policy but also to the fact that the ageing of the population in the Netherlands has proceeded more slowly than in other countries. Finally, it has to be observed that the Dutch government has invested additional funds in care since 1998. Unfortunately, the lack of comparable figures for the other countries means that none could be included here.

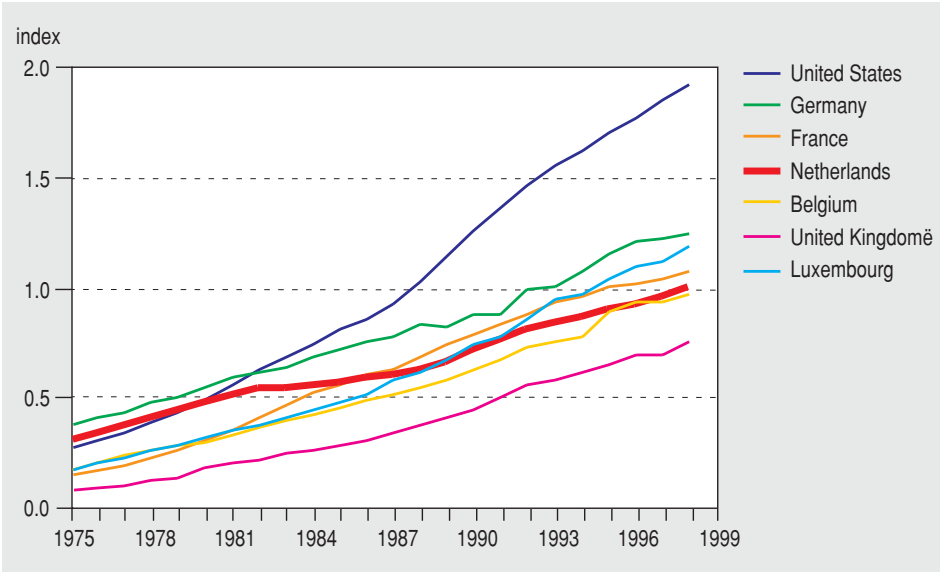


Figure 2.37: Trend in healthcare expenditure per capita for seven countries over the period 1975-1998 (index: The Netherlands 1998 = 1). Differences with the Netherlands in 1998 were calculated using dollar exchange rates. (Source: OECD health data, 2001).

Major patterns in health care use are the same for all developed countries

The OECD has included the distribution of costs over the 17 ICD-9 chapters in the Health Data database for a number of countries. These figures have not been corrected for international differences in health care, but were taken directly from the various cost-of-illness studies. *Table 2.18* gives an overview for six countries: Australia, Canada, the Netherlands, Sweden, the United Kingdom and Germany. The above countries were selected because the reference year of the studies roughly coincided and because each of them had a background report, which facilitated a better assessment of the comparability of the figures.

The table shows that the overall pattern in the distribution of health care use over the ICD chapters was roughly equal for all countries:

- high costs for mental disorders, cardiovascular diseases, disorders of the digestive system and the musculoskeletal system;
- low costs for congenital abnormalities, perinatal disorders and infectious diseases.

In spite of this comparable pattern, countries exhibit large differences in terms of major disorders such as mental disorders, cardiovascular diseases, diseases of the digestive system and of the musculoskeletal system. What is more, it would appear that several ICD chapters are missing in the UK figures and that for Canada and the UK the total costs do not add up to one hundred per cent.

Table 2.18: Cost of disease by ICD chapters in six countries. Contribution of ICD chapters to the total cost, with coefficient of variation (Source: Polder et al., 2002).

ICD Chapters	AUS [a] 1993	CAN 1993	UK 1993	GER 1994	NETH 1994	SWE 1991	Coeff. Var [b]
Infectious diseases	2.7	1.8	3.7	1.9	1.3	2.0	36%
Neoplasms	6.1	7.3	8.3	5.2	3.9	5.6	26%
Endocrine diseases	3.1	3.0	2.9	3.9	1.9	3.4	23%
Diseases of the blood	0.6	0.6	1.6	0.6	0.3	0.5	71%
Mental disorders	8.4	11.4	14.4	10.9	23.1	18.4	38%
Nervous system and senses	7.4	5.1	3.4	8.4	5.2	5.8	31%
Cardiovascular diseases	11.7	16.7	25.7	12.4	10.5	16.9	36%
Respiratory system	8.0	8.6	9.8	5.2	4.0	7.7	30%
Digestive system	11.8	7.5	8.3	15.9	7.8	4.6	43%
Urinary system	5.3	5.1	6.8	5.0	2.8	3.8	29%
Pregnancy	3.3	4.6	-	2.5	2.6	1.6	38%
Skin diseases	3.0	2.0	3.1	2.3	1.6	2.0	26%
Musculoskeletal system	9.5	5.6	7.3	12.6	6.0	5.4	36%
Congenital abnormalities	0.6	0.7	-	0.4	0.5	1.2	44%
Perinatal disorders	0.8	1.2	-	0.3	0.6	0.6	43%
Symptoms	4.3	4.2	-	4.7	4.8	5.6	13%
External causes	8.3	7.1	-	7.9	4.2	5.6	26%
Unallocated	5.1	1.2	-	0.0	18.8	9.2	111%
Total cost	100.0	93.8	95.3	100.0	100.0	100.0	

a) AUS = Australia, CAN = Canada, UK = United Kingdom, GER = Germany, NETH = the Netherlands, SWE = Sweden
b) coefficient of variation = standard deviation / average.

In the absence of standardization, international differences remain difficult to interpret

A more detailed study shows that there are three factors that account for differences in the cost-of-illness figures between countries. Firstly, there are differences in what falls within the scope of health care in a given country (Van Mosseveld & Van Son, 1998). Furthermore, most cost-of-illness studies do not include all health care sectors. Secondly, the cost contributions per ICD chapter differ as a result of methodological issues and, thirdly, because of differences in population and treatment practice. Examples of the latter category are differences in health care use and cost of care as a consequence of international differences in the state of health and the care requirement, as well as differences in treatment, where differences in both medical practice and cultural aspects play a role. A familiar example of a cultural aspect is the specific Dutch preference for giving birth at home. The large international differences in the number of Caesarean sections should also be mentioned (see *text block 2.28*).

The third category is without doubt the most interesting, because it provides an insight into the efficiency of health care systems. To date, however, the large differences in definitions and methods still obstruct analyses of this kind. Standardization is necessary to gain a better insight into international differences in health care use.

Finally: the provision of information is deficient in a number of respects

The complete description of Dutch health care use draws on virtually all care registrations that are available in the Netherlands, which are numerous. The Netherlands compares favourably in this respect with most other countries, where this type of investigation tends to be obstructed by the paucity of data. However, it should be noted that the quality of the Dutch data varies greatly, partly due to sample size, coverage and the recording method used. In addition, the data involved is usually administrative, and lags behind practice. For instance, the most important registrations in the field of care of the disabled still assume complete intramural care, although this is becoming increasingly uncommon in practice. Little is therefore known about the newer forms of care. Other registrations also omit various important matters. The Netherlands Medical Registration System (LMR) encompasses nearly all hospitals, but with respect to the care that they provide, reliable registrations are restricted to admissions, bed occupancy and operations. Data on diagnostics, laboratories, specialist units, intensive care, coronary care, renal dialysis and radiotherapy, for example, is either incomplete or entirely absent.

Another problem is that multiple registrations exist alongside each other in many sectors in the Netherlands. This is true, for example, of mental health care, where outpatient care, intramural care and outpatient addiction treatment and care each maintain their own registrations. The nursing home sector even has two competitive registration systems for the same type of care. This fragmentation encourages inefficiency and a loss of quality. Otherwise, much progress has been made in mental health care in recent years, including the introduction of the ZORGIS registration system.

Diagnosis data is indispensable for an epidemiological approach to health care. However, a number of care sectors do not record such data, the most important of which are outpatient care in hospitals, medicinal products and devices, home-care services and residential care homes. In addition, the data on diagnosis, age and sex is not recorded simultaneously in a number of registration systems, so that it is impossible to map out the costs multidimensionally.

A cross-sectional picture of complete health care use can be constructed by combining the data from a variety of registrations, so as to outline interesting patterns in health care use. However, an approach of this type provides no insight into the interrelationship between the care that is provided in the various sectors. It is impossible to determine the progress of a patient with a given disorder through the care system, although it would be extremely interesting from the viewpoints of care reform, decompartmentalization and efficiency. Such analyses require that data from the various registration systems be linked. To date, the feasibility of such linkage has been hampered by the lack of a unique number for care purposes and the inadequate recording of other identifying variables. Privacy aspects are also involved in the use of personal records.

Many care registrations change in the course of time, possibly because they were one-off registrations for a specific study, or because the purpose of recording or the recording procedures have changed. Such discontinuities in trends have so far hindered the

creation of a clear picture of the trends in health care use, which means that there is considerable room for improvement in the provision of information for health care research. The most important focal points are more coherence, linkability, continuity and filling in the gaps.

2.5 Are the benefits and costs in balance?

Efficiency is not a purely economic concept
The concept of efficiency in health care is always accompanied by issues of principle which deal with fairness, accessibility and solidarity. Efficiency is more than cost containment. The achievement of public health targets has the highest priority, but the efficient deployment of resources is important.

Prevention is often less expensive than cure
The cost of each healthy year of life gained varies considerably in health care. Preventive measures in the early stages of the disease chain are often 'more economical' than interventions at the end of the care chain.

Cost-effectiveness is only one of the values
Economic evaluations are a useful aid to making decisions on priorities and allocations in care and prevention. If cost is the only issue, prevention is not only better than cure, it is often also considerably less expensive, at least per year of life gained. However, population health status does not revolve exclusively around cost-effectiveness and cost containment, but also around solidarity, and the legitimate claim of everyone to protection, care and residential care.

Efficiency is more than cost containment

Sections 2.3 and *2.4* discussed the contributions of prevention and care to our health, health care use and the related costs. We discuss the relationship between health benefits and cost in greater detail in this section: appropriateness or efficiency. Since as long ago as the 1980s, 'efficiency' has been a key concept in the battle against rising costs in the care sector in the Netherlands (WRR, 1997). This concerns not only more appropriate care that is accessible to all, but also care that has to be provided with the lowest possible use of resources, or at least at acceptable costs (Lapré et al., 1999; Westerhout, 2000; De Kam & Nypels, 2001).

However, the focus of this debate is not such a black-and-white issue. The definition of *efficiency* depends strongly on the context. Efficiency is not a value-free, purely economic context. It can play a role in decision-making only if agreement exists on the 'goal' itself and all sorts of principles are taken into account. Efficiency is therefore more than 'moderation' alone, and not remotely synonymous with cost containment in care. The achievement of the goal has the highest priority, although it has to be accompanied by an efficient use of resources. For example, a sharp focus on efficiency can conflict with the principle of *equal accessibility*. Or, to state the case more clearly: if it

would be only a matter of efficiency, care budgets would concentrate on investing in prevention and care for young people. The fact is that young people make up the group for which the greatest health gain can be achieved at the lowest cost by far, whereas care for the progressively growing number of elderly people is relatively expensive (*section 2.4*). Neither does care for the elderly revolve primarily around health gain, but equally around good residential care and nursing, which is another major public health policy objective (see *chapter 1*).

Efficiency in care can also conflict with another principle: *solidarity*. Is a person who can be helped only with expensive care, for example, an organ transplant, less entitled to healing than someone who could be saved with a simple antibiotic? After all, people do not choose their own afflictions (Bonsel, 2001; Wanless, 2001). In other words, certainly in health care, the concept of efficiency is always accompanied by questions of principle surrounding fairness, accessibility and solidarity.

'Goal' and 'moderation'

Efficiency is always linked to a certain goal, which, however, may exist on one of many levels, or may vary somewhat from the point of view of the different parties. On the *macro level* of the national government, the goal is to maintain and improve the health of the entire Dutch population at the lowest possible social *cost* (see *chapter 1*). This means, for example, that as far as the national government is concerned, non-medical costs such as lost productivity also count.

On the *meso level*, the scope of the concept of efficiency is often more limited, and certain costs and benefits do not enter the equation. For instance, for a commercial *medical expenses insurer* in the current situation, efficiency is firstly a favourable ratio of income from premiums on the one hand to expenditure on care on the other (or, in a manner of speaking: the legitimate goal is 'shareholder value'). This means that 'bad risks', such as the elderly with a high probability of chronic disorders, will be avoided as much as possible, while 'good risks', for example athletic young people, will be attracted by offering them favourable conditions. It goes without saying that the insurer also benefits from an efficient provision of care, but, by way of example, the same effect can be realized by discharging patients from hospital sooner into publicly-funded nursing or residential care ('partitions between the sources of finance'). For *hospital management*, efficiency is related mainly to the production process: the goal is an optimum bed occupancy, an optimum utilization of specialists, supporting personnel, resources, equipment and budget, given the capacities of production agreements with the national government. However, this can give rise to divergent interests even within the hospital. For instance, 'wrong beds' can work to the benefit of management, because patients that are not being treated are relatively inexpensive, whereas they obstruct the specialist in accepting new patients for treatment. Finally, the patient does not move on in good time into residential care, nursing or home-care services.

On the *micro level*, the consulting physician opts for an intervention (or whether or not to carry one out). The emphasis here often lies more on the 'goal' (health, healing) and

rather less on the economic side, the 'moderation'. For instance, the doctor will have one more diagnostic test carried out in order to be sure, or will prescribe a more expensive medicine, especially if there are no visible cost disadvantages involved. Finally, for the consumer's own health (or that of the family), no price is too high, which is a legitimate position, and one that can also be fulfilled thanks to medical expenses insurance.

The finite nature of budgets obviously influences the introduction of an effective technology, even if the cost of health gain is low. A cost-effective intervention for which a large number of people are eligible can impose an enormous burden on the available budget (for example, Taxol or Viagra). On the other hand, a much less cost-effective intervention will be admitted, because the number of potential users is only small (for example, 'orphan medicinal products' for rare conditions).

The literature often distinguishes four types of efficiency. The focus can be on the technical *efficiency* of the process (*production*), on the utilization of resources - to make them provide as much value for money as possible (*allocative efficiency*), on the reduction of operational costs (*transaction*), or, more dynamically, on promoting the *development* of more efficient *technology* (Drummond et al., 1997; Lapré et al., 1999).

In other words, efficiency is a 'many-headed monster' where different players place a different stress on different levels between 'goal' and 'moderation'. In general, efficiency on the micro level of individual interventions can still be considered in a value-free analytical framework. However, the higher the level of the organization that is under consideration, the more the publicly supported principles of fairness, reasonableness and solidarity dominate the assessment of efficiency.

The cost per year of life gained differs greatly within prevention and care

Economic evaluation studies support discussions of efficiency. This has now become a flourishing branch within the health economy (Drummond et al., 1997; Rutten-van Mölken et al., 2001; Oostenbrink et al., 2001). Roughly speaking, the idea is to gain insight into the relationship between the benefits and the cost of care or prevention, mostly at the *(micro) level* of *interventions* and mostly from the perspective of *allocation*. If such a study is to be completed satisfactorily, it will of course require transparency and a certain standardization of the analysis (Drummond et al., 1997; Hutubessy et al., 2001). Such studies can take one of four forms:

- *cost (minimization) analysis*, which compares the cost of two or more alternatives;
- *cost-effectiveness analysis*, in which the monetary cost of two or more alternatives is compared with the benefits in (clinical) units of health gain, such as a reduction in symptoms or life-years gained;
- *cost-utility analysis,* in which monetary cost and benefits are expressed in quality-adjusted life-years; unlike the previous form, an attempt is made to assess the benefits in 'health coinage' that is usable for any condition;
- *cost-benefit analysis,* in which an attempt is made to express both the cost and the health benefits in monetary terms.

Table 2.19 shows a number of estimates of cost-effectiveness of interventions in different health care domains. Use was made of a series of databases that have been made available on Internet by various organizations (HCRA; US Dept. HHS CDC; NHS EED; the Office of Health Economics HEED; SWOV). In addition, various, sometimes raw, calculations for the Dutch situation have been included (e.g. Schoon et al., 2000; De Charro and Oppe, 1998; Puts, 2002; R&M, 2002). When making such comparisons, account must be taken of considerable uncertainties in the calculation of both the cost and the benefits. Significant differences in the calculation method can be related to:

- the *measurement* of the *benefits* (clinical measures, in life-years, possibly adjusted for health);
- the *costs* that are included (medical: personnel, equipment, transport, medicines and devices, or also social: productivity, cost of care);
- the situation that is used as a *reference* (no intervention or conservative medical treatment);
- the *time horizon* or *discount rate*.

Furthermore, the efficacy of (medical) technologies can improve rapidly. The statistics must therefore not be taken too literally. They only provide an indication of the order of magnitude, purely by way of illustration.

In *table 2.19* it is immediately obvious that there is an enormous variation in cost per quality-adjusted life-year. Disease prevention is often inexpensive, as are health promotion and safety in traffic and at home. Medical treatment covers the entire spectrum from cost-saving measures (it goes without saying that the prevention of medical and other costs may be subtracted from the investments) up to life-years gained expensively through impressive technologies. In addition, some environmental measures are extremely expensive. Research carried out in the early 1990s showed that, for the United States, limits on benzene emission in the tyre industry cost as much as 20 billion dollars per life-year gained (Tengs et al., 1995). However, it should be noted that the environmental measures often have additional benefits in an ecological or sustainability sense, apart from clean air, soil and water as values in themselves (Davis et al., 2002.)

Can we now conclude from the above that policy in certain domains is ineffective and that everything should be changed? Researchers from the *Harvard Centre for Risk Analysis* in America certainly think so. They claim that a more effective investment of funds for prevention would yield more than 200,000 life-years annually in the United States (Tengs et al., 1995). However, this statement is based on the most limited definition of efficiency, namely pure cost-effectiveness. As commented above, solidarity is a major aspect of health care, and we consider that everyone should be able to have expensive treatment paid for. Many environmental risks, however small they may be in scale and number, are often not accepted by the public because they are involuntary, because the advantages and disadvantages are not shared fairly or because doubts exist about whether the technology can be controlled. This is also reflected in Dutch regulations that are based on high levels of protection for the individual citizen (maximum permissible risk less than or equal to one in a million), in the first instance regardless of cost.

Table 2.19: Overview of cost-effectiveness calculations for a series of interventions in different population health status domains.

Costs: euro/QALY [a]	Intervention
< 0 (cost-saving)	National Vaccination Programme (NVP) (ZP) [b]
	PKU test, neonatal heel prick (DP)
	Screening of pregnant women for syphilis (DP)
	Influenza vaccination for chronically ill elderly people (DP)
	Smoke detector in the home (DP)
	Help with addiction to smoking (HP)
	Removal of lead from petrol and paint, stripping lead-based paint coats (HPt)
0-1,000	Mandatory safety belt (HPt)
	Disease coping training for asthma (MC)
	Screening and treatment of chlamydia (DP)
	Practical test for moped and autocycle (low-speed moped) riders (HPt)
1,000-10,000	Chlorination of drinking water (HPt)
	Specific vaccinations, e.g. meningococcus C (DP)
	Treatment of mild to moderate hypertension with beta blockers and anti-diuretics (DP)
	HIV screening of visitors to sexually transmitted disease (STD) clinics (DP)
	Surgery and after-care of congenital diaphragmatic hernia (MC)
	Influenza vaccination for all elderly people (DP)
	Pacemaker (MC)
	Cholesterol test and dietary advice (DP)
	Bypass operation (MC)
	Stroke units (MC)
	Viagra (MC)
	Mammography population survey (DP)
10,000-100,000	Heart transplant (MC)
	Hip replacement for osteo-arthritis (MC)
	Statins for patients with coronary heart disease (MC)
	Pneumococcal vaccination for the elderly (DP)
	Kidney replacing treatments (dialysis) (MC)
	Smear and treatment for cervical cancer (DP)
	Periodic automobile test (HPt)
	Treatment for mild to moderate hypertension with ACE inhibitors, etc. (DP)
	Airbags (HPt)
	Ban on asbestos in brake blocks (HPt)
	Helicopter trauma team (MC)
	Lung transplant (MC)
100,000-1,000,000	Reduction of radon in existing dwellings (HPt)
	Neurosurgery for malignant brain tumours (MC)
	EPO for anaemia in renal dialysis patients (MC)
	General measures for controlling Legionella in water distribution systems (HPt)
1,000,000	Measures for reducing industrial benzene emission in the USA (HPt)
	Earthquake-proof dwellings in parts of the USA (HPt)

a) QALY: according to quality-adjusted life-year.
b) DP: disease prevention, HPt: health protection, HP: health promotion, MC: medical care.

People would prefer their food and drinking water to be unadulterated, free of dangerous substances or microbes, irrespective of the scale of the health risks involved (Health Council (GR), 1995, 1996). In other words, like scientists, policymakers and politicians, the public perceives health, care, risk, and safety on the basis of a rich pallet of values, standards, feelings, political colour and religious and other convictions. In addition, it

goes without saying that the budgets available in the different domains are important. Figures for health benefits and cost form only one of the many aspects that shaped our assessment of the balance between cost and benefits (Health Council (GR), 1996).

There could also occasionally be an element of diminishing returns. For instance, in collective prevention, such as environmental hygiene, the simple, inexpensive measures were all taken long ago. New interventions are often relatively expensive. It is therefore worthwhile for the EU to help East European countries to improve their technology and to reduce the emission of dangerous substances (each euro invested has a higher return there than here). In principle, this is even more true for the contribution from the wealthy West to building up health care in developing countries. Conversely, inexpensive health gain would still appear to be achievable with health promoting measures directed at individuals. However, individual choice often stands in the way of effective measures.

Effectiveness of interventions within the course of one disease

In order to scrutinize the costs of different forms of prevention and care (*cure* and *care*), we can also investigate the different phases of one disease (see *figure 2.38*), where consideration is also given to the distribution of cost (investment) and benefits in time.

Our base is the course of chronic obstructive pulmonary disease (COPD), a group of chronic, progressive disorders. Approximately 300,000 patients suffer from a form of COPD In the Netherlands. In the later, more serious, phases especially, these patients experience a considerable loss of quality of life. A series of effective interventions can be identified throughout the entire course of disease, starting with different forms of prevention, medical interventions oriented to healing or improvement, and finally nursing.

Smoking cigarettes is by far the major cause of COPD. It is therefore possible to achieve a substantial reduction in the incidence of COPD with *programmes* aimed at not *starting* or at *stopping* smoking. This is possibly cost-saving, or costs at most a few hundred euros per life-year gained, according to a combination of the outcomes of several Dutch studies (Mudde et al., 1996; Mudde & De Vries, 1999; Rutten-van Mölken et al., 1999). The general practitioner can also *detect* possible COPD patients at an *early* stage by, for example, regularly measuring lung function where symptoms are reported. Through medication and lifestyle advice, among other means, the general practitioner can then

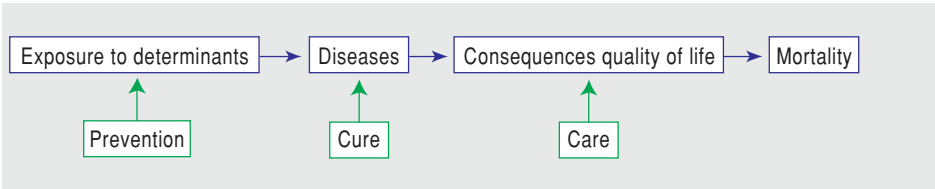


Figure 2.38:Scheme depicting the disease process and the role of prevention and healthcare (Source: Ruwaard & Kramers, 1997).

improve the patient's quality of life (secondary prevention). The related costs are approximately 30,000 euros per quality-adjusted life-year (QALY) gained (Van den Boom et al., 2001). Other forms of (tertiary) prevention, such as *support* in stopping smoking, *dietary advice* (malnutrition may occur in serious COPD) and *influenza vaccination*, are currently being investigated in the Netherlands (figures are not yet available). According to data from other countries, for patients with a heart condition help in stopping smoking is cost-saving or costs at most a few hundred euros per life-year gained (Brown & Garber, 1998). No Dutch data is (yet) available for *medication* (including antibiotics, mucus dissolving agents (NAC), and medicines that improve the flow of air (bronchodilators)). Studies in other countries often reveal costs in the order of magnitude of several tens of thousands of euros for each quality-adjusted life-year (Ruchlin & Dasbach, 2001). Furthermore, medical care can concentrate on improving the quality of life through what are known as *self-management programmes*, which teach patients to 'manage' their disease themselves, part of which includes adjusting their own medication if necessary. Dutch studies are still in progress, but studies in other countries have shown that a programme of this type is able to save costs with mildly to moderately ill patients (Gallefosse & Bakke, 2002). For seriously ill patients, there are programmes for *lung rehabilitation* (costs per 'well-year' on the basis of studies in other countries, 30,000 to 70,000 euros (Ruchlin & Dasbach, 2001). The main costs here are oxygen equipment and benefits in quality of life. The most cost-effective solution for oxygen therapy is determined on an individual basis, and depends, for example, on the patient's mobility (Kampelmacher et al., 2001). Studies from other countries show that for a small group of patients with COPD, as a consequence of a genetically determined alpha-1 antitrypsin deficiency, treatment costs may differ between 20,000 to a possible 210,000 euros per life-year gained. The large margin is based on uncertainty on the efficacy of the treatment (Hay & Robin, 1991; Alkins & O'Malley, 2000). Finally, *surgical interventions*, lung reduction or lung transplantation, are relatively expensive according to Dutch and foreign studies: estimates varied from 90,000 to 250,000 euros per QALY (Al et al., 1998; Ruchlin & Dasbach, 2001).

This example appears to bear out the old saying that 'prevention is better than cure', or in any case is less expensive. As always, however, things are rather more complicated in obdurate practice. Efforts aimed at prevention usually pay off only after a considerable time (and then by no means for everyone). Furthermore, many prevention measures have an impact on our cherished freedom of choice regarding lifestyle, which often make them less attractive. Also, there is no allocation of resources from care to prevention in practice. If patients can be offered an extension to life and an easing of their burden, we will pay a high price, irrespective of a person's past behaviour. In practice, more weight is given to accessibility (recall the public dissatisfaction with waiting lists) and solidarity than to health benefits, in particular where individual patients are concerned.

Undesirable surprises for national health expenditure?

Successful prevention could also have unexpected consequences. Although a high return in healthy years is to be had for a relatively low price, on a collective level, prevention can also lead to a considerable increase in the cost of care. Successfully deter-

ring smoking will greatly reduce lung cancer. As an often untreatable disorder, lung cancer is relatively inexpensive in terms of care, and furthermore it is fatal usually after a productive life. The successful prevention of lung cancer therefore causes a considerable increase of the inflow into expensive years of old age and care requirement, with the consequence of possibly higher public cost. A short time ago, a cigarette manufacturer caused a stir by cynically presenting the Czech government with a calculation that smoking ultimately had a favourable effect on the nation's ledger (see for example www.tobaccofreekids.org). Savings on pensions, care and residential help for the elderly tipped the balance. Nonetheless, the result of a Dutch study into the costs of smoking were less clear. Whether smoking saves costs on a macro level also depended on the discount rate, time horizon and whether or not certain social costs were included in the calculation (Barendregt et al., 1997).

What is healthy life worth to us?

Alongside the cost-effectiveness or cost-utility analysis, cost-benefit analysis is a form of evaluation in which the benefits are often expressed in monetary terms. Efficiency calculations are made easier by putting cost and benefits under one heading, namely money. Furthermore, it is easier to include non-health aspects on the benefit side. In principle, investments in the health domain are compared with investments outside, in economics, socio-cultural conditions or ecology. Obviously this form of analysis does not allow us to avoid the almost impossible task of expressing loss of life, life-years, or burden of disease in money. There are roughly two ways to produce these estimates:

- investigating how health risks that are related to certain risky occupations are allowed for in the differences in salary, or what extra amount people are prepared to pay for safer or healthier products (for example, cars with airbags everywhere, or houses in quieter surroundings);
- posing shrewd questions to find out what people are prepared to pay for one extra life-year or one year free of disease or disabilities (in the absence of data, costs of disease or loss of production is also used as a proxy, but these estimation methods are by their nature relatively unrepresentative of loss of health).

Significant methodological objections are attached to both methods in connection with the transferability of implicit (behaviour) or explicit (survey) preferences of people from one circumstance to another, including a series of shortcomings that are characteristic of all questionnaire-based surveys (Hoevenagel, 1994; Van de Berg & Rutten, 2002; Diener et al., 1998; Klose, 1999; Olsen & Smith, 2001). In terms of the value of a statistical life, the outcomes of the above-mentioned methods are nevertheless reasonably consistent. Americans, Canadians or Europeans give on average in the order of two million euros for their lives (1.5 to 7 million euros), which is approximately 70,000 to 80,000 euros a year at a discount rate of 3% (which for most of us is considerably more than our earning capacity, which is another commonly used proxy).

Having completed a thorough analysis of the increase in life expectancy against the increased cost of health care since 1970, researchers at NYFER conclude that we have nothing to complain about on a *macro level* with respect to cost-effectiveness (see also

chapter 1). For the four years of life expectancy that we have gained in thirty years, we only pay about 23,000 euros per year extra, on average (NYFER, 2000). It should be noted that the authors have assumed that a substantial part of these four years is also directly attributable to the care budget. In the macro-economic view of the researchers, the question is not whether we spend too much on health care, but whether the money is spent wisely, for example by giving priority to promising technologies, and improving the performance in poorly performing sectors (meso and micro levels).

As yet, there has been only a limited application of cost-benefit analysis to the health care sector (Anell & Norinder, 2000). It was soon evident that expressing mortality and other loss of health in monetary terms was often 'a bridge too far' for policymakers in the health care sector. They therefore resorted to more abstract measures, such as quality-adjusted life-years (QALYs). In the environmental domain, however, this kind of analysis has been of pivotal importance for ten years now. Its application became fashionable in the United States during the Reagan administration. He saw it as a means of simplifying what he saw as complex and extensive environmental regulation. In the meantime, the obligation to perform a cost-benefit analysis for new regulations is often incorporated in law, for example in the Clean Air Act. The EU also stimulates the application of this instrument, particularly in the area of air pollution and noise (Dusseldorp et al., 2001). Economic evaluations are also applied in the Dutch health care sector, for example when adding care interventions to the package of cover (for example transplant programmes), or in the introduction of preventive programmes (for example breast cancer screening). The submission of a cost-effectiveness dossier for new pharmaceuticals will become compulsory in 2005 (Van den Berg & Rutten, 2002).

In the early American and European cost-benefit analyses, measures for limiting air pollution achieved conspicuously high scores. These analyses often placed a generous value on a human life, with amounts varying from 1.5 to approximately 7 million euros per life lost. Each new case of chronic bronchitis attributable to air pollution was valued at 100,000 to 300,000 euros (Davis et al., 2002). In more recent studies, however, there is no longer an exclusive focus on mortality. Instead, an attempt is made to quantify the years of life lost, taking into account their quality. This usually leads to a considerably less rosy picture of the relationship between investments and health benefits, in view of the fact that most 'modelled' victims of air pollution are expected to be elderly people in fragile health and therefore no longer worth the full price ('harvest effects'). These studies also place greater relative weight on ecological and sustainability benefits (AHG-EAHEAP, 1999; Howarth et al., 2001).

If there is no longer an exclusive focus on the value of a statistical life (VOSL), but more account is taken of duration and quality (VOLY), this bridges the gap to the use of QALYs or disability-adjusted life-years (DALY)s, as used in cost-utility analyses. For instance, various attempts have been made to establish the willingness to pay for quality-adjusted life-years in a credible way (Bleichrodt & Quiggin, 1999). A number of analyses suggest that, for policymakers, the value of a quality-adjusted life-year is of the order of 20,000 to 50,000 euros (Melse & De Hollander, 2001). The study by Tengs et

al. (1995) into the cost-effectiveness of as many as 500 'life-saving' interventions shows that the distribution's centre of gravity lies between 10,000 and 100,000 dollars (see also *table 2.19*, Tengs et al., 1995).

3 OUR HEALTH IN THE FUTURE: PROSPECTS FOR 2020

Nobody can foretell the future, but that does not make us any less curious, or prevent us from searching for methods that still allow us a view of the future so that we can anticipate developments in our policy. In this chapter we concentrate on assumptions that can be formulated about the future health status of the population by studying trends in health-related factors, including the determinants and the autonomous developments addressed in *chapter 1* (see also *figure 1.2*). We begin by outlining the autonomous developments up to 2020 under the headings of 'demographic', 'socio-cultural', 'economic' and 'medical technology' trends.

3.1 Tomorrow's world: a brief impression

The future: both 'more' and 'less'
The next twenty years in the Netherlands will be characterized by 'more': more people, more households, more individual choice, more mobility, more information and communication technology, more diagnostic technology, more therapeutic techniques and more market forces. However, in some prominent domains the expectations are characterized by 'less': notably, less economic growth and less government control.

Demographic trends

The Dutch population (15.9 million in 2000) will increase by 1.6 million between 2000 and 2020. This trend will be paralleled by a continued rise in the number of elderly people. At present, one person in seven is aged 65 or over. This will rise to almost one in five in 2020. Meanwhile, the percentage of young people (aged 0 - 20) in the population is declining (Statistics Netherlands, population forecast 2000).

These forecasts by Statistics Netherlands (CBS) are based on, amongst others, the assumption that, in future generations, each woman will bear, on average, 1.75 children. The trend towards starting a family at a later age has come to an end and women will continue to have their first child at the average age of 29. The annual number of births will fall from 207,000 in 2000 to 193,000 in 2020. The growth in the (elderly) population will push up the number of deaths from 140,000 in 2000 to 174,000 in 2020.

In 2020, ethnic groups (western and non-western) will account for a quarter of the population, compared with one sixth in 2000. In the next two decades *western* ethnic groups will grow in size from around 1.4 million to almost 1.8 million. *Non-western* ethnic groups will grow more sharply: from 1.4 million in 2000 to 2.6 million in 2020. Consequently, in 2020 non-western ethnic groups will account for 15% of the population, compared with 9% in 2000 (Statistics Netherlands, population forecast 2000).

The number of households is expected to rise by one million in the next 20 years. This trend stems from population growth, but also from the fact that households will be smaller than before. The share of single-person households will rise from 15% to almost 18%. Institutional households (including residential care and nursing homes) will fall relatively sharply from 1.4% to 0.9%, largely because people will stay longer in their own homes (Statistics Netherlands, population forecast 2000).

Socio-cultural trends

Women will continue to close the educational gap between themselves and men. Meanwhile, the educational level of persons between the age of 15 and 65 (the potential labour force) will improve further. According to forecasts by Statistics Netherlands (CBS) and the Netherlands Bureau for Economic Policy Analysis (CPB), the share of the potential labour force with only elementary schooling will fall to around a third in 2020 and the number with higher education will increase to around a quarter.

Greater freedom of choice will result in smaller households, the independence of household members, personalized social insurance schemes and employment contracts, more homes, more cars and increased space consumption. The Social and Cultural Planning Office (SCP) predicts that this individualization will lead to *informalization*: more equality and the end of authority-based relationships (with more problems and conflicts relating to deference and respect) and traditional social institutions such as the church and political parties. Business and leisure, work and home will become increasingly intertwined and people will seek 'intensification' by attaching greater importance to the 'intense and conscious experience' of work, relationships, sport or leisure activities. The early 21st century will also see various expressions of hedonism: the reduction of inhibitions by means of drug-taking, group aggression and the aggrandizement of sexuality and sport. The mass media will respond to this trend and heighten it (Schnabel, 2000).

In the past few years subjective experience of (in)security has remained fairly stable (approx. 30% of the population feel unsafe). However, objectively, the situation has deteriorated in the main cities and in some neighbourhoods. Here, actual crime rates are higher and often go hand in hand with large problems related to liveability. No significant decline is expected in the crime figures in the near future (Maas-de Waal & Van der Torre, 2000).

The correlation between educational levels and health is particularly strong. Generally speaking, people with a higher educational level enjoy better health (see *sections 2.1* and *3.2*). The downside of the socio-cultural developments outlined above is that more people will experience stress, loneliness and a lack of social support. Increasing urbanization and rapid social change might also add to the emergence of these mental health problems (Maas & Jansen, 2000).

Economic and political trends

In the 1990s the economy boomed in the Netherlands. The forecasts that were compiled before 2001 were also highly optimistic. But 2001 brought an economic downturn,

which was further exacerbated by the terrorist attacks of 11 September. The upshot was that the economic growth of most industrial countries – including the Netherlands – came to a virtual standstill. The CPB analysis for 2003-2006 is based on the expectation that the economy will recover somewhat and that annual growth will even out at around 2.5% (CPB, 2002). However, these prognoses are constantly being revised downwards. Given the variability of the economic trends in the past few decades, it is unlikely that the trough will continue until 2020.

Technology is progressing rapidly and leading to further growth in the knowledge economy. Meanwhile, ICT is still triggering changes in products, production methods, markets, corporate structures and labour patterns. The demarcation lines between communication, media presentation, advertising and information are fading (Schnabel, 2000).

Women will increase their participation in the labour market. The size of this increase depends on many factors, not least childcare facilities, the taxation system, the labour market and social amenities (CBS/CPB, 1997). At the same time, the participation of ethnic groups in the labour force will increase from around 7% in 1995 to between 12% and 16% in 2020. There are no signs of an impending large flow of highly qualified immigrants from developing countries or Eastern Europe with an educational background relevant to the Dutch labour market. Though the educational level of the potential ethnic labour force will improve greatly, the ethnic population will grow to such an extent that it will be more strongly represented in the lower levels of the labour market. In 2020 ethnic groups will make up approximately half the workforce in the lower levels of the labour market (people with only an elementary education) as opposed to a quarter in 1995 (CBS/CPB, 1997).

Another economic trend expected in the coming years is a decline in the agricultural land use. This will not, however, be enough to fulfil the requirements of housing, industry, infrastructure, sport & leisure, wildlife and landscape. Over a quarter of the surface of the Netherlands will be used for a new purpose in the coming decades (Ministry of Housing, Spatial Planning and the Environment (VROM), 2001). We shall have to find spatial solutions that will intensify and combine functions. The growing need for recreational space is creating problems, especially in the *Randstad* (highly urbanized western part of the Netherlands), where it looks as if there will be an even greater shortage of green recreational space around the cities. Easily accessible green space is important and a determining factor for the quality of the living environment (RIVM, 2002).

The principle of centrally steered social change will be further eroded as the government increasingly finds itself dealing with educated and emancipated citizens who have their own ideas about what is best for them. The national government will increasingly try to find solutions in market forces and by devolving more powers to local authorities. Stronger market forces will be reflected; not only in the privatization of government services, but also in the structure of the health care sector (e.g. a more prominent role for private clinics, insurance companies being given a role as coordinators). The government will have to rethink many of its policies and tackle dilemmas. The dilemmas it

faces in terms of law and order include preventive policy versus repressive policy, supervision versus individual freedom and public-sector versus private-sector responsibility (Maas-de Waal & Van der Torre, 2000). The government will also face some awkward dilemmas when drafting its policy on health and social welfare. We shall return to this theme in *chapter 4*.

Internationalization is cutting across borders, distance and time. Internationalization brings a stronger influence by the EU, multinationals and NGOs, but also unlimited tourism and (worker) migration. In this border-free world, national governments are losing their power to multinationals and large NGOs (Herz, 2002). European legislation and regulations have an ever stronger impact on tobacco and alcohol advertising, food ingredients and additives, the availability of new drugs and the ground rules for the health care system (notably in matters of competition and accessibility). Cross-border health care will increase, but the question is whether it will increase to such an extent that it will affect health.

Medical technology trends

Many aspects of health care have progressed enormously in recent decades as a result of advances in medical technology. On balance, *diagnostic technology* has so far developed faster than *therapeutic techniques* (WRR, 1997) and will probably continue to do so in the years ahead. However, better and earlier diagnosis means that existing treatments can be more effectively applied in many cases.

The unravelling of the human genome makes it easier to isolate genetic abnormalities that cause hereditary disorders, but the therapeutic options are currently lagging behind. Another important associated trend is the shift from the treatment of *diseases* to the prevention and treatment of *risk factors* (Wanless, 2001; Mos et al., 2002). *Section 3.3* addresses this subject in detail.

Tomorrow's world: possible solutions

In *section 3.2* we present some projections and discuss the potential effects of sociodemographic trends on the future health status. As forecasts are available for these trends and because they are known to be health-related, it is possible to present these effects in quantitative terms. We shall then address some major developments in medical technology. Here the influence on the health status is described mainly in qualitative terms (*section 3.3*). The aim of this kind of analysis is to determine how the health status in the Netherlands can change in the future under the influence of 'autonomous' developments.

Section 3.4 presents two analyses of the health status, which are based on developments in health itself or in health-determining factors, as discussed in *chapter 2*. The PHSF for 1997 also contains some examples of this type of prospective analysis (Ruwaard & Kramers, 1997; Van den Berg Jeths, 1997). Given the international perspective of this PHSF, we are basing the two analyses on health differences in Europe. The first relates to mortality differences in Western Europe, classified according to cause of death. The second relates to differences in the prevention of six risk factors.

3.2 Socio-demographic projections

Population growth and ageing lead to strong increase in chronic diseases
According to Statistics Netherlands (CBS), male life expectancy will rise from 75.5 in 2000 to 78.0 years in 2020. The increase in female life expectancy will be lower, i.e. from 80.6 to 81.7 years. The number of patients with a chronic disease will rise by 25-55% in the next 20 years because of population growth and ageing. The increase will be higher for men than for women.

Better education and changes in marital status significantly influence health
The effects of ageing on the health status will be reinforced by shifts in the marital status of the population. Conversely, higher levels of education could – at least partly – cancel out the effects of the ageing population (provided the relationship between health and all these factors stays the same in the future). The results suggest that, apart from population growth and ageing, other socio-demographic factors may have a profound effect on the health status of the population.

3.2.1 The effects of population growth, ageing and dejuvenation on the health status

Ageing and dejuvenation
The first question in socio-demographic surveys is: how do population growth, ageing and dejuvenation affect the health status? According to the CBS forecast of 2000, the population will grow by 10.3% from 15.9 million in 2000 to 17.5 million in 2020. The over-65 cohort will grow from 13.6% in 2000 to 18.4% in 2020. The increase will be sharper for males, mainly because the probabilities of dying are declining faster for men than for women (see *text block 3.2*). Men are also subject to 'double ageing': the percentage of men over the age of 80 is increasing slightly in relation to the percentage of men over the age of 65. Meantime, the percentage of women over the age of 80 will fall slightly in relation to the percentage of women over the age of 65. The representation of the 0-20 cohort in the overall population will drop from over 24% in 2000 to over 22% in 2020. The expected changes in the Netherlands for six age groups between 2000 and 2020 are shown in *figure 3.1*.

Compared with the population forecast of 1996 – which was used as the departure point for PHSF 1997 – CBS has not only revised its assumptions on births, deaths and migration, but has also employed a new forecasting method (see *text block 3.1*).

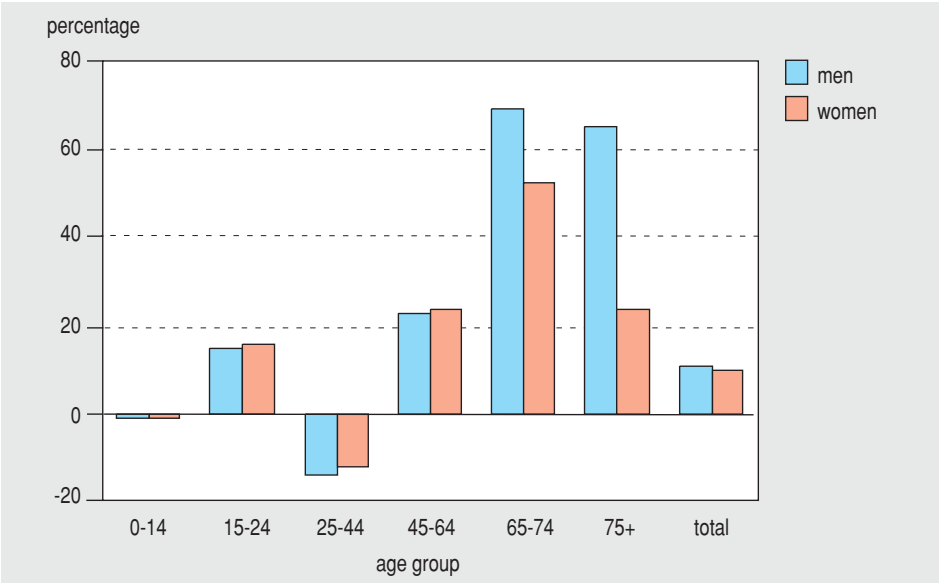


Figure 3.1: Changes in the Dutch population size (in percentages) subdivided by age and gender in 2000-2020 (Source: CBS population forecast 2000, data processed by RIVM).

Text block 3.1: CBS population-forecasting method since 2000

CBS reviews its long-term forecast every two years with the time horizon at 2050. Up to 1998, it presented a low, medium and high variant, but in 2000 it adopted a new system (De Jong, 2001). The forecast describes a plausible population trend on the basis of assumptions about births, deaths and migration. The uncertainty involved in making such a forecast is reflected in a probability distribution. This system provides an upper and a lower limit with a probability of two out of three that the future population will lie somewhere in-between (67% forecast interval). The lower limit of the 67% forecast interval for the overall population in 2020 is 16.8 million and the upper limit is 18.1 million (CBS, 2001). This report will make no further use of these upper and lower limits.

Longer life expectancy, especially for men

According to the CBS population forecast, female life expectancy at birth will increase from 80.6 years in 2000 to 81.7 in 2020. Male life expectancy is expected to rise from 75.5 years in 2000 to 78.0 in 2020. The difference between the life expectancies of men and women will therefore decrease from over five years in 2000 to slightly less than four years in 2020 (see *text block 3.2*).

Strong rise in disease cases due to population growth and ageing

Changes in the number of new and existing disease cases have been calculated for the 53 selected illnesses and disorders listed in the PHSF. The starting point is the CBS population forecast of 2000 and the assumption that the incidence and prevalence figures will remain the same for each gender and age group (see *chapter 2*). The results are clustered according to the degree of change (see *table 3.1*).

Text block 3.2: Assumptions about mortality in the CBS population forecast 2000
(Source: Van Hoorn & De Beer, 2001)

A new element in the CBS population forecast is an explanatory model for mortality. This model is based on life expectancy observations for the entire 20th century and takes account of six effects:

1. *Smoking*. The effect of smoking on male life expectancy was greatest in the 1970s. This effect falls to two years in the forecast period (up to 2050). For women the effect of smoking on life expectancy was less than one year in 2000. This is expected to increase to two years in the future.
2. *Traffic accidents*. The effect of traffic accidents on life expectancy rose between the 1950s and the early 1970s and then subsided. For the long term the CBS sets this effect at zero. In other words, it will not lead to a deviation from the life expectancy trend.
3. *Rectangularization*. The survival curve is becoming more rectangular: life expectancy at birth will increase, mainly because more people out of every 1,000 births will grow old and, to a lesser extent, because elderly people will be living even longer.
4. *Antibiotics*. It is assumed that since the introduction of antibiotics life expectancy at birth has consistently been almost 1.5 years higher than it had been before.
5. *Intrinsic gender-related difference*. Life expectancy at birth is a few years longer for women than for men. The gender-related difference is assumed to be a constant three years in the future.
6. *Unforeseen events*. World wars and flu epidemics have had a negative effect on life expectancy in the 20th century. It is assumed that these unforeseen events will not have any effect on the long-term trend of life expectancy in the future.

Finally, in addition to the above six factors the CBS takes account of a residual trend for the unexplained aspects of mortality patterns in the past (an exponential curve). This trend is extended into the future. The CBS gives a number of reasons for not including any other causes or determinants of mortality (e.g. lifestyle, influence of medical technology) in the model: either there is not enough insight into the extent of their effects on life expectancy, or the effects may be interdependent (a model that includes the effects of smoking cannot also include smoking-related causes of death), or no assumptions can be formulated about the future trend (e.g. the effect of medical breakthroughs).

Table 3.1: The change in the number of new (i = incidence) and known cases (p = prevalence) of the selected diseases and disorders in 2020 in the Netherlands compared with 2000 (in percentages) as a result of developments in the size and composition of the population in terms of age and gender [a,b] (Source: CBS population forecast 2000; data processed by RIVM).

Change	illness/disorder
-6 - 0%	AIDS (i), multiple sclerosis (i), congenital abnormalities of the central nervous system (i), congenital abnormalities of the cardio-vascular system (i), Down's syndrome (i), extremely premature birth (i)
0 - 5%	Intellectual disability (p), asthma (i), constitutional eczema (i), congenital abnormalities of the central nervous system (p), congenital abnormalities of the cardiovascular system (p), industrial accidents (i), sport accidents (i), (attempted) suicide (i), violence (i)
5 - 15%	Infections of the gastro-intestinal tract (i), tuberculosis (i), meningitis (i), schizophrenia (i/p), depression (i/p), anxiety disorders (i/p), multiple sclerosis (p), epilepsy (i), influenza (i), asthma (p), infections of the upper respiratory tract (i), inflammatory bowel diseases (i/p), constitutional eczema (p), contact eczema (i/p), neck and back problems (i/p), traffic accidents (i), domestic accidents (i)
15 - 25%	Breast cancer (i), epilepsy (p), infections of the lower respiratory tract (i), gastric and duodenal ulcers (i/p), urinary tract infections (i), rheumatoid arthritis (i)

Continue table 3.1

Change	illness/disorder
25 - 35%	Sepsis (i), breast cancer (p), non-Hodgkin's lymphoma (p), diabetes mellitus (i), decubitus ulcers (i/p), rheumatoid arthritis (p), osteoporosis (i/p)
35 - 45%	Oesophageal cancer (p), colorectal cancer (i), non-Hodgkin's lymphoma (i), skin cancer (i/p), diabetes mellitus (p), dementia (i/p), Parkinson's disease (i/p), visual impairment (i), coronary heart disease (i/p), heart failure (p), stroke (i/p), age-induced and noise-induced hearing loss (i/p), COPD (i/p), osteo-arthritis (i/p), hip fracture (i)
45 - 55%	Oesophageal cancer (i), stomach cancer (i/p), colorectal cancer (p), lung cancer (i/p), heart failure (i), visual impairment (p)
55 - 67%	Prostate cancer (i/p), aneurysm of the abdominal aorta (i)

a) diseases and disorders ordered according to the ICD code.
b) no demographic projection of STD (i), alcohol or drugs dependency (i/p), mental disorders among children and adolescents (i/p), congenital or early hearing impairments (i/p), dental abnormalities (i/p), Down's syndrome (p) or health problems in full-term infants (i/p) due to the absence of suitable age-specific statistics.
c) a purely demographic projection of the number of cases of illness should be based on an 'adjusted' population forecast which assumes that the age-specific and gender-specific death rates are constant; after all, if incidence and prevalence are assumed to be constant according to age and gender then this also applies to mortality.

As expected, *table 3.1* shows only a slight rate of change (-6–15%) in diseases that affect all age groups or specifically the very young (including many infectious diseases). The growth rate for almost half of the diseases and disorders is between 25% and 60%. This relates particularly to diseases affecting the elderly. The increase therefore reflects the combination of population growth and ageing. The growth rates are considerably higher for men than for women. In some cases they are double, e.g. for dementia, Parkinson's disease, chronic heart failure, strokes and hip fractures (55-70% for men; not shown in *table 3.1*). This is partly attributable to the fact that life expectancy for men will increase more than for women. This data is especially useful when assessing the required (shifts in) health care capacity (see also *section 3.5*).

3.2.2 Effects of trends in martial status, education and ethnicity on health status

More widows/widowers, divorcé(e)s and single persons in the future

The second key question in socio-demographic surveys is: how can trends in marital status and education potentially influence the health status? The number of unmarried persons will rise sharply from 7 million in 2000 to 8.8 million in 2025. In the Netherlands unmarried men outnumber unmarried women by half a million both now and in the future.

There will also be more widows/widowers and divorcé(e)s in the future. In 2000 these groups were more or less even at 800,000. In 2025 there will be almost a million widows/widowers and some 1.2 million divorcé(e)s. Widows will outnumber widowers and

divorced women will outnumber divorced men. This situation is due to the difference in life expectancy, as women are, on average, married to men who are two years older. It is also due to the fact that more men than women remarry after divorce. The difference between the number of widows and widowers will fall slightly in the future, thus reflecting the smaller difference in life expectancy. The number of married persons will fall slightly from 7 million in 2000 to 6.8 million in 2025 (no data for 2020). Formal statistics on marital status do not offer a clear picture of actual 'cohabitation'. For example, in 2000 15% of couples who lived together were unmarried. In 2020 this is expected to rise to 25%. Data on the trend in marital status has been taken from the CBS household survey of 2000 (De Jong & Steenhof, 2001).

Married people have the fewest health problems, followed by persons who have never been married and widows/widowers; divorcé(e)s have the most health problems. Couples who live together have fewer health problems than single persons, after corrections for age, gender and education (Joung & Van Poppel, 1997). Differences in health are greater for the more subjective variables, such as self-rated health, than for objective variables, such as the prevalence of chronic diseases. The socio-demographic projection presented below shows the effects of changes in martial status on public health.

Higher levels of education

On average, Dutch people with higher levels of education enjoy better health than people with lower levels of education (Stronks et al., 1997). This is reflected not only in the incidence of diseases and disorders but also in the way health status is experienced and by the existence of long-term disabilities (see also *section 2.1*). *Figure 3.2* shows the

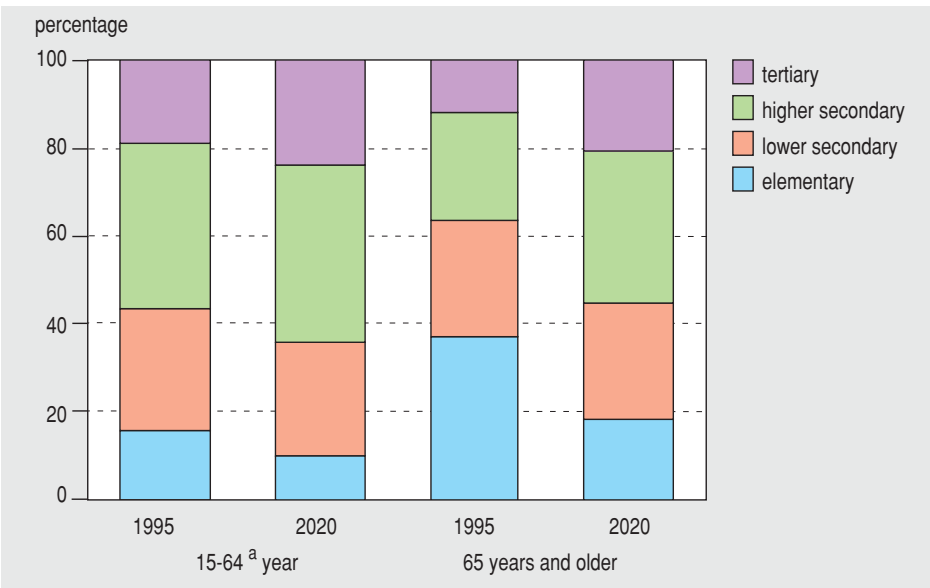


Figure 3.2: Forecasts of levels of education of the Dutch population aged 15 and over in 1995-2020 (Source: CBS/CPB, 1997; Herweijer, 2001).

a) excluding participants in full-time education.

further improvement in educational levels both for the potential labour force and for the elderly in the period 1995-2020.

Effects of ageing on the health status are heightened by fall in the number of married people, but mitigated by higher levels of education

Joung et al. (2001) have presented calculations of the effects of demographic changes in age, gender, marital status and education on the health status. In other words, they have added two factors to those of age and gender, which were addressed in *section 3.2.1*. Health is measured with three variables: self-rated health, the presence of chronic diseases and the presence of long-term disabilities. The calculation method is explained in *text block 3.3* and the results are shown in *table 3.2*.

Text block 3.3: Method for calculating the influence of demographic trends in age, education and marital status on the health status

(Source: Joung et al., 2001)

The calculations are based on the following sources and assumptions:

- Data on differences in health, classified according to age, gender, marital status and education, is taken from the CBS Health Survey, combining data for 1993, 1994 and 1995.
- The CBS 1996 household survey has been used to estimate the future composition of the population in terms of age, gender and marital status.
- Use was made of the CBS/CPB forecasts for the potential labour force (15-65 year-olds who do not participate in full-time education), supplemented by a forecast for the 65-84 age group (based on the CBS Health Survey 1991-1995, which assumes that the educational level of age groups above 65 remains constant).
- Finally, it was assumed that health differences according to age, marital status and educational level are constant throughout the calculation period.

Table 3.2: Prevalence statistics per 100 Dutch men and women [a] in 1996 and 2015, taking account of demographic trends in age, educational level and marital status (Source: Joung et al., 2001).

	Age	Age + level of education	Age + marital status
Self-rated health (less than good)			
Men - 1996	21.0		
Men - 2015	23.6	21.7	24.0
Women - 1996	25.3		
Women - 2015	27.5	24.8	27.8
One or more chronic disorders [b]			
Men - 1996	45.0		
Men - 2015	48.2	47.5	48.3
Women - 1996	54.7		
Women - 2015	57.2	56.4	57.3
One or more long-term disabilities			
Men - 1996	12.3		
Men - 2015	14.7	12.9	15.0
Women - 1996	18.7		
Women - 2015	21.2	18.2	21.5

a) age between 25 and 85.
b) the question in the CBS Health Survey covers 24 common (groups of) chronic diseases; the actual percentage of people with at least one chronic disorder is therefore greater.

Table 3.2 first shows the effect of ageing (conform s*ection 3.2.1)*, but this time the prevalence is relative and other health variables are presented. The ageing effect is reinforced by trends in marital status (though these are nowhere near as strong as ageing). If educational levels improve as anticipated, the age effect will be largely cancelled out for men and perhaps even entirely cancelled out for women.

More people belonging to western and non-western ethnic groups

Besides the above factors, we need to understand the effects of migration on health status. It is difficult to accurately forecast migration because social, economic and political developments on the European and world stage often trigger strong fluctuations in the annual migration figures.

The assumptions about migration in the CBS population forecast are specified according to country and the type of migration (family unification, asylum seekers, chain migration, work and study migration and Dutch nationals returning from abroad). These assumptions result in a declining positive balance from approximately 50,000 in 2000 to approximately 30,000 in 2020.

A total of 130,000 immigrants per year has been forecast for the long term, the largest groups being migrant workers and returning Dutch emigrants. Total emigration amounts to 100,000 per year and consists mostly of migrant workers returning to their country of origin and emigrant Dutch nationals (Alders, 2001; CBS, 2001). *Table 3.3* shows the figures for the latest CBS forecast for ethnic groups.

The ageing trend will also affect the population of non-western ethnic groups. The representation of the over-65 age group has trebled from 2% to almost 6% (first and second generation combined).

Ethnic groups are currently concentrated in the four major cities. In 2000 over 37% of the population of Amsterdam, Rotterdam, The Hague and Utrecht consisted of ethnic groups, two thirds of which were non-western (Van der Lucht & Verkleij, 2001). The representation of non-western ethnic groups in the population of the four major cities will about double to almost 40% in 2015 (Huisman & Van Wissen, 1998).

Table 3.3: Ethnic groups in 2000 and 2020 (x 1,000) in the Netherlands subdivided into first and second generation [a] (Source: CBS forecast for ethnic groups 2000).

	2000		2020	
	First generation	Second generation	First generation	Second generation
Total non-western	886	523	1,420	1,172
Total western [b]	545	822	761	998
Total	1,431	1,345	2,181	2,170

a) the first generation consists of persons who were born abroad and with at least one parent who was also born abroad; the second generation consists of persons who were born in the Netherlands and with at least one parent who was born abroad.
b) including Indonesia and Japan.

Influence of ethnicity on health status unclear

The last PHSF reported that the health status of the various ethnic groups is worse than that of the indigenous population. However, at that time very little data was available (Van Wersch et al., 1997). Though a little more information has emerged in recent years, the picture is still unclear. *Chapter 2* of this report contains the latest data on the health status of ethnic groups. This data indicates that some ethnic groups actually have a higher life expectancy than non-ethnic groups. When we look at risk factors, the situation is variable. The picture for ethnic groups looks better with regard to nutrition, smoking and alcohol but worse for drug use and participating in sports. High cholesterol levels are rare among ethnic groups, but high blood pressure and obesity are more common. Once again, all of these factors vary according to gender and age in the various ethnic groups. Hence, it is impossible to compile an accurate projection of the effect of trends in ethnicity on the health status of the population as a whole.

3.3 Medical technology prospects

More opportunities for prevention

Current preventive technology will be expanded in the future. Genetic profiling will be increasingly used to identify predispositions for certain diseases and disorders (predictive genetic testing) and to ascertain how a disease is likely to progress. However, predictive medicine not only paves the way for new types of medical practice, it also creates new relationships between the medical profession and patients and between the medical profession and other organizations. In the process, the dividing line between prevention and care will become blurred.

Current treatment methods will become more effective

In the next ten years the effects of medical technology on the health status will mainly take the form of earlier and more accurate diagnoses. This will raise the effectiveness of existing treatment methods and give the patient a better quality of life. The patient's quality of life can also be improved by the developing and upgrading of existing treatment methods and to a far lesser degree by the emergence of totally new treatments.

Improved understanding of genetics will lead to new diagnostic techniques

More insight is being gained all the time into genetically determined diseases. At the moment treatment options are trailing behind techniques for (early) diagnosis. ICT is being applied in increasing measure. In the long term (10-20 years and beyond) more real breakthroughs can be expected in treatment methods, and possibly, better ways will be found to repair cells, tissue and organs. However, in recent decades experience has shown that developments often move less quickly than was originally hoped and anticipated, gene therapy being a case in point.

Medical technology is a vast terrain; impossible to see the full picture

What are the most important medical technology developments currently being anticipated for prevention and (early) diagnosis, and care and treatment? What is the potential

influence of these developments on the health status? These questions will be addressed in this section.

Medical technology is the umbrella term for a wide range of technologies including biotechnology, nanotechnology (application of new technology by using minute particles), telemedicine, imaging techniques, replacement surgery (organ transplants, tissue transplants or tissue regeneration with the aid of bio-technology), gene therapy, medication, diagnostics, et cetera. These require not only diverse types of equipment and instruments but also clinical knowledge and procedures and the right organization and support systems. This chapter will discuss some major developments in prevention and (early) diagnosis and in treatment and care.

3.3.1 Development potential for prevention and (early) diagnosis

Current prevention technologies will be further developed in the future. This section will discuss three examples of prevention technology: new vaccines, new drugs for primary prevention and better imaging techniques. It will also focus on new technologies for (early) diagnosis, which are important in the domain of predictive medicine.

New vaccines expected for various diseases

The huge advances in biotechnology are playing a crucial role in the development of new vaccines and, at the same time, adding to the knowledge of immunology and the micro-organisms that cause infectious diseases (Van Alphen, 2001).

In some parts of the world vaccines are already being used which have not yet been introduced in the Netherlands: hepatitis A and B, Varicella zoster (chickenpox) and pneumococcae. Within ten years vaccines are expected for several other diseases, such as respiratory syncytial virus (RSV), herpes genitalis, meningococcae B and Helicobacter pylori. Investigations are also being conducted into alternative ways of administering vaccines (e.g. through nasal sprays and patches) and into new combination vaccines. In the next few years decisions may be made to include new vaccines in the National Vaccination Programme (NVP). This will depend on cost-effectiveness amongst other things (Van der Zeijst et al., 2000). Bacterial mutation has reduced the efficacy of the current whooping cough vaccine in the NVP and work is underway to improve this vaccine.

Even so, there is at present no prospect of a safe and efficient vaccine for many diseases. There are many reasons for this, not least the strong mutability of viruses. This is the main reason why a vaccine against HIV cannot be expected in the short term. Similarly, a vaccine against the human papilloma virus, which can cause cervical cancer, is not expected within the next ten years.

More drugs for primary prevention

An increasing number of drugs are being produced for primary prevention, with the aim of (partly) mitigating an unhealthy lifestyle. These drugs, for instance lower blood pressure and cholesterol, support attempts to quit smoking, combat alcoholism and heroin addiction, and treat low bone mass to prevent osteoporosis (Timmerman & Van den Berg Jeths, 2001). For a long time, a search has been underway for an anti-obesity drug, which could be crucial in preventing diabetes mellitus and osteo-arthritis. The current drugs still have too many adverse side effects (Lutterman, 2001). Articles appear regularly on potential new openings for anti-obesity treatment, such as an intestinal hormone to suppress the appetite (Batterham et al., 2002).

Less sharp distinction between medication and nutrition

The distinction between medication and nutrition will become blurred with the production of enriched or 'functional' foods, 'novel' foods and food containing (potential) medication (nutraceuticals). All of these groups relate to food, the composition of which has been altered, usually to make it healthier. Typical examples are cholesterol-reducing margarines and food to which non-absorbable glycerines have been added as a substitute for fat. On average, these foods are more expensive. It is to be expected therefore that the relatively high cost of these foods will lead to socio-economic differences in consumption patterns. Assuming that these products have a permanent and measurable effect on health, these differences in consumption patterns may eventually add to socio-economic differences in health (Mos et al, 2002).

Further improvements in imaging techniques

Imaging techniques to facilitate (early) diagnosis are still developing strongly thanks to the ever widening scope of ICT. In the next few years we can expect to see a mass changeover to digital imaging and processing. In five or ten years automated image analysis and computer-supported diagnosis will be firmly established, for example in the form of three-dimensional images that enable more accurate radiotherapy and 'real-time' imaging (diagnostics and treatment at the same time) to minimize invasive surgery.

Echography and magnetic resonance imaging (MRI) will be applied in more and more domains and will figure more strongly in the overall spectrum of diagnostic techniques in the years ahead.

In nuclear medicine positron emission tomography (PET) is proving the most successful new technique. Because of its added value in locating metastases PET will become increasingly important this decade. Imaging techniques are developing so fast and in so many ways that it is impossible to look beyond the next five or ten years (Lembrechts et al., 2001).

Is predictive medicine about to take off?

At the start of 2001, the human genome was more or less completely identified (Lander et al., 2001; Venter et al., 2001). This landmark in bio-medical science triggered a wave

of optimism about the possibilities for unravelling the causes of disease and about improved prevention and treatment. This optimism, however, is now being placed in perspective (Mos et al., 2002).

Although no-one can say exactly when or to what extent predictive medicine will be translated into concrete applications, the possibilities for identifying predispositions for certain diseases and disorders (predictive genetic testing) will increase and it will become easier to ascertain the progress of a disease (see *text block 3.4* for examples). The downside is that the value of DNA diagnostics may be overestimated because the role of exogenous factors (gene-gene and gene-environment interactions) is underestimated. What is more, it will take a lot of medical expertise to translate the enormous volume of complex information into clinically relevant data (Mos et al., 2002).

Text block 3.4: Examples of DNA diagnostics

DNA diagnostics for breast cancer
One of the techniques used in predictive medicine is DNA chip and micro-array technology. This technology detects specific DNA fragments, which confirm a predisposition for a disease or indicate its progress (Council for Public Health and Health care (RVZ), 2002). According to expectations, it will be used in two years' time to trace gene activity in breast cancer tissue. Using a set of 70 genes it will be possible to determine with 90% certainty which mammary tumours will spread and which will not. This means that women with a favourable prognosis (30-40%) need not undergo chemotherapy or hormone treatment (Van 't Veer et al., 2002).

DNA diagnostics in screening programmes
At present, the government is considering the introduction of screening programmes that make use of DNA diagnostics, either for the entire population or for specific high-risk groups:

- A *screening programme for colon cancer* is still uncertain as there is still some discussion about the best strategy (Health Council, 2001). At present, high-risk groups are already receiving regular sigmoidscopy/colonoscopy, i.e. patients with bowel diseases such as colitis ulcerosa, people who have undergone surgery for adenomatous polyps, and people with familial or hereditary forms of colorectal cancer. As the main genetic abnormalities that underlie the known hereditary forms of colon cancer have been identified, DNA diagnostics are already possible. Thanks to these pre-symptom DNA diagnostics, only half of the people from families with a history of colon cancer now need to undergo periodic colonoscopies (Bokkel Huinink & Schornagel, 2001).
- Since the publication of the results and evaluation of an experimental programme for the detection of familial hypercholesterolemia (FH), the Minister of Health is pushing for a nationwide FH detection programme on the basis of family history and DNA diagnostics (VWS/GZB, 2001). It is thought that between 35,000 and 40,000 people in the Netherlands are affected by FH; around 70% of this group are unaware that they suffer from the disorder.

Predictive medicine, however, can be described in broader terms than just DNA diagnostics: it can also be regarded as 'all non-symptom-related, risk-oriented health practices'. Predictive medicine not only introduces new medical practices, but also new relationships between the medical profession and its patients, and the medical profession and the government, private insurance companies and other organizations. A brief account of the ethical and political dilemmas arising from predictive medicine is provided by Horstman et al. (1999).

3.3.2 New care and treatment options

In 1997 an increase was reported in 'half-way technologies', i.e. medical technologies that extend life expectancy but cannot provide a complete cure (WRR, 1997). This conclusion may also be true of various *new* methods of treatment, such as new drugs that could turn cancer into a chronic disease (see *text block 3.5*). In any event, it is clear that we may not only expect a wider range of treatment options, but also that these will be used more often in combination and that the age limits for intervention will rise. This will have far-reaching consequences for health care costs. Below, we shall present four examples of potential new methods of treatment: new drugs, gene therapy, stem cell therapy and tissue engineered medical products.

More drugs and pharmacotherapy

A study has been conducted on the developments in medication for the 17 diseases and disorders that occur most often in the population and/or incur the greatest costs. The following general trends emerged (Timmerman & Van den Berg Jeths, 2001):

- New variations will be added to existing categories of medication (applies to almost all 17 diseases) and entirely new categories of drugs will probably appear.
- Many patients will receive drug treatment for longer periods as a result of early diagnosis and postponement of death.
- The intensity of drug treatment per patient will increase (several types of medication at the same time; closer supervision). More specific developments for three diseases are described in *text block 3.5*.

Improved administration of medication

Various improvements are also anticipated in the administration of medication (Peters-Volleberg et al., 2001). New, better and more convenient ways will be found to administer medication. These include slow-release anti-depressants, 'closed-loop' systems for glucose regulation, inhalable insulin and better inhalers for asthma/COPD patients. It is not yet clear whether greater convenience actually improves patient compliance. More opportunities will also emerge for drug targeting. New forms of administration will be

Text block 3.5: Three examples of future developments in medication

Cancer: The exponential increase in knowledge of the biology and biochemistry of cancer cells have opened up possibilities for new drug categories, e.g. enzyme blockers and drugs to prevent the formation of blood vessels in a tumour. These types of drugs could turn cancer into a chronic illness (Schornagel et al., 2001).

Rheumatoid arthritis (RA): The search for improved therapy for RA is concentrating on the immune system. Various substances are being studied to find out how they block inflammation. Two drugs are now being marketed which belong to a new category of inflammation blockers: the TNF alpha-antagonists, etanercept and infliximab. These are extremely costly. Etanercept costs ∈ 9,000-13,000 per person per year (Nab & Breedveld, 2001).

Cardio-vascular disease: The drug-eluting stent may play a greater role in the treatment of cardio-vascular disease. A stent is a tube for keeping an artery open (often used in combination with balloon angioplasty), to which a medicine has been attached. For instance, an anti-coagulant may be gradually released into the surrounding tissue to prevent further constriction of the arteries (Van Wijk et al., 2001).

needed a new generation of drugs, especially for protein-like compounds (e.g. administration through liposomes).

New drugs can further reduce the burden of disease

The present arsenal of drugs contributes to reducing the burden of disease among the population. The contribution varies according to the disease and its extent is generally unclear (see *section 2.3*). New drugs that further reduce the burden of disease may partly or entirely cancel out the effects of population growth and ageing. Below the potential effects of new drugs on the health status are quantified for seven diseases. The results are shown in *Table 3.4* and the calculation method is explained in *text block 3.6*. In the long term the application of genomics may have profound implications for pharmacotherapy (*see text block 3.7*).

Table 3.4: Number of Years Lived with Disability (YLD) for seven diseases in 2000 and 2020 in the Netherlands (Source: De Bruin, 2001).

Disease	YLD in 2000	YLD in 2020 due to population growth and ageing [b]	YLD in 2020 with new medication [a,b]
Diabetes mellitus	54,200	74,400	67,500
Schizophrenia	18,200	19,800	18,600
Chronic heart failure	16,000	22,700	21,000
Stroke [c]	64,400	91,600	82,700
Asthma	14,100	14,700	12,900
COPD	98,000	133,000	127,000
Rheumatoid arthritis	45,500	56,700	43,400

a) including the effects of population growth and ageing.
b) medium variant of population prospect.
c) including the effect of better drug treatment through temporary admission to a specialized stroke unit.

Text block 3.6: Method for calculating the influence of new drugs on the burden of disease
(Source: De Bruin, 2001)

The influence of new drugs on the incidence of disease has been calculated as follows:

- The prevalence of each disease is divided according to level of severity. A weighting factor with a value between zero (optimal state of health) and one (worst state of health) is determined for each level. This is then used to calculate the YLD in the baseline year 2000. The YLD is the number of years (corrected for quality of life) that are spent with a specific disease, taken at the population level. The prevalence figures are taken from health care registers and the data on levels of severity and weighting factors from Van der Maas & Kramers (1997).
- First the influence of population growth and ageing on YLD in 2020 is calculated (using the CBS population forecast from 1998 and the age-specific distribution of prevalence across the levels of severity).
- Shifts in prevalence across the levels of severity are modelled on the basis of new developments recorded in pharmacotherapy and on the basis of expert advice. A range of new developments in pharmacotherapy can often be observed for each disease. For each development a shift is modelled towards less severe levels; these shifts are added up for all the new developments for each disease. Bandwidths are also used when expressing the shifts across the levels of severity, as there is a high degree of uncertainty about the health effects of new drugs (low, medium and high variant).
- The YLD for 2020 is calculated for new drugs, including the effect of population growth and ageing.
- When the YLD is calculated no explicit account is taken of any reduction in or postponement of mortality (because there are no data for disease-specific survival rates). Allowance is made for increasing life expectancy through the CBS population forecast but this is not specifically cause-related.

Text block 3.7: The application of genomics in pharmacotherapy
(Source: Leufkens, 2001)

Genomics is expected to have a deep impact on the way new drugs are developed, used and assessed. We are now seeing the start of the massive transformation of the raw data from the human-genome project, which cynically speaking amounts to no more than a huge list of ones and zeros.
Besides determining how greater knowledge of the human genome will contribute to the development of better drugs, we also need to discover the role that this knowledge can play in improving the use of existing drugs. The driving idea behind pharmacogenetics is 'genetically customized pharmacotherapy'. Ideally, a drug should not be prescribed for patients with a genetic profile which indicates that the drug will not work or that they will have an increased risk of side effects. The embedding of genomics in pharmacotherapy and health care as a whole will raise urgent questions about privacy and ethics. If patients are selected because they respond well to a drug and others are excluded because they do not, this could lead to 'orphan patients' and push up the costs of pharmacotherapy (individualized treatment almost invariably costs more). Such developments are not, however, expected in the near future.

Promising developments in gene therapy after stagnation?

Developments in molecular biology could pave the way for successful forms of gene therapy. In gene therapy specific changes are made to genetic material by administering (therapeutic) DNA. This then brings about a (stable) change in the cellular genome or in its transcriptional activity. In germ-line gene therapy the changes are introduced in the sex cells and are hence passed on to subsequent generations. Germ-line treatment of humans (but not on animals) is subject to a moratorium in the Netherlands. In somatic gene therapy the patient's genome is altered within other bodily (somatic) cells to bring about a long-term therapeutic effect without consequences for further generations (see also *text block 3.8)*.

Text block 3.8: Ups and downs of gene therapy

There are two groups of 'candidate diseases' for gene therapy, namely, 'hereditary monogenetic' diseases and 'acquired' diseases such as cancer and cardiovascular disease. Because of technical and other problems (e.g. administration, which generally involves the use of modified viruses as 'packaging' for the various gene-transfer systems) the results of somatic gene therapy have not yet lived up to the initial high expectations. But despite all the ups and downs of recent years, gene therapy is now making sure and steady progress. The most promising applications for the near future are local injections of viral vectors to kill tumour cells, immunotherapy with the aid of DNA vaccinations and the stimulation of blood vessel formation in cardio-vascular disease (bio-bypass) (Van Kreijl et al., 2001).
In October 2002, gene therapy met with a new setback when a young patient developed leukaemia. An investigation is underway to find out whether the gene therapy was the cause. In the meantime, various plans and experiments in gene therapy have been suspended (*De Volkskrant*, 7 October 2002).

Stem cell therapy – a promising technology but application still uncertain

Damaged cells in tissue can sometimes be replaced with donor cells. Stem cell therapy is a new form of cell transplant. Bone-marrow transplants are a classic example of this type of therapy and are already being performed. There are two types of stem cell therapy. In somatic stem cell therapy healthy stem cells are removed from a patient. Reproduction and (possible) differentiation are then stimulated under laboratory conditions and the cells are reintroduced into the tissue or organ. But stem cells can also be extract-

ed from embryonic or foetal tissue. The Embryo Act and the Foetal Tissue Act of 2002 make it possible – under rigorous conditions – to conduct research into stem cells that have been acquired in this way. The advantage of embryonic stem cells is that they can be reproduced indefinitely in a culture and can mature into almost any cell type. Possible applications are pancreas cells for treating diabetes mellitus and brain cells for Parkinson's disease. Stem cell therapy is highly promising but still very uncertain (Gezondheidsraad, 2002b).

Cautious optimism about Tissue Engineered Medical Products

Tissue engineered medical products (TEMPs) are a new type of medical product that might be destined for great things in the future. TEMPs consist of human (or possibly animal) tissue, which coats or permeates a scaffold material. As in stem cell therapy, the basic principle is to remove healthy cells and stimulate them into reproduction and (possibly) differentiation under laboratory conditions, usually in combination with the scaffold material. These are then transplanted to the damaged tissue or organ. This procedure can be carried out with either autologous material (from the patient) or allogenic material (from a donor). Almost every type of tissue and organ is the subject of study at present. Products made of tissue-engineered skin, bone and cartilage which have been developed in the Netherlands are expected to be available within five years (Wassenaar & Geertsma, 2001). The cartilage-engineered products may eventually be used to replace damaged cartilage, making it possible to postpone or even avoid replacement by artificial joints. That said, we should not expect a wave of new products in the immediate future. Although animal testing has borne out theories and hypotheses, efficacy and – more importantly – durability and safety still need to be proven (Wassenaar & Geertsma, 2001). Elsewhere, people are more optimistic (see *text block 3.9*). If this optimism proves founded and it actually becomes possible to replace many tissue types and organs, TEMPs will have profound implications for the health status in the future.

Text block 3.9: Optimism about TEMPs

In 1997 the Science and Technology Agency of Japan expressed high expectations of TEMPs (Mitamura, 1999). It predicted the development of fully implantable artificial hearts and kidneys, biohybrid endocrine organs (combinations of living cells and artificial polymers), tissue-engineered organs (pancreas, liver), retina implants and artificial muscles before 2020. These predictions are regarded as highly optimistic by some people. R&D teams and experts from some German organizations and research institutes say that the situation with regard to liver, skin, cartilage, bone, bone marrow and pancreas tissue looks very promising in terms of opportunities for further product development (Marx et al., 1998).

Increase in ICT applications

One of the current ICT applications is the Electronic Prescription System (EVS in Dutch), which generates pharmacotherapy recommendations after the physician has entered patient data and diagnostic data into the computer. Another ICT application, the Electronic Patient File (EPD in Dutch), has triggered some discussion. It is conceivable that in the future each patient will have an electronic medical file and that the information exchange between the patient and the care provider and between the care providers

themselves will take place through the electronic highway (Council for Public Health and Health care (RVZ), 2001d).

This brings us to the development of telemedicine and telecare. The Council for Public Health and Health care (RVZ) estimates that in the next 20 years a much larger part of the health care budget will be spent on telemedicine (currently only 1%, RVZ, 2001c). Telemedicine and telecare can improve patient compliance and enhance the efficiency of the health care process (Vlaskamp et al., 2001). *Text block 3.10* provides some examples of new applications.

Text block 3.10: Some new applications of ICT in health care

- In the USA and Norway video conferencing (an electronic home visit) is used for patient and family counselling. Though the electronic home visit can also take place by phone, video conferencing is possibly more effective and more likely to be perceived by the patient as a 'real' visit. In addition, the camera provides the care provider (doctor or nurse) with visual feedback.
- In the USA a highly successful pilot was conducted with a portable unit fitted with a camera, a screen and some sensors (e.g. sphygmomanometer, stethoscope, otoscope). The unit used the TV cable network. Though this type of health care is not yet applied in the Netherlands, there is a strong possibility that it will be used in the future. Some GPs have already introduced an electronic consultation. Teleconsultation is also used for meetings between physicians.

Improvements also expected in existing care and treatment

Up to now we have concentrated on the more spectacular high-tech developments in health care. However, many technological improvements are also being realized in existing methods of treatment. The PHSF of 1997 features various examples, such as better cementing techniques for hip prostheses and better operating techniques for colon cancer to greatly reduce the risk of metastases (Van der Meer & Schouten, 1997).

Assistive technology is also important, as it concentrates on making better use of technology by providing products and services to physically handicapped people so that they can lead an independent life (see *text block 3.11).*

Text block 3.11: Technological improvements in hearing aids

Hearing aids (air-conduction devices) will also benefit from the use of digital technology to regulate phase and control buzzing and background noise (Van Drongelen et al., 2000). Hearing impairments are among the more common disorders (see *chapter 2*) and hearing aids are one of the most common medical aids. An estimated 400,000 Dutch people wear one. Technological improvements to hearing aids will also further improve the quality of life of many people.

Diffusion of medical technology also dependent on organizational and funding systems

The degree of influence exerted by developments in medical technology on the future health status not only depends on the nature of the developments themselves but also on the level of application. This, in turn, depends primarily on how fast new technology is disseminated, how quickly it is adopted by health care providers and whether the organizational and funding systems are aware of and open to new developments.

3.3.3 Early warning system for developments in medical technology

The above developments are only a few examples of the activities taking place in the vast domain of medical technology. We have said nothing about advances in surgery and anaesthesia, for instance. The choice of examples has largely been dictated by surveys in medical technology that were commissioned or conducted by the RIVM in the past three years. Strictly speaking, early detection and evaluation of medical-technology developments is the responsibility of the Health Council, with support from initiatives inside and outside Europe, such as the SBU Alerts of the Swedish Council on Technology Assessment in Health care, the Early Warning System of the Danish Centre for Evaluation and Health Technology Assessment, and the Emerging Technologies Bulletins of the Canadian Coordinating Office for Health Technology Assessment. One important international network is EuroScan, which has been operational since 1998 with participation by Canada and various Western European countries (Carlsson & Jørgensen, 1998; www.publichealth.bham.ac.uk/euroscan). Other Dutch organizations besides the Health Council are active in this field as well, such as the Rathenau Institute, which investigates the political, social and ethical implications of new technologies (Rathenau Instituut, 1996; Horstman et al., 1999), the Council for Public Health and Health care (e.g. RVZ, 2001c, 2002), the Advisory Council on Health Research (RGO) and university hospitals that participate in research programmes (e.g. clinical trials for new drugs). In the Netherlands, the early detection and evaluation of developments in medical technology has been crystallizing in the sector itself, since the government decided in 1995 not to introduce legislation for Medical Technology Assessment (Second Chamber, 1995).

Early warning systems have three aims:
1. To identify and assess new medical technology in the domains of prevention, diagnostics, cure, care and rehabilitation (including drugs, medical aids, procedures, settings and programmes), which are expected to be relevant to health care policy and practice within 0-5 years;
2. To classify the technology as supplementary, replacement or totally new in relation to existing technology;
3. To inform policymakers (in the broadest sense of the word) at an early stage about the implications of a technology in terms of safety, effectiveness, cost, ethics and health care organization, with a view to formulating a proactive approach to new medical technology (Reijmerink & Vos, 2002).

A fully operational early warning system requires sufficient clarity about the information requirements of the various players (government, insurers, health care providers, patient associations) and proper embedment in the health care system.

3.4 Europe as a source of inspiration for forecasts

Scope for significantly higher life expectancy
There are considerable differences in mortality rates across Europe. Significant gains would be made in life expectancy (6.0 years for men and 3.8 years for women) if the lowest mortality rates from any EU country were to apply for 14 major causes of death. If the highest mortality rates in the EU for the same causes of death applied in the Netherlands, life expectancy would be reduced by 4.6 years for men and 4.1 years for women.

An analysis based on European differences in the prevalence of six risk factors (smoking, excessive use of alcohol, lack of exercise, serious overweight (obesity), hypertension and high overall cholesterol levels) produced a bandwidth of life expectancy of -2.8 to +1.4 years for men and -3.0 to +1.2 years for women. These shifts in life expectancy would emerge only after some time, given the time lapse between exposure to these risk factors and their effect on health.

3.4.1 European mortality patterns for the Netherlands

This section analyses the health status by comparing Dutch mortality rates with those in other European countries. The question is: how would mortality rates and life expectancy in the Netherlands be affected if the highest and/or lowest mortality rates in Western Europe applied for some major causes of death?

The mortality rates in Europe show considerable variations for several causes of death (see *section 2.1)*. Below we present an analysis based on these differences. By selecting the countries with the highest and lowest mortality rates for some major causes of death we can calculate a bandwidth of life expectancy that would apply if these levels were recorded in the Netherlands. *Table 3.5* shows the results and the effects on mortality rates and life expectancy. *Text block 3.12* explains the calculation procedure.

Mortality patterns in the European Union
If the EU mortality pattern for the separate causes of death were to apply to the Netherlands, it would result in gains and losses for both men and women. Dutch men have a lower mortality rate for traffic accidents and suicide in particular, but a higher mortality rate for smoking-related causes of death, such as for lung cancer and for COPD (but not for stroke). Reducing male mortality rates for these two causes of death would cause the largest increase in life expectancy.

The mortality patterns for stomach cancer, cardiovascular diseases, stroke and traffic accidents among Dutch women compare favourably with the rest of the EU. Life expectancy would benefit most if the mortality rates for breast cancer matched the EU average, followed by smoking-related lung cancer and COPD.

Text block 3.12: European mortality patterns for the Netherlands: methodology

The lowest and the highest mortality probabilities were selected for 14 causes of death from several countries in Western Europe and then applied to the Netherlands. These countries were not necessarily the same for men and women for a particular cause of death.

- 15 countries were chosen: Belgium, Denmark, Germany, Finland, France, Greece, Ireland, Italy, Norway, Austria, Portugal, Spain, the United Kingdom, Sweden and Switzerland. Luxembourg and Iceland were not included as separate countries because of their low populations and therefore often variable mortality rates. The mortality figures are taken from Eurostat's New Cronos database and relate to 1997, except in the case of Belgium (1995) and Denmark/Sweden (1996).
- 14 causes of death were selected. These are causes from which at least 1,000 people (total men and women) died in the Netherlands in 2000. It should be mentioned here that over 1,000 people also died of diabetes mellitus, dementia and domestic accidents, but these have been left out of the analysis because of ambiguities and coding changes in the international cause-of-death statistics.
- The Eurostat definitions for four causes of death (lung cancer, chronic heart failure, pneumonia and suicide) are broader than those in the PHSF. The broader definitions have been applied in the projections for the Netherlands so that the countries may be compared.
- First the absolute mortality rates for each cause of death for each country were converted into relative mortality rates per 100,000 head of the country's population in 1997. These relative figures from all 15 countries were then projected onto the Dutch population in 1997 (according to 5-year age intervals and gender). This made it possible to compare the countries individually and with the Dutch situation. Absolute mortality figures were then calculated for each cause of death, and the best and worst figures from the 15 countries were selected for the 14 causes of death (for men and women separately).
- Finally, the highest and lowest mortality probabilities were entered in a survival table and the gains and losses were calculated for each cause of death and for the total life expectancy. Death from other causes was assumed to be constant (thus including diabetes mellitus, dementia and domestic accidents). Gains or losses in life expectancy for each cause of death cannot be added up together. The total gain or loss in life expectancy was calculated by filling in the combined effect of the 14 causes of death on the mortality probability at 5-year age intervals.

An analysis was also carried out on the basis of the mortality probabilities in the EU as a whole. These were taken directly from Eurostat's New Cronos. The set of 15 EU countries is slightly different from the set that was used for the analysis based on the mortality figures (Norway and Switzerland are not EU members, Luxembourg and the Netherlands are).

Life expectancy at birth would improve slightly for Dutch men and women if the mortality rates for the 14 selected causes of death were the same as the EU average. The increase would be 0.4 years for men and 0.3 years for women.

Europe's worst mortality pattern projected onto the Netherlands

Life expectancy at birth falls by 4.6 years for men and 4.1 years for women if Europe's worst mortality pattern is projected onto the Netherlands. The strongest contributors to such a decline are Finland (coronary heart disease and suicide) and Portugal (stomach cancer, stroke, traffic accidents) for men and Denmark (colon, lung and breast cancer), Greece (chronic heart failure) and Ireland (coronary heart disease and COPD) for women. In general, the current mortality rates in other European countries partly reflect past lifestyles (insofar as is ascertainable). Moreover, it is not known whether and to what extent health care has influenced the mortality rates in these countries. Many of the differences in mortality rates are not readily explainable. More elaborate research (e.g. of the vast bulk of literature) may eventually lead to better insight in this area.

Table 3.5: Effects on mortality and life expectancy if European mortality patterns [a,b] would apply to the Netherlands, by gender and for 14 causes of death (Source: CBS cause-of-death statistics and Eurostat New Cronos, data processed by RIVM).

Men	European Union		Worst mortality pattern			Best mortality pattern		
Cause of death	Effect on number of deaths (in %)	Effect on life expec-tancy (in years)	Worst country	Effect on number of deaths (in %)	Effect on life expec-tancy (in years)	Most favourable country	Effect on number of deaths (in %)	Effect on life expec-tancy (in years)
Oesophageal cancer	-11	0.01	Ireland	37	-0.05	Greece	-73	0.11
Stomach cancer	9	-0.02	Portugal	120	-0.27	Sweden	-35	0.07
Colon cancer	-6	0.02	Ireland	17	-0.08	Greece	-56	0.23
Lung cancer	-21	0.23	Belgium	23	-0.39	Sweden	-67	0.93
Prostate cancer	-18	0.06	Norway	23	-0.08	Greece	-49	0.17
Non-Hodgkin's lymphoma	-9	0.02	Finland	3	-0.01	Greece	-27	0.07
Coronary heart disease	2	-0.02	Finland	84	-1.48	France	-49	1.03
Chronic heart failure	-18	0.16	Greece	34	-0.17	UK	-68	0.61
Stroke	16	-0.12	Portugal	203	-1.31	Norway	-42	0.03
Pneumonia	-16	0.03	UK	109	-0.37	Greece	-81	0.25
COPD	-27	0.15	Ireland	32	-0.21	Greece	-81	0.53
Traffic accidents	64	-0.20	Portugal	216	-0.58	Sweden	-22	0.08
Suicide	34	-0.08	Finland	208	-0.68	Greece	-57	0.17

Women	European Union		Worst mortality pattern			Best mortality pattern		
Cause of death	Effect on number of deaths (in %)	Effect on life expec-tancy (in years)	Worst country	Effect on number of deaths (in %)	Effect on life expec-tancy (in years)	Most favourable country	Effect on number of deaths (in %)	Effect on life expec-tancy (in years)
Oesophageal cancer	-38	0.02	UK	68	-0.04	Greece	-81	0.05
Stomach cancer	24	-0.03	Portugal	149	-0.18	France	-29	0.04
Colon cancer	-9	0.03	Denmark	27	-0.11	Greece	-47	0.17
Lung cancer	-25	0.15	Denmark	82	-0.36	Spain	-68	0.33
Breast cancer	-24	0.18	Denmark	4	-0.04	Greece	-41	0.33
Non-Hodgkin's lymphoma	-13	0.03	Finland	1	-0.00	Greece	-29	0.07
Coronary heart disease	21	-0.16	Ireland	113	-1.14	France	-47	0.63
Chronic heart failure	0 [c]	0.04	Greece	125	-0.81	Finland	-62	0.52
Stroke	15	-0.12	Portugal	202	-1.53	France	-28	0.30
Pneumonia	-18	0.05	UK	141	-0.54	Greece	-82	0.31
COPD	-19	0.07	Ireland	100	-0.32	Greece	-78	0.27
Traffic accidents	29	-0.04	Greece	141	-0.17	UK	-25	0.03
Suicide	-9	0.02	Belgium	75	-0.12	Greece	-85	0.15

a) diabetes mellitus, dementia and domestic accidents are not included in the analysis because of ambiguities and changes in the coding system. These factors may play a role in several causes of death. The effect is untraceable but checks were performed to ascertain whether wide differences existed between the countries for the category 'symptoms and other causes of death'. None were found.

b) fluctuations may appear in the mortality rates for certain causes of death over the years, so the selection based on 1997 could contain an element of coincidence. This applies especially to pneumonia (e.g. as a result of a flu epidemic or a severe winter). In 1997 the UK had the highest mortality figures for pneumonia for both men and women. Indeed, the UK morality rate for pneumonia was higher in 1997 than in previous years.

c) it is possible to record a zero effect on mortality figures and still have an effect on life expectancy if mortality shifts to higher age groups.

Europe's best mortality pattern projected onto the Netherlands

When Europe's best mortality pattern is projected onto the Netherlands substantial gains are realized in life expectancy: 6.0 years for men and 3.8 years for women. What can we learn from this result? When it comes to well-known and potentially changeable causes of death we could learn a lot from Sweden about lung cancer among men, from France about coronary heart disease among men and women, and from the UK about chronic heart failure among men. Greece has the lowest mortality rates for 7 of the 14 causes of death for both men and women. We looked into whether this result might be connected with the coding of the causes of death. If so, we could expect a large other/unknown category, but this was not the case. Greece does, however, have the highest mortality rate for chronic heart failure (for men and women) and for traffic accidents for women. The low mortality rates for lung cancer among Spanish women is unsurprising, as only 4% of Spanish women between the age of 45 and 74 smoke. However, as the percentage of younger women smokers is the same as in the Netherlands, Spain looks set to lose its lead in this category. Further research into favourable mortality rates in other countries can also provide openings for policy.

3.4.2 European risk factor prevalences for the Netherlands

This section determines the health status in the Netherlands, if it were exposed to the best and worst prevalence of a number of risk factors in other European countries. Six risk factors will be addressed: smoking, excess use of alcohol, lack of physical exercise, severe obesity, hypertension and high cholesterol levels. The diseases included in the model are: oesophageal and lung cancer, diabetes mellitus, myocardial infarction, other coronary heart diseases, chronic heart failure, stroke and COPD.

This analysis calculates the effect of the prevalence of the six risk factors on the incidence of new disease cases as well as the bandwidth for life expectancy. Appendix 2 lists the prevalence of the risk factors in the European countries included in this analysis. The calculations were performed using the Chronic Diseases Model of the RIVM. This is a dynamic model that is suitable for calculating the effects of risk factor prevalence on the incidence, prevalence and mortality probabilities for a group of diseases that are connected with these factors. At the same time, it takes account of demographic trends (population growth and ageing). Those interested in details about the model may contact dr R Hoogenveen (rudolf.hoogenveen@rivm.nl). The results reflecting the effect on the number of new cases of the eight diseases are shown in *table 3.6*.

Table 3.7 shows the gains or losses in life expectancy in 2020 when the best and worst prevalence is projected for each risk factor. As the effects of the different risk factors on life expectancy are modelled independently of each other, they may be roughly added together. This produces a gain of 1.4 years and a loss of 2.8 years for men compared with the reference scenario. For women the gain is 1.2 years and the loss is 3.0 years. In reality (small) deviations may appear in this sum due to clustering, risk-factor interaction in a single individual, and the fact that other causes of death will replace the one that is eliminated (although at an older age).

Table 3.6: Effects in 2020 (in percentages compared with the reference scenario [a,b] on the incidence of new disease cases in the Netherlands when the best and worst European prevalence levels for six risk factors are projected onto the Netherlands (Calculation: Chronic Diseases Model RIVM).

	Men		Women	
Disease	Best	Worst	Best	Worst
Oesophageal cancer	-15	+22	-23	+38
Lung cancer	-20	+16	-32	+13
Diabetes mellitus	- 6	+24	- 7	+23
Myocardial infarction	-16	+65	-16	+66
Other coronary heart diseases	-14	+51	-15	+50
Chronic heart failure	- 7	+37	- 9	+30
Stroke	-15	+41	-16	+68
COPD	-11	+14	-23	+ 9

a) the number of new cases of each illness in 2020 with constant probability of interaction between the risk-factor categories, e.g. the probability of starting or quitting smoking (calculated from actual smoker data drawn from the population in the past); this is done to take account of an 'intrinsic' age effect for the prevalence of the risk factors (blood pressure and cholesterol levels rise automatically with age, regardless of lifestyle).
b) including the effect of population growth and age and gender changes in the population.

What can we learn from Europe?

This analysis shows us that, in theory, the health status could significantly benefit from risk factor interventions. Again, further research is required to find out why the prevalence of these risk factors varies so widely from one EU country to another. This may open up opportunities for new policy.

In the analysis that is based on differences in risk factors, the effects on life expectancy are lower than in the analysis based on mortality differences. This is to be expected, as far fewer causes of death were included in the risk-factor study. Time also plays a role. In the past the differences in lifestyle patterns between countries were far greater than they are today. This is still reflected in the current mortality differences for the causes of death which correspond with these lifestyle factors.

Table 3.7: Effects on life expectancy (in years) in 2020 when the best and worst European prevalence for six risk factors are projected onto the Netherlands (Calculation: Chronic Diseases Model RIVM [b]).

	Men		Women	
Risk factor	Best	Worst	Best	Worst
Smoking	0.6	-0.5	0.5	-0.3
Excessive use of alcohol	0.2	-0.1	-[a]	-0.5
Lack of physical exercise	0.6	-1.4	0.6	-1.6
Hypertension	-[a]	-0.3	-[a]	-0.2
High overall cholesterol levels	-[a]	-0.2	-[a]	-0.1
Serious overweight	-[a]	-0.3	-[a]	-0.3

a) the Netherlands has the best level or the differences with other countries are too small to emerge in the life expectancy estimates.
b) for more information about the Chronic Disease Model: please contact RIVM: dr R Hoogenveen.

Finally, we would like to point out that the Netherlands has the most favourable levels in Europe for hypertension, high cholesterol and obesity and for excessive alcohol use among women. However, these levels were last measured a few years ago. At present the prevalence of risk factors among younger age groups in European countries seems to be converging, especially for smoking and excessive alcohol use. The improvement in life expectancy which is calculated on the basis of differences in risk factors will not emerge for several decades, given the time lapse between the risk factor exposures and the health effects.

3.5 Implications for the health care budget

To recap, population growth and ageing will trigger a sharp rise in diseases and disorders in the future, especially occurring among the elderly. These trends will also push up the cost of health care and there will be a further shift from cure to care. Developments in medical technology are also likely to add to the costs. Other cost-related factors are level of education, marital status and ethnicity (see *section 3.20)* but account should also be taken of epidemiological shifts, policy changes, new care-demand patterns and salary and price developments.

There is not enough quantitative data available to enable us to estimate the future costs of health care as caused by all these developments. For this reason the estimate presented below should be seen as a combination of a demographic projection and a trend extrapolation, which implicitly includes other factors (Polder et al., 2002). The results are shown in *figure 3.3* and the working method is explained in *text block 3.13*.

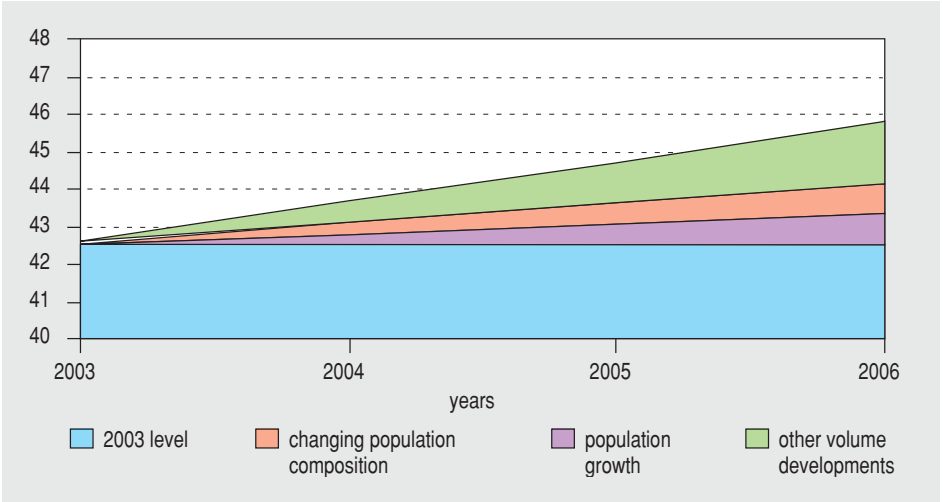


Figure 3.3: Projection of the development of Dutch health care costs split into components for the period 2003-2006 (in billions of euros in constant prices from 1999) (Source: Polder et al., 2002).

Text block 3.13: Procedure for calculating future health care costs for 2003-2006
(Source: Polder et al., 2002)

The procedure consisted of the following steps:
- The health care expenditure for 1994-1999 was corrected for demographic trends and salary and price developments.
- The 'residual trend' thus obtained reflects the other volume developments (epidemiological and medical technology developments, plus changes in demand patterns and the organization of the health care); this trend in other volume developments was projected unchanged into the future.
- The influence of population growth and ageing was calculated by applying the profile of the average costs per head according to age and gender to the total population in 2003-2006. These costs were assumed to be constant.
- Salary and price developments have been omitted because of their unpredictability; the results are therefore in constant prices from 1999.

In the next period of government the health care costs, on the basis of demographic trends, will rise by 1.2% per year. Additional costs arising from the 'other developments' will also be 1.2% per year. This works out at a total of 2.4% per year or – in absolute terms – over 3.5 billion euros (in constant prices from 1999).

Between 1994 and1999 shortages in financing were mounting. Extra resources were made available, especially in 2000-2001, to shorten waiting lists and cut down waiting times. No allowances were made in our prospects for these additional resources in the budget. To get rid of waiting lists an annual increase of another 0.6% is needed in the health care budget for the next four years (Polder et al., 2002).

The demographic cost projection is different for each disease and disorder. On the basis of the demographic trends in 2003-2006, the costs associated with intellectual disability – which topped the league for health care costs in 1999 – will rise by 0.6% per year compared with an average of 1.2%. Dementia, which is second in the league, will require an annual increase of 2.1% as a result of demographic trends. On the other hand, the costs of pregnancy, childbirth and maternity will fall slightly because of the predicted fall in the birth rate (assuming constant costs according to age and gender).

Recently, in the Netherlands various estimates have been drawn up for health care expenditure. In a 'basic scenario' (expected developments if policy remains unchanged) CPB and SCP (Dutch Central and Socio Cultural Planning Bureaus) estimate that the annual rise in costs through volume developments in 2003-2006 will be 2.5%, 1.1% of which is the result of demographic trends and 1.4% the result of other volume growth (by all other developments including medical technology). As the influence of medico-technological developments on health care costs is uncertain, sensitivity analyses have been performed in which the remaining volume growth in 2003-2006 varies between 1.0 and 1.7% (Folmer et al., 2001).

4 MESSAGES FOR POLICY-MAKERS AND OTHER PARTIES

Earlier chapters presented new data and insights relating to Dutch public health, care and prevention. They looked at the past, present and future and drew comparisons both within the Netherlands and with other countries. The resulting picture will be useful for the Ministry of Health, Welfare and Sport in developing a vision of health and care for the medium and long terms. The information is also important for other players: the Public Health Supervisory Service, local government authorities, other ministries, patients and consumers, suppliers of prevention and care services, health insurers and organizations in the field of health research and research programmes. This chapter returns to the main findings, but they will now be assessed on the basis of the aims of Dutch public health policy as set out in *chapter 1*. That basic assumption – the national public health policy – consists in broad terms of the following two linked lines:

Maintaining and *improving public health*. There are three points of special interest here:
- preventing avoidable disease and mortality;
- reducing differences in health between socio-economic groups;
- preserving quality of life (particularly for those with chronic disorders).

Cure and *care* for people with diseases and handicaps. Both the cure and the care should be:
- of high quality (effective, safe and appropriate);
- available to everyone when needed;
- provided at an acceptable price.

This chapter is structured as follows. First of all, *section 4.1* describes the main findings. *Section 4.2* provides a broad indication of the significance of the findings for policy and for the actors involved in that policy. *Section 4.3* then discusses a number of difficulties in society as a whole which may interfere with rational decision-making. *Section 4.4* provides a brief review of the availability of relevant data that may be important for monitoring Dutch health. Finally, this section provides a first indication of a set of linked indicators that can be used to determine how the Dutch public health system is performing compared to systems in other countries. This investigation elaborates on the basic principles of policy, the conceptual framework for public health in *chapter 1* and elements in national and international developments relating to 'measuring the performance of the care system', as proposed by, for example, WHO and OECD.

4.1 Important findings

The Dutch are living longer

Since 1980, life expectancy has increased by 3.1 years for men and by 1.4 years for women. At birth, our average life expectancy is now 75.5 and 80.6 years respectively. This increase is primarily the result of a *fall in mortality caused by coronary heart dis-*

ease and *stroke*. In addition, there has been a fall in men in *mortality from lung cancer.* The main cause of death remains *mortality from coronary heart disease*. This disease, together with *mental disorders and chronic lung diseases*, also has a considerable adverse effect on quality of life. Statistics Netherlands (CBS) predicts that life expectancy will continue to increase over the next 20 years.

We enjoy good health longer

A positive side to the increase in life expectancy is that the years of life which have been gained in the last decade are mainly spent in good health. The number of healthy years for men and women was virtually equal at the turn of the millennium: people rate their health as 'good' for about 61 years, there are no physical impairments for more than 70 years, and 68 years are spent in good mental health. Women therefore spend many more years than men in poor health. Given the fact that there has been no fall in either the prevalence or the duration of chronic diseases, real improvements are apparently being made in the social participation of the chronically ill through the use of specific care facilities such as medical aids or medicines.

Nevertheless, the Netherlands is gradually becoming 'just average' by European standards.

We are living longer but the Netherlands is falling behind in the European Union. Male *life expectancy is increasing less quickly* than in most EU countries. The increase in female *life expectancy* is even flattening out to such an extent that we are now below the EU average. *The mortality rate from lung cancer* in men is still one of the highest in the EU. In women, this rate is increasing faster than the European average. Women are also dying more and more often from *chronic obstructive lung diseases* (COPD). Both lung cancer and COPD are largely attributable to cigarette smoking. *Perinatal mortality* in the Netherlands is relatively high. The same applies to mortality caused by *breast cancer*, although this figure is now declining.

If we look at the *most favourable* national mortality figures within the EU for 14 major causes of death, there is still room for improvement in life expectancy in the Netherlands. The potential improvement is approximately six years for men and four years for women. It should be pointed out that we would lose four years if we depart from the *least favourable* level in the EU for these causes of death. Here, it is certainly the case that not all the causes of these differences in Europe are known or amenable to intervention.

In addition, inequalities in health have proven stubborn.

Health is distributed unevenly in the Netherlands. There are considerable differences between the poor and the rich, and between different neighbourhoods. Men with the lowest level of education live 5.0 years less than men with the highest level of education. For women, the difference is 2.6 years. On top of that, men and women with the highest levels of education remain free of physical impairments for almost 10 years longer. The difference in the number of years people feel healthy is 16 years for men and 14 years for women. Health differences of this size also emerge when comparing

regions or neighbourhoods. Poorer health in deprived areas is often associated with an accumulation of unfavourable social and physical environmental factors, in combination with a less healthy lifestyle.
On the basis of the available data, it is not easy to determine trends in health differences. However, there is no indication that there has been any reduction in the existing differences in the last five years.

Unhealthy behaviour is the main cause of stagnating health quality

In adults, *unhealthy behaviour is the main known cause of stagnating life expectancy*. Personal characteristics associated with unhealthy behaviour, such as overweight and elevated blood pressure, are on the increase or, at best, persisting at the same, unfavourable level. On the other hand, the intake of saturated fats is developing favourably, primarily because of the fact that the food industry has replaced 'hard' fats more and more with vegetable unsaturated fats. In recent years, women have adopted much of the less healthy behaviour of men. Particularly among young people, the trends with respect to smoking, excessive alcohol consumption, inadequate consumption of fruit and vegetables, and inadequate exercise are a source of concern. Severe overweight is becoming ever more prevalent at younger and younger ages. On the other hand, older people have started to adopt healthier behaviour.

The adverse developments in the *lifestyles of young people can be thought of as long-term investments in 'poor health'*. The same applies more or less to the adult population: unhealthy behaviour now results in future premature mortality and a loss of quality of life or, in other words, a reduction in the potential for normal social participation. On the other hand, the fact that older people are adopting healthier behaviour in certain respects actually contributes to an increase in healthy life expectancy. In a certain sense, current developments in healthy life expectancy reflect what has often been a more 'moderate' lifestyle among older people in the past. In the long term, the unfavourable lifestyles of young people at present could result in a further stagnation or even reduction in healthy life expectancy.

A significant proportion of total annual mortality in the Netherlands (140,000 deaths in 2000) is linked to behaviour and is therefore, in principle, avoidable. The main contributing factors are: smoking (approximately 15% of annual mortality), too much saturated fat (5%), not enough fruit and vegetables (5%), not enough exercise (6%), high blood pressure (6%) and severe overweight (6%). A considerable proportion of care use can be attributed to unhealthy behaviour, overweight and high blood pressure. The associated costs account for between 5 and 9% of total expenditure on health care.

The health effects caused by the physical environment would now appear to be reasonably under control in the Netherlands. Rough estimates indicate that the contribution of environmental factors to the total disease burden in the Netherlands does not exceed 5%. This contribution consists above all of a higher and more severe incidence of health problems in people with existing disorders, for example as a result of air pollution, noise, or poor indoor-environment quality.

In Europe, the Netherlands does badly in terms of smoking and excessive alcohol consumption. On the other hand, we do relatively well in terms of physical activity. If the Netherlands was to achieve the most favourable level in Europe for known risk factors, we would in theory achieve an increase of another 1.4 years of life expectancy for men and 1.2 years for women. Here also, the 'influence' that can be exerted on these factors is limited, however.

The accessability of care has been under pressure in recent years due to waiting times and waiting lists, for example. There are no indications that this is linked to the stagnation in the increase in life expectancy. The latter is primarily the result of unfavourable changes in lifestyle. It would appear to be obvious that, in certain cases, waiting times in individual patient care have an adverse effect on the quality of life of the chronically ill.

Efforts are required to maintain health gains achieved in the past

In the past, *many health gains were achieved through prevention and infrastructure* (life expectancy has doubled since 1850). The fact that infectious diseases are no longer included in the main diseases and disorders is the result of unremitting efforts: safe drinking water, sewers, waste disposal and vaccination. Regulations in a wide range of areas (food, traffic, work, housing, environment and recreation) have prevented, and continue to prevent, a great deal of damage to health, although this is often difficult to quantify. However, deregulation has, here and there, resulted in the weakening of an important aspect of health protection, namely the monitoring of the adequate enforcement and implementation of regulations. A range of serious incidents have made this clear (the firework disaster in Enschede, the fire in the cafe in Volendam, the Legionnaire's disease outbreak in Bovenkarspel.

New preventive approaches can turn the tide

Considerable health gains can still be achieved through prevention, particularly by encouraging healthy behaviour. However, the unfavourable trends, both domestic and international, suggest a certain insensitivity to 'classic' forms of health education. Modern methods are based on a stimulating environment and an integrated approach within existing 'settings' rather than an exclusive emphasis on changing behaviour. This is possible by granting healthy behaviour a clear position in socio-cultural life as a whole, at school, in sport and recreation, at work, in neighbourhoods and in traffic. That means that, alongside the Ministry of Health, Welfare and Sport, other sectors of government, as well as public and private parties, can contribute to better health. Factual information, price stimuli, clarity about 'healthy' and 'unhealthy' products, and the organization of the workplace and of the built environment can encourage the public to make healthy choices or discourage unhealthy behaviour. This amounts to: 'Making the healthy choice the easy choice'. Support for preventive intervention in the form of legislation and regulation increases efficacy.

Other important pre-conditions for successful intervention targeting lifestyles are approaches catering for specific target groups (young people, ethnic groups, people with low education), and a long-term vision with the associated continuous support. In other

words, 'stamina' is essential, not only because the required working structures are complex, but above all because lasting changes in behaviour can only be achieved through long-term investments and ongoing attention. There is still too little evaluation of prevention programmes and too little national follow-up to successful local prevention initiatives.

Considerable health gains are also possible if prevention is given a more explicit position in the provision of health care. Giving prevention a clear place in health care is beneficial for both public health and the efficiency of care. It is often the case that the organization of the care system (for example, budgeting or the lack of financial stimuli) and other organizational aspects or workload constitute obstacles. Furthermore, there is generally not enough emphasis on prevention during medical training.

In the future, more and different care will be required

In 1999, Dutch society spent 36 billion euros on health care; that was 9.6% of the gross domestic product. Most of it was accounted for by *cure* facilities, such as hospitals (29%), medicines (10%) and GPs (3%). Care for older people, the chronically ill, and the disabled (*care* facilities) accounted for more than 36% of expenditure. Less than 4% was spent on prevention, half of which related to occupational health care. This does not include prevention as a part of care provision. Most care use relates to chronic mental disorders such as intellectual disability and dementia. Older people use more care than young people. Care use increases more and more rapidly from the sixtieth year of life onwards in both men and women.

In the future, *the increase in the size and average age of the population will result in a considerable increase in the number of cases of illness,* particularly chronic diseases. If the trend of recent years continues, the total volume of health care will have to increase between now and 2006 by 2.4% annually in order to maintain care at the current level. In addition, there will have to be a further shift of expenditure from cure to care. Half of the volume growth required in the future will be caused by population growth and the increasing average age of the population; the other half will be caused by, for example, developments in medical technology and changes in consumer demand for care. It should be pointed out that the trend is based on figures from the years in which deficits actually increased. It is estimated that catching up with the backlogs on waiting lists and eliminating other difficulties will, in the years to come, require additional investments of at least 0.6% a year for four years.

The waiting times and capacity shortages in the areas of nursing and care are already considerable. Extra resources which have been made available in previous years have resulted in more production but recent trends do not indicate any reductions as yet in waiting lists for most sectors.

Health care use in the Netherlands is average compared to the surrounding countries. That applies both to the size of the health care system and to the share of gross domestic product and the average cost of care per capita. The increase in care expenditure per capita has, in recent decades, lagged behind the surrounding countries.

Care is a question of quality as well as quantity.

In the future, what will matter will be not only *more* care, but also *good* care. High quality care means: care that is effective, safe and universally accessible. Care can be more effective and safer if 'best practices' and standards are applied properly and the experience from pilot projects is implemented on a wide scale. Pilot projects may, for example, relate to safer or more integrated care. These improvements in quality can also result in cost savings. The obstacles to the introduction of these improvements are usually organizational and financial in nature.

The timely application of new effective medical technology and the reduction of unnecessary inter-physician variation can result in health gains. Nevertheless, the evaluation of efficacy and safety in practice remains necessary (through 'medical technology assessment', and 'postmarketing surveillance').

Integrated care - the optimization from the patient's point of view of the transition through the care circuit - can help to achieve health gains, make practices more patient-centered, and make more efficient use of resources when compared to the classic approach based on strictly separated sectors.

Studies in the United States and Australia indicate that the undesirable negative effects of medical intervention may result, in general terms, in a considerable loss of health in the range of a loss of 6-12 months of life expectancy. There has not been any research in the Netherlands in this area but it is improbable that the Dutch situation will be entirely different. Pilot projects have shown that specific health risks in care such as bed sores and wound infections can be considerably reduced if specific attention is paid to the problem.

In the Netherlands, there are no indications of socio-economic differences in terms of access to the required care. It would appear to be the case, however, that people with lower levels of education make less effective use of care, for example in the case of chronic diseases. An extensive analysis in the United States (Institute of Medicine) suggests that the quality of care given to non-Western ethnic groups may be less, for example because of language problems, cultural differences, subconscious stereotyping and different ideas about health. Similar causes may also play a role in the Netherlands.

Prevention is not only better, it is often cheaper

The costs of interventions per healthy year of life gained can vary widely in the diverse areas of prevention and health care. *Some interventions can generate savings, while others cost more than € 100,000* per healthy year of life gained. Preventive action at the start of the disease chain, such as the heel stick, vaccination, or traffic safety measures, are often more effective than interventions at the end of the care chain such as lung transplants. So prevention is not only better than cure, it is often more efficient as well. In other words: investment in prevention is worthwhile, particularly in the long term.

In addition to the cost-effectiveness or efficiency of interventions (health per euro invested), however, there is also the question of solidarity and the legitimate claim of every Dutch person to protection and care. Since people want to maintain a high level of personal protection, certain environmental measures can sometimes be costly as well. Nevertheless, making the link between costs and health gains more explicit may make decision-making more transparent.

4.2 Significance of the findings for the various players

Central government must invest in prevention to reverse the stagnation in health status

Investment in prevention is required in order to break with the pattern of stagnation in our health status. Central government will have to do this by developing a *consistent policy framework* and a *long-term vision* for health. This should be the basis for *ongoing investment* by central government in existing preventive facilities, and provide *powerful encouragement* for the development, evaluation and national implementation of new preventive interventions. Strengthening the position of prevention and intersectoral policy in the care system should be spearheads here.

- The 2002 PHSF provides *central government* with a basis for the formulation of national priorities in the area of collective prevention. In consultation with the other players, it can link those priorities with *quantitative objectives*. That enables the empirical testing of policy progress. At the same time, national objectives can also encourage and inspire the other players in the development and implementation of their own policy plans.
- Central government must continue to invest in existing preventive facilities, in order to consolidate past health gains. This includes keeping the existing system of preventive facilities up to scratch, including inspection and enforcement.
- Encouragement should be provided for the national implementation of new interventions that have proven effective. One way of doing this is through consultations with other players with a view to disseminating knowledge about these interventions, establishing partnerships and providing structural financing for national implementation.
- Central government will have to continue with investments in research that targets the development, efficacy, implementation and evaluation of preventive interventions with the aim of further strengthening the foundations of prevention policy.
- The introduction of effective prevention activities in the care system will have to be encouraged, for example through the elimination of organizational and financial obstacles, or by actually providing incentives for *care suppliers and health insurers*.
- Central government can encourage health-driven intersectoral policy by establishing agreements on the *ministerial level* between various policy fields about shared objectives. There are opportunities in, for example, the large cities (Ministry of the Interior), sports (Ministry of Health, Welfare and Sport), schools (Ministry of Education, Culture and Science), employment (Ministry of Social Affairs and Employment),

road safety (Ministry of Transport, Public Works and Water Management), and housing and the environment (Ministry of Housing, Spatial Planning and the Environment).
- Central government can encourage structural collaboration between local government and local representatives of *care suppliers*, *health insurers* and *consumer* and *patient organizations*.

Local prevention players should join forces

The actual implementation of collective prevention is largely local. *Municipal authorities and municipal health services* are important local players, in collaboration with the local representatives of *care suppliers, health insurers and care clients*. They should combine forces and work together on formulating and elaborating a local prevention policy, with shared local priorities and policy objectives. A national policy framework can inspire the local parties and provide them with a direction for the elaboration of local public-health-policy documents and the formulation of local objectives.
- The local parties can encourage the development, implementation and evaluation of new interventions in the local setting within the national policy framework. In addition, they can encourage the implementation of interventions that have proven effective (after adaptation to local conditions).
- Local forms of intersectoral collaboration must be extended. On the one hand, this can consist of the further development of national agreements at the ministerial level; on the other hand, local initiatives elsewhere can serve as a source of inspiration for all levels of government, including the national level.
- The local parties will have to make a joint appraisal of how preventive interventions that have proven effective within the care system can be included in the basic packages of the relevant care suppliers. In addition, they will have to intensify the development of new preventive interventions within the care system.
- Joint investment will be required in bilateral risk communications between the government and the public, with the accent being placed on the public's own responsibility in this respect. *Consumer and patient organizations* in particular can make significant contributions to a balanced approach to risks and risk perception.

More care, different care and better care are necessary and possible

The 2002 PHSF did not have either the resources or the ambition to cover the full spectrum of care. Care was primarily assessed from the point of view of potential health gains. In this respect, accessibility, efficacy, safety, costs and efficiency are keywords. In the future, *more* and *different* care will be required, particularly as a result of the increase in the size and average age of the population. Furthermore, there are still numerous ways in which the *quality* of care can be improved. Finally, the parties must make better use of the available options for anchoring prevention in care activities (see above).

More and *different* care can be achieved by:
- Allowing the annual increase in the care budget to keep pace with demographic changes, the development of medical technology and other autonomous develop-

ments. Between now and 2006, an annual increase in the order of at least 2.4 to 3% would appear to be necessary. An increase of this size is justified in part by the fact that there was no increase in the budget in the nineties.
- Eliminating capacity shortages by increasing the volume of medical training in association with a long-term vision for the development of capacity in the medical professions.
- Implementing the necessary shift from *cure* to *care* simultaneous with the necessary volume growth of total health care.

Better care can be achieved by:
- Explicitly including health targets, such as health gains, improvements in the quality of life and the reduction of inequalities in health, in the formulation of preconditions for a new care system.
- Improving the quality of care through encouragement of the use of standards and guidelines, while remaining open-minded in terms of the flexibility required for care reform.
- Removing financial and organizational obstacles that interfere unnecessarily with the adoption of effective forms of care reform, integrated care and new technology.
- Determining, within a patient-oriented perspective, whether a limit can be set to the demand for care that is 'not medically justified'.
- Making extra investments in the availability and, in particular, the appropriateness of care for socially weaker groups.
- Encouraging the development, on the level of institutions or care providers, of methods for measuring health outcomes or relevant process parameters. Indicators of this kind may play a role in internal quality improvements, in terms of the external quality assessment by consumers and insurers on the health care market and in terms of answering to society and government.

4.3 Political and policy dilemmas

Earlier chapters have also identified a number of dilemmas that sometimes appear to be obstructions to rational policy decisions. This is true for both prevention and care. Some dilemmas have been with us for quite a while, whereas others will only have practical significance in the future. To achieve the right societal balance for these dilemmas, it is important to encourage a *political and public debate* about them. In brief, the dilemmas are as follows.

Prevention is a question of stamina

Prevention demands a long-term vision, enduring attention and investment. The health benefits of investments are only seen after longer periods of time, and they emerge gradually, without being noticed. For example, successful anti-smoking policy only results in a reduction in mortality from lung cancer or in the severe disease burden of cardiovascular disorders after a few decades. This means that prevention runs a risk of being the Cinderella of politics, where short-term problems often claim priority.

Collective interests versus individual freedom of choice

The Dutch are more assertive, independent, and individualistic than ever. On the one hand, the public demand maximum safety from the government at any price; on the other, they reject any restriction on their personal freedom, for example to run considerable health risks themselves. Policy therefore has to sail a difficult course between the collective importance of good public health and respect for individual freedom of choice. An associated dilemma is the conflict between the collective importance of public health and private economic interests (the alcohol and tobacco industries, for example). These virtually irreconcilable interests may stand in the way of the establishment of effective prevention policy.

Risk: a question of statistics or a question of perception?

There is often little agreement between experts and the public about the odds, nature, extent or management of health risks. The public appears to disregard the calculations of risk experts. For a long time, it was thought that communications about risks could bring the 'uninformed' public on the 'right' track, but it would appear to be the case that there has been a failure to understand in full this complex concept that is determined by its social context: health risk. The government faces the dilemma of, on the one hand, adopting a rational approach to risks on the basis of scientific calculations of probabilities, the expected amount of damage and the cost-effectiveness of safety measures, and, on the other, taking into consideration a legitimate perception of risks by the public, that are based on a wide range of prevailing standards and values.

Prevention with prior knowledge

Developments in genetics are providing us with an ever-clearer picture of our personal risk and treatment profile. That makes it possible to adapt prevention and treatment accordingly in the future. At the same time, these developments involve all sorts of moral and ethical dilemmas, above all because the diagnostic possibilities increase much faster than the treatment options. How do we deal with the right *not* to know which diseases we may contract later if there is no possibility of a cure? What do we do with technology that enables diseases to be diagnosed more reliably and at an earlier stage than ever before, but which does not generate significant health gains? Do we allow all tax-payers to pay for expensive medicines that compensate for an unhealthy individual lifestyle?

Controlling demand on 'imperfect' markets

The principle of demand-driven care and the 'right to care' are at odds with a restricting financial framework that sets limits to the volume of care provision. But even when the financial structures are less strict, there is a bottom to every purse. Making improvements in this 'imperfect' care market results in quite a number of dilemmas: are we sacrificing solidarity for efficiency, for example by introducing personal contributions? Should we extend the basic package of care or will we expect people to take out additional insurance? Is it helpful here to make a distinction between 'evidence-based' medicine and problems that are 'wrongly medicalized'?

Flexible standards?
Standards in care improve quality but they can, in theory, act as a brake on timely modernization and a patient-driven approach.

Efficiency versus the right to the best care
Investments in preventive measures with the aim of preventing or postponing disease often result in greater health gains than care at later stages of the disease process: prevention is better than cure, and often cheaper, at least per healthy year of life gained. There is a dilemma here between the efficient deployment of scarce resources on the one hand and the right of every Dutch person to the best possible care on the other.

Measuring performance in care: final judgement or learning opportunity?
Arguments are heard in favour of measuring quality or performance in care in order to improve the quality of care and to make the options available to consumers and insurers more transparent. How far should we go in making this information public? Do we want to use quality measurement to create rankings or to find scapegoats, or do we want to provide a good learning opportunity to improve quality?

4.4 PHSF and the provision of information

The provision of information falls short in some areas
As in previous PHSFs, the PHSF-2002 made use of many registers, population studies, health surveys and one-off studies. Since PHSF-1997, the provision of information has improved in some areas and worsened in others (for example, registers of absence from work through sickness). A number of major difficulties remain in various areas. *Sections 2.1 to 2.4* already discussed this in detail. This section returns to the broad outlines. In order to continue with a monitoring system like the PHSF in the future (including the National Public Health Compass, the National Atlas of Public health and Cost of Illness), it is necessary to have an adequate underlying data collection system that can generate the required data. That means that continuous investments are required to maintain and, where necessary, improve the current level of information provision. Important improvements are desirable in the following areas.

- Many databases about diseases and determinants lack *continuity*, national *representativeness* and the possibility of *regional differentiation*. In addition, coordination between databases is often lacking. As a result, trends in the Dutch population and regional differences (especially on the level of municipalities, neighbourhoods and post codes) are difficult to establish. The present development of the Local and National Public Health Monitor, the continuation of the data infrastructure of the Second National Study and the continuation of NEMESIS provide good opportunities for improvements in this respect.
- There is too little information about socio-economic status, ethnicity, type of household and other relevant characteristics (such as the severity of the disorder or quality of life) in registers and studies. Our understanding of socio-economic differences has

improved but there is still not enough standardization of records of *socio-economic status* in registers and studies. As a result, it is difficult to establish a picture of the trends in these differences. Information about *ethnic groups* is generally lacking, especially when it comes to older people in those groups. In addition, many studies and surveys cover ethnic groups in a limited way, if at all. There are possibilities for improvement, particularly in the field of operations of Statistics Netherlands.

- The quality of care registers is very uneven. *Coordination* between registers are generally lacking, and *linkage* between registers is hindered by the absence of a unique care number. In addition, there is often a lack of *diagnosis data* and the *trend data* is often missing or invalid. This means that the progress of a patient with a certain disease through the care system cannot be monitored (the care chain) and that it is not possible to study coordination in care or monitor it over time. There are possibilities for improvement, for example in the case of Prismant, the manager of a large number of important care registries.
- A reasonably complete picture of the *quality* and *accessibility* of preventive and care interventions is not available. The Branch Reports on Prevention, Cure, Care and Mental health care will in time be able to make an important contribution in this respect. The national Quality of Interventions project (QUI) will also, in time, provide a more complete picture of effective preventive interventions. Good coordination between Branch Reports, the QUI project and PHSF is essential here.
- Various databases (including those in the public domain) are housed with private parties and, as a result, accessibility is becoming increasingly difficult or impossible.
- The current efforts to properly monitor *developments in the field of medical technology* are small-scale and fragmented. An integrated overview is lacking. Among policy-makers, insurers and suppliers, however, there is a demand for information of this kind since it can benefit the national implementation of new technology. A permanent structure for the monitoring of developments in medical technology could result in improvements in this respect.
- The demand for *international comparisons* ('benchmarking') for health and care is on the increase. In recent years, WHO, OECD and Eurostat have all done a lot to harmonize databases (see *text block 4.1*), but the *availability* and *comparability* of much information could be greatly improved. The new EU public health programme, that will be launched in 2003, aims to develop a sustainable 'monitoring system' with qualitative and quantitative indicators about health, health determinants and health policy (EU, 2002). This requires the coordinated efforts of the parties involved in data collection and the supply of data to international bodies. In turn, this requires the unremitting efforts of all the countries that participate in international data collection systems.

Towards a coordinated framework of health and care indicators

All the information brought together in earlier chapters is, in principle, relevant for the policy and for other actors in public health and care. The shortcomings and difficulties referred to above were also formulated from that point of view. We have shown that this information is of particular interest for policy if it means we can identify trends over time, or if we can make comparisons ('benchmarking') on the local/regional levels (municipal authorities, care institutions) or the international level (countries).

Recently, various publications have made the link between policy information and specific policy objectives explicit. Here, a central role is played by the *control information* concept (Delnoij et al., 2002). This is the concrete information needed to steer a particular policy and monitor its effects, including 'benchmarking'. How can we select and present the information for the Netherlands about public health and care so that it becomes *control information*? The *selection* has to be based on the areas that policy can control and that it aims to control. *Presentation* should take the form of *indicators*. *Indicators* here means a number that provides an 'indication' (which is as reliable and compact as possible) of the current situation in the relevant area. If we also want to determine whether quantitative policy objectives are being achieved, well-chosen indicators, generated regularly by an underlying data collection system, are a powerful tool.

In the World Health Report 2000 (WHO, 2000), WHO presented and filled in a framework for the analysis and comparison of national 'health systems'. This framework consists of five indicators for describing a country's health system. Although the substance of the report has been widely criticized (Achterberg et al., 2001), the WHO approach has also been praised for its vision. The OECD has an ongoing programme for supplementing and improving the WHO approach (OECD, 2000a, 2001). Others have also elaborated frameworks of this kind for assessing the *performance of the health or care systems*, or the successes achieved by our efforts to improve health ('health system performance assessment' or HSPA), both abroad (for example in Canada: CIHI, 1999) and in the Netherlands (SZW, 2000; Delnoij et al., 2002). In all these cases, there is a coherent framework of performance indicators, for making the best possible assessment of the condition and performance of the health or health-care systems.

Text block 4.1 elaborates the framework sketched above and completes it with a number of indicators selected from the information collected in *chapter 2*. Two things are important for establishing a practical, coherent framework of indicators in the future. First of all, in the years to come, further elaboration of the concept and the translation of 'control information' into practical and measurable indicators will be necessary, together with broad participation from those involved in policy and the provision of information. The indicators defined will then have to be actually measured and calculated on a regular basis. Here, in broad terms, it will be possible to use the information infrastructure of the PHSF (National Compass on Public Health, National Atlas of Public Health, Cost of Illness in the Netherlands study) and the associated partners.

Towards a sustainable information supply: opportunities and recommendations

A few shortcomings have already been described above, together with a description of the recent trend for performance indicators. How can the government and other parties respond best in this area? First of all, it is clear that a good and continuous information supply is indispensable as support for 'evidence-based' policy. That is why central government itself should, more than in the past, develop a long-term vision for information policy and also be involved in directing the implementation of the policy. This includes the following elements:

- Identification of the fields and subjects for which standard information provision is required; i.e. the monitoring of quantitative policy objectives.
- Making agreements in consultation with the various parties about the implementation of data collection; making attempts to improve efficiency here through coordination and to establish access to relevant sources of information despite private interests.
- Encouraging that data are collected on the local level, according to local needs, but also co-ordinated on the national level.
- Encouraging efforts to make data about health and care more amenable to international comparison; in this context, there should be encouragement for active contributions to the design of the European public health programme and for the participation of Dutch researchers in this programme.
- Continuing to develop a framework of indicators for measuring performance and risk in health care and prevention, for 'benchmarking' on both the meso-level (between institutions) and the macro-level (between countries).

Text block 4.1: Indicators for monitoring health, determinants and the performance of health (care) systems; the international context and a detailed example for the Netherlands

The establishment of public health indicators has a longer history than the current 'performance measurement' trend. A number of health indicators were established in the eighties as part of the WHO Health For All (HFA) strategy (WHO regional office for Europe). These indicators are linked to HFA targets, which are intended as sources of inspiration for public health policy in the member states. In practice, Dutch public health policy has adopted few of the quantitative HFA targets (Van de Water & Van Herten, 1996, 1998).
The collection of data on the indicators in the HFA database has contributed to the potential for international 'benchmarking'. Recently, international comparison has become more important as a source of inspiration for Dutch health policy and it has therefore also been one of the leading perspectives in this PHSF.
Alongside WHO, the OECD uses a series of indicators for its database that relate primarily to care facilities and care use, and also publishes Eurostat figures about these subjects. Finally, a set of indicators has been proposed as part of the EU programme for health monitoring (ECHI, 2001). At present, this list provides a structuring principle behind the design of the new EU public health programme that will be launched in 2003. All these lists are 'reasonably complete' lists of statistical variables rather than limited sets of control variables of the kind targeted by the recent trend of performance measurement. Like PHSF does on the national level, they provide the context in which control variables can be selected.
The indicators listed in the various reports can be broken down into five categories: health status, determinants of health, quality and accessibility of care, health care use and costs, and efficiency. The health status and determinants categories include the indicators relating to the health status of the population and its underlying causes and the other categories include the indicators for performance in prevention and care. There are differences in the way in which health status indicators are used. WHO (WHO, 2000) and a report from the Ministry of Social Affairs and Employment (SZW, 2000) both use a general health measure to assess the performance of the 'health system'. The concern here is that general measures of this kind do not adequately reflect the performance of the current health system in the broadest sense, and that they are of even less use for measuring the performance of the care system. That is why the frameworks of the OECD, the Canadian report and Delnoij et al. (OECD, 2000a, 2001; CIHI, 1999; Delnoij et al., 2002) only include health status indicators that relate specifically to current care or prevention activities (for example, avoidable mortality). In these approaches, health status and determinants outside the care system are items which require monitoring but which have nothing specific to say about how the system performs.

Table 4.1 includes a selection of a number of indicators. Where possible, an indication is given of the situation in the Netherlands as compared to the other EU countries, and of recent trends in the Netherlands. It should be emphasized that the table provides an *example* of a possible system of indicators, *not a carefully considered selection*. The health status (and health differences) and determinants categories relate to descriptions of situations and the other categories relate to the performance of prevention and care. However, what are the selection criteria? *Health status* may include indicators for the main health problems or composite indicators such as healthy life expectancy, as well as indicators for problems that can clearly be influenced, examples being traffic deaths and lung cancer mortality. *Determinants* may include monitoring the determinants of the main health problems, but also specific factors that can be influenced, examples being smoking or exposure to noise. This means that some status indicators can also be used as performance indicators. In concrete terms, during the selection of indicators in the example in *table 4.1*, both criteria were used: the extent of the health problem and the degree to which it can be influenced.

In the *quality* and *accessibility* category, the selection of good indicators is a subject of discussion on the international level. In the field of the efficacy of medical activity, both medical outcome indicators (for example, cancer survival rates) and process indicators are used when the link with outcomes is clear enough (see also *section 2.3*). In the area of patient orientation and accessibility, outcomes are, for example, satisfaction surveys and processes are the factors that relate to organization and staff. The selection of indicators in this area was based very much on the international literature and, for the time being, the range of relevance and comparable indicators remains limited. *Care use/costs* includes only a few widely-used indicators for care costs. Information about care use is, to an increasing extent, internationally comparable, despite the differences in how care is organized. In the *efficiency*

(continue text block 4.1)

category, no selection was made. Macro-selections (for example in WHO, 2000) such as 'increase in life expectancy per investment in care' mean little because life expectancy is still primarily determined by factors from outside the care system. Micro-selections relating to efficient ways of achieving health gains (*section 2.5*) remain highly fragmented. Process indicators have also been suggested such as 'percentage of hands on the bed' (percentage of medical staff that are actually active in patient care; SZW, 2000). Further discussions are necessary on this topic.

Table 4.1. Example of a system of indicators for health, determinants and performance of prevention and care.

Indicator description	Position of the Netherlands	Trend in the Netherlands
Health status and inequalities		
Indicators marked (*) may be qualified as performance indicators for prevention and care		
Health: life expectancy (m,v)	average	favourable (unfavourable vs. EU-trend)
Health: life expectancy without disabilities	?	favourable
Inequalities: socio-economic differences in health life expectancy	?	stable
Mortality: coronary heart disease (m,v) (*)	average	favourable
Mortality: breast cancer (*)	unfavourable	favourable
Mortality: lung cancer (m,v) (*)	unfavourable	favourable (m), unfavourable (w)
Mortality: traffic accidents (m,v) (*)	favourable	favourable
Burden of disease: prevalence of chronic diseases	?	unfavourable: diabetes, mental disorders
Participation: % working disability (causes: mental, locomotor)	?	?
Determinants		
Indicators marked (*) may be qualified as performance indicators for prevention		
Personal risk factors: prevalence of overweight (BMI ≥ 30) (*)	favourable	unfavourable
Lifestyle: smoking by young people: prevalence (15-19 yrs) (*)	unfavourable	unfavourable
Lifestyle: smoking prevalence (≥ 15 yrs) (*)	unfavourable	stable
Lifestyle: alcohol abuse (*)	unfavourable	unfavourable
Lifestyle: not enough fruit and vegetables (*)	unfavourable	
Physical environment: noise exposure (*)	unfavourable	stable
Social environment: work stress (*)	?	unfavourable
Quality and accessibility of the healthcare system		
Disease prevention: participation breastcancer screening (process)	favourable	stable
Disease prevention: 5-year survival breastcancer (outcome)	average	favourable
Disease prevention: vaccination coverage measles (process)	favourable	unfavourable
Health promotion: price of packet of cigarettes (process)	unfavourable	?
Adoption of new technology: PTCA and CABG (process)	average	?
Use of protocols: variation in appendix operations (process)	favourable	favourable
Optimal care: perinatal mortality (outcome)	unfavourable	favourable
Appropriate use of medication: antibiotic resistance (outcome)	favourable	stable
Accessibility: volume on waiting lists/waiting times (process)	unfavourable	stable
Accessibility: responsiveness (WHO survey) (outcome)	average	?
Labour market: number of docters/inhabitant (process)	low	stable
Satisfaction with healthcare (outcome)	favourable	unfavourable
Healthcare utilisation/Costs		
Costs: costs as % of GDP	average	stable
Utilisation: costs per inhabitant	average	increasing
Effectiveness		
See elucidation in text tekst		

4.5 PHSF as a national project, now and in the future

In order to increase the utility of the PHSF, it was decided to adopt a three-layered framework for the PHSF 2002: first of all, websites with basic information, secondly a series of theme reports dealing with specific policy issues and thirdly this summary report with integrated information (see *text block 1.1*). This structure constitutes the next step towards extending the target group of the PHSF from the Ministry of Health, Welfare and Sport to other players in the area of health and care. The area covered by the information collection has also been extended. In the PHSF 1993, the emphasis was on the description of health status and the underlying determinants; in the PHSF 1997, information was added about prevention and care and, in the PHSF 2002, regional and international information has been added. The purpose of extending the scope of the information was to establish benchmarks for the Netherlands in various areas.

Most of the added value of the PHSF lies in the fact that it brings together the available knowledge in a conceptual framework. As a result, a clear picture is established of the links between ill health, its causes and the consequences for health care. Regular updating of the information makes it possible to identify changes and to compare the performance of the Dutch health care system with the surrounding countries on an ongoing basis. One of the new challenges for the future is therefore to develop the concept of performance indicators for health care further in accordance with the description introduced in *section 4.4*.

Like the previous PHSF-reports, the production of this PHSF is the result of the work of many individuals. Leading Dutch experts and expertise centres in many areas have made contributions to the RIVM websites, to the theme reports and to this summary report. So this third PHSF is once again a national undertaking.

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ACKNOWLEDGEMENTS

This report has been a joint effort of many. The Supervisory committee of the Ministry of Health Welfare and Sports and the National Scientific Advisory Committee for this PHSF have greatly contributed to the potential policy relevance and the scientific basis of this PHSF report, respectively. The finalization of the report was a joint effort by the PHSF projectteam.

Many others contributed as well.

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Observers on account of the PHSF project team:

Ms. A. van den Berg Jeths, MSc; A.E.M de Hollander, MSc; Dr. P.G.N. Kramers; Dr. J.A.M. van Oers

PHSF Project team

Project leader and final editor

Dr. J.A.M. van Oers

Editing team

Ms. A. van den Berg Jeths, MSc; A.E.M. de Hollander, MSc; Dr. P.G.N. Kramers

Members project team and authors

Dr. P.W. Achterberg; Ms. ir. W.J.E. Bemelmans; Ms. dr. T.L. Feenstra; R. Gijsen, MSc; Ms. dr. N. Hoeymans; Ir. R.T. Hoogenveen; Ir. J. Jansen; Ms. ir. H.M.J.A. van Leent–Loenen; Ms. dr. ir. A.J.M. van Loon; Dr. F. van der Lucht; Dr. J.J. Polder; M.J.J.C. Poos, MSc; Ms. ir. S.I. Rutz; Dr. D. Ruwaard; Ms. dr. ir. A.J. Schuit; L.J. Stokx, MD, MPA; J. Takken, MSc; Ms. dr. H.F. Treurniet; A.A. van der Veen, MSc; Ing. W.J.J. Vrijsen; Dr. G.P. Westert; Ms. E.A. van der Wilk MSc, MPH; Ms. dr. G.A. de Wit

Project support

Ms. J.A.G. van Beusekom; Ms H. Giesbers, MSc; D.J. Griffioen; Ir. A.H.P. Luijben; Ms. V.L. Mallée

Cartography

Ir. P.F. van Boven; Ms H. Giesbers, MSc; S.L.N. Zwakhals, MSc

Lay-out and graphics

Ms. M.J. Kramer

English translation

Taalcentrum-VU, Amsterdam

Others involved

Many other Dutch experts and institutions have contributed to the knowledge base behind this PHSF report. Their names and affiliations are provided in the National Compass on Public Health and Health care (www.nationaalkompas.nl), which presents this knowledge base.

Appendix 1: Ranking of diseases and disorders in the Netherlands according to mortality, years of life lost, incidence, prevalence, disease years equivalents and DALYs

Table 1: Ranking of disorders by mortality (absolute numbers) in the Netherlands in 2000 (Source: CBS-Cause of death statistics/statistics of unnatural death causes; data processed by RIVM).[a]

	Occupational accidents					
	Tuberculosis					
	Meningitis	Epilepsy				
	Down's syndrome	Multiple sclerosis				
	Asthma	Violence				
	Osteoporosis	Congenital anomalies of heart and circulatory system	Aneurysm of the abdominal aorta			
	Congenital anomalies of nervous system		Sepsis	Prostate cancer	Lung cancer	
	Arthrosis	Rheumatoid arthritis	Alcohol induced disorders	Home- and leisure accidents	Lower respiratory infections	
Upper respiratory infections	Drug induced disorders	Premature birth and unspecified low birth weight	Parkinson's disease	Stomach cancer	COPD	
STD's	Inflammatory bowel disease	Skin cancer	Suicide	Heart failure		
Depression	Intellectual disability	AIDS	Ulcers of stomach and duodenum	Oesophagus cancer	Dementia	
Schizophrenia	Intestinal infectious diseases	Health problems among full-term newborns	Decubitus	Non-Hodgkin lymphoma's	Colorectal cancer	
Acute urinary tract infections	Dorsopathies		Influenza	Road traffic accidents	Breast cancer	Coronary heart disease
					Diabetes mellitus	Stroke
10-30	**30-100**	**100-300**	**300-1,000**	**1,000-3,000**	**3,000-10,000**	**>10,000**

a) within each column items are ranked according to their ICD codes in descending order. A number of disorders for which mortality is very low (<10) are not included in the table. These are anxiety disorders, disorders of the eye, diseases of the ear, (para)dental disorders, dermatitis and sports injuries. More information about cause specific mortality is to be found in the National Public Health Compass (www.nationaalkompas.nl).

note: the population of the Netherlands in the year 2000: 15.9 million

Table 2: Ranking of disorders by the number of potential years of life lost in the Netherlands in 2000 (Source: CBS-Cause of death statistics/ Statistics of unnatural causes; processed by RIVM). [a]

			Health problems among full-term newborns	Stomach cancer Alcohol induces disorders		
			Violence	Prostate cancer	Breast cancer	
			Aneurysm of the abdominal aorta	Oesophagus cancer	Suicide	
			Epilepsy	Non-Hodgkin lymphoma's	COPD	
	Inflammatory bowel diseases		Parkinson's disease	Congenital anomalies of heart and circulatory system	Colorectal cancer	
	STD's	Drug induced disorders	Congenital anomalies of nervous system	Premature birth and unspecified low birth weight	Lower respiratory infections	
	Arthrosis	Decubitus	Multiple sclerosis	Sepsis	Road traffic accidents	
Upper respiratory infections	Osteoporosis	Meningitis	AIDS	Skin cancer	Heart failure	
Depression	Dorsopathies	Intellectual disability	Occupational accidents	Diabetes mellitus	Home and leisure accidents	Coronary heart disease
Schizophrenia	Intestinal infectious diseases	Asthma	Down's syndrome	Dementia	Lung cancer	
		Rheumatoid arthritis	Influenza		Stroke	
		Tuberculosis				
100-300	**300-1,000**	**3,000-10,000**	**1,000-3,000**	**10,000-30,000**	**30,000-100,000**	**> 100,000**

a) within each column items are ranked top to bottom according to number of potential years of life lost. A number of disorders for which the number of potential years of life lost is very low (<100). For more information see www.nationaalkompas.nl.

note: the population of the Netherlands in the year 2000: 15.9 million

Table 3: Ranking of disorders by point prevalence (absolute numbers); standardised to the population in the Netherlands in 2000. The information above the scale is based on data from health care records, while that below the scale is based on data form epidemiological population studies [a] (Sources: see National Public Health Compass: see www.nationaalkompas.nl).

			Breast cancer			
		Congenital anomalies of nervous system	Epilepsy			
		Drug dependence	Dementia			
		Alcohol dependence	Anxiety disorders			
		Lung cancer	Osteoporosis			
		Inflammatory bowel disease	Colorectal cancer		Dorsopathies	
		Intestinal infectious diseases	Skin cancer		Arthrosis [f]	
		Multiple sclerosis	Congenital anomalies of heart and circulatory system	COPD	Hearing impairments	
AIDS	Stomach cancer	Non-Hodgkin lymphoma's	Parkinson's disease	Depression	Coronary heart disease	
Oesophagus cancer	Decubitus		Schizophrenia	Atopic dermatitis	Asthma	
			Prostate cancer	Stroke [d]	Visual impairments [g]	
				Heart failure	Diabetes mellitus	
				Rheumatoid arthritis	Contact dermatitis	
< 3,000	**3,000-10,000**	**10,000-30,000**	**30,000-100,000**	**100,000-300,000**	**300,000-1,000,000**	**> 1,000,000**
		Epilepsy	Aneurysm of the abdominal aorta	Alcohol dependence [c]	Contact dermatitis [h]	Dorsopathies
		Schizophrenia [b]	Drug dependence [c]	Coronary heart disease	Osteoarthrosis	Hearing impairments
			Decubitus	Dementia	Diabetes mellitus	Anxiety disorders [j]
			Parkinson's disease	Heart failure	Osteoporosis	
				Rheumatoid arthritis	Depression [i]	
				Visual impairments [e]		
				Stroke [d]		
				Intellectual disability		

a) within each column items are ranked according to their ICD codes. A number of disorders, for which point prevalences were missing or were considered not relevant, are not included in the table. These are infectious diseases excluding AIDS, basal cell carcinoma, mental disorders in children and youth, Down's syndrome, premature birth, health problems in full-term new-borns and acute physical harm. For the prevalence of dementia, stroke and Parkinson's disease also

b) data from nursing home records have been used, while psychiatric hospitals provided additional data for the prevalence of schizophrenia. For more information about incidence of a certain disorder see www.nationaalkompas.nl.

b) research data only available for 18-65 year olds. Over 64 year, the same prevalence has been assumed as for the age class 60-64 years.

c) 18-65 year olds only.

d) prevalence refers to life prevalence: number of persons that ever had a stroke.

e) the data only cover sub-categories of macula degeneration, diabetic retinopathy and glaucoma.

f) the data only cover arthrosis of limbs. Neck- and back arthrosis is included in Dorsopathies.

g) the data cover sub-categories of macula degeneration, diabetic retinopathy, glaucoma and cataract.
h) the data refer to year prevalence of contact dermatitis of hands and fingers among 20-60 year olds. This group is considered to be the highest risk group (working population, housewives).
i) data for 18-64 year olds refer to depressive disorder and/or dysthymic disorder and for 13-17 year olds to depressive disorder only. For depressive disorder in over 85 year olds it has been assumed that the prevalence is equal to the prevalence in age class 80-84 years.
j) the data cover 13 years old and over. Over 85 years, prevalence has been assumed equal to prevalence in age class 75-84 years.

note: the population of the Netherlands in the year 2000: 15.9 million

Table 4: Ranking of disorders by year incidence (absolute numbers) based on data from registries; standardised to population in the Netherlands in 2000[a] (Sources: see www.nationaalkompas.nl).

				Arthrosis [e]			
				Visual impairments [f]		Acute urinary tract –infections	
	Inflammatory bowel diseases		Rheumatoid arthritis	Atopic dermatitis		Lower respiratory infections	
	Stomach cancer	Sepsis	STD's [c]	Coronary heart disease		Sport injuries	
	Non-Hodgkin lymphoma's	Lung cancer	Skin cancer	Diabetes mellitus		Contact dermatitis	
	Schizophrenia	Colorectal cancer	Suicide(attempt)	Hearing impairments		Influenza	
Multiple sclerosis	Tuberculosis	Epilepsy	Dementia	Heart failure		Road traffic accidents	Upper respiratory infections
Congenital anomalies of nervous system	Congenital anomalies of heart and circulatory system	Aneurysm of the abdominal aorta	Osteoporosis	COPD		Occupational accidents	Home and leisure accidents
Down's syndrome	Oesophagus cancer	Prostate cancer	Hip fracture	Violence		Infectious intestinal disease	Dorsopathies
AIDS	Meningitis [b]	Decubitus	Premature and very premature birth [d]	Anxiety disorders	Depression		
		Alcohol dependence	Ulcers of stomach and duodenum	Stroke	Asthma		
		Drug dependence	Breast cancer				
		Parkinson's disease					
< 1,000	**1,000-3,000**	**3,000-10,000**	**10,000-30,000**	**30,000-100,000**	**100.000-300.000**	**300,000-1.000,000**	**1,000,000**

a) within each column the highest incidence is stated at the top. A number of disorders for which suitable incidence figures were missing have not been included in the table. These are intellectual disability, mental problems in children and youth, congenital of early-acquired hearing impairments, (para)dental disorders, premature birth and health problems among full-term new-borns. For more information see www.nationaalkompas.nl.
b) data refer to bacterial type only.
c) viral STD's include herpes genitalis, hepatitis B and genital wrats. Bacterial STD's are *chlamydia trachomatis* infection, syphilis en gonorrhoea.
d) premature birth: pregnancy shorter than 37 weeks; very premature: pregnancy shorter than 32 weeks.
e) data cover arthrosis of the limbs only. Neck- and back arthrosis is included in Dorsopathies.
f) the data cover sub-categories of macula degeneration, diabetic retinopathy, glaucoma and cataract.

Table 5: Ranking of disorders [b] by disease-year equivalents (loss of quality of life) in the population of the Netherlands in 2000 (Sources [a]: see www.nationaalkompas.nl).

			Contact-dermatitis		
			Pneumonia and acute bronchi(oli)tis		
		Prostate cancer	Schizophrenia		
		Infectious intestinal diseases	Heart failure		
			Breast cancer		
		Epilepsy	Parkinson's disease	Stroke	
		Lung cancer	Congenital anomalies of nervous system	Diabetes mellitus	
		Upper respiratory infections	Home and leisure accidents [c]	Visual impairments	
				Rheumatoid arthritis	
AIDS		Multiple sclerosis		Hearing impairments	Anxiety disorders
Oesophagus cancer	Non-Hodgkin lymphoma's	Congenital anomalies of heart and circulatory system	Colorectal cancer	Dementia	Depression
Ulcers of stomach and duodenum	Stomach cancer		Atopic dermatitis	Intellectual disability	Coronary heart disease
	Skin cancer		Influenza	Dorsopathies	Alcohol dependence
Meningitis	STDs [d]	Inflammatory bowel disease	Acute urinary tract infections	Road traffic accidents [c]	COPD
Tuberculosis	Hip fracture			Asthma	Arthrosis
< 1,000	**1,000-3,000**	**3,000-10,000**	**10,000-30,000**	**30,000-100,000**	**>100,000**

a) Most prevalence and incidence data are derived from health care records; data on depression, anxiety disorder, alcohol or drug dependence, and intellectual disability are based on population studies.
b) No disease-year equivalents have been calculated for Down's syndrome, premature birth and health problems among full-term new-borns, (para)dental disorders, mental problems in children and youth, aneurysm of the abdominal aorta, sepsis, sport injuries, occupational accidents, violence, suicide attempts and decubitus.
c) For road traffic accidents and home- and leisure accidents only permanent injuries have been taken into account.
d) STDs: only bacterial STD's: *chlamydia trachomatis*, *gonorrhoea* en *syphilis*.

note: The population of the Netherlands in the year 2000: 15.9 million

Table 6: Ranking of disorders by [a] DALYs in the population of the Netherlands in 2000 (Sources: see www.nationaalkompas.nl).

		Contact dermatitis		
		Prostate cancer		
		Stomach cancer		
		Parkinson's disease	Dementia	
		Schizophrenia	Road traffic accidents [b]	
		Congenital anomalies of nervous system	Breast cancer	
		Non-Hodgkin lymphomas	Pneumonia and acute bronchi(oli)tis	
		Oesophagus cancer	Visual impairments	
		Congenital anomalies of heart and circulatory system	Rheumatoid arthritis	Coronary heart disease
		Epilepsy	Heart failure	Anxiety disorders
	Intestinal infectious diseases	Influenza	Colorectal cancer	Stroke
	Upper respiratory infections	Skin cancer	Hearing impairments	COPD
Meningitis [e]	Aneurysm of the abdominal aorta	Multiple sclerosis	Suicide [c]	Alcohol dependence
STD's [d]	AIDS	Atopic dermatitis	Home and leisure accidents [b]	Depression
Hip fracture	Inflammatory bowel disease	Acute urinary tract infections	Intellectual disability	Lung cancer
Tuberculosis	Ulcers of stomach and duodenum	Sepsis	Dorsopathies	Arthrosis
			Asthma	Diabetes mellitus
1,000-3,000	**3,000-10,000**	**10,000-30,000**	**30,000-100,000**	**> 100,000**

a) no DALYs have been calculated for Down's syndrome, premature birth, health problems among full-term new-borns, (para)dental disorders, mental disorders in children and youth, sport- and occupational injuries, violence en decubitus. For notes that refer to prevalence see ranking table for prevalence
b) for road traffic accidents and home- and leisure accidents, only mortality and the consequences of permanent injury are included.
c) DALYs for suicide consist of years of life lost only.
d) STD's: only bacterial STD's: chlamydia trachomatis, gonorrhoea en syphilis.
e) bacterial type meningitis only.

note: the population of the Netherlands in the year 2000: 15.9 million

Appendix 2: Risk factors in the Netherlands and other European countries

Prevalence data on risk factors in the Netherlands and other European countries have been used for the calculation of Population Attributable Risks (PARs) in chapter 2, for the web graphs in chapter 2 and for the forecasting of European prevalence levels of risk factors in chapter 3. Prevalence data for the Netherlands are presented for age categories of 25 years and older, the reason being that virtually no incidence and mortality are associated with these risk factors under 25 years. To determine which country has the most favourable/unfavourable prevalence levels, only the highest risk factor levels have been taken into account (grey in following tables). For methodological reasons (distribution of population over the various risk factor levels), this has not been done in the case of alcohol consumption and blood pressure. Here, the two upper risk factor levels have been used. Risk factor prevalence data for the Netherlands and for selected European countries are presented, followed by a description of the data sources that have been used.

Prevalences

Smoking

Smoking prevalence in the Netherlands (% population 25 years and older) for men (m) and women (f) (Source: StiVoRo, 1999).

	Risk classes					
	never smoked		current smoker		ex-smoker	
age	m	f	m	f	m	f
25-44	44	46	42	37	14	17
45-64	34	52	38	30	28	18
65-74	28	64	31	17	41	19
75+	33	75	27	11	40	14

Smoking prevalence in European countries (% population 35-64 years) (Source: WHO-MONICA, 2002; Stivoro, 1999).

	Risk classes					
	never smoked		current smoker		ex-smoker	
	m	f	m	f	m	f
Belgium	22	57	46	28	32	15
Luxembourg	23	72	43	18	34	10
Denmark	39	41	44	45	18	15
Finland	38	72	29	15	33	14
France	34	63	27	18	40	19
Germany	34	64	34	22	32	15
Italy	34	62	32	23	34	15
Sweden	44	46	23	29	33	25
Switserland	39	61	31	26	30	14
United Kingdom	38	48	35	33	27	19
Netherlands	36	47	40	34	24	19

Nutrition – saturated fatty acids

Prevalence in the Netherlands (% population 25 years and older) (Source: TNO Voeding, 1998).

	Risk classes (% total energy consumed as saturated fat)									
	< 10.0		10.0-12.5		2.5-15.0		15.0-17.5		≥ 17.5	
age	m	f	m	f	m	f	m	f	m	f
25-44	8	8	21	17	32	32	26	25	13	18
45-64	7	7	21	21	26	26	23	27	22	20
65-74	7	8	23	22	23	25	22	27	25	19
75+	7	8	23	22	23	25	22	27	25	19

Nutrition – fruit and vegetables

Prevalence in the Netherlands (% population 25 years and older) (Source: TNO Voeding, 1998).

	Risk classes (grams per day)									
	< 100		100-200		200-300		300-400		≥ 400	
age	m	f	m	f	m	f	m	f	m	f
25-44	17	13	25	24	22	20	16	16	20	27
45-64	13	9	21	19	21	19	17	18	27	35
65-74	12	7	18	17	21	19	18	20	31	38
75+	12	7	18	17	21	19	18	20	31	38

Physical activity

Prevalence in the Netherlands (% population 25 years and older) (Source: Hildebrandt et al., 1999).

	Risk classes (hours per week physically active)					
	inactive		moderate		recommended	
age	m	f	m	f	m	f
25-44	12	10	54	48	33	43
45-64	15	12	47	41	38	47
65-74	16	19	41	35	43	46
75+	19	27	37	31	45	42

Prevalence in European countries (% population 15 years and older) (Source: IEFS, 1999).

	Risk classes (number of hours physically active)				
	none	< 1	1-3	3-5	≥ 5
Austria	16	4	18	20	42
Belgium	42	7	18	15	14
Denmark	24	6	16	22	30
Finland	10	5	18	26	41
France	36	7	20	20	16
Germany	31	6	19	19	24
Italy	39	7	20	19	14
Luxembourg	20	8	19	21	30
Sweden	12	4	16	23	45
United Kingdom	24	7	17	25	27
Netherlands	19	6	18	18	38

Alcohol consumption

Prevalence in the Netherlands (% population 25 years and older) (Source: CBS, 1998 data directly obtained).

	Risk classes (number of glasses per day)							
	0	0	1-3	1	4-5	2-3	≥ 6	≥ 4
age	m	f	m	f	m	f	m	f
25-44	18	55	47	41	18	4	17	0
45-64	19	42	59	50	13	7	9	1
65-74	26	58	67	37	3	4	4	1
75+	35	79	65	20	0	1	0	0

Prevalence in European countries (% population 18-64 years) (Source: Leifman, 2002).

	Risk classes (glasses per day)							
	0 m	0 f	1-3 m	1 f	4-5 m	2-3 f	≥ 6 m	≥ 4 f
Finland	7	7	82	87	6	4	4	2
France	14	27	69	64	9	7	8	2
Germany	9	19	82	75	7	5	2	1
Italy	12	21	74	67	8	9	6	3
Sweden	9	14	86	84	3	2	3	0
United Kingdom	11	14	62	69	13	11	14	6
Netherlands [a]	19	45	56	48	15	6	10	1

a) CBS, data of 1998.

Blood pressure

Prevalence in the Netherlands (% population 25 years and older) (Source: Blokstra et al., 1997; Mennen et al., 1995).

	Risk classes (systolice blood pressure mmHg)									
	< 120		120-140		140-160		≥ 160		drug use	
age	m	f	m	f	m	f	m	f	m	f
25-44	39	62	41	20	8	3	1	0	11	15
45-64	21	30	37	27	16	12	5	4	22	27
65-74	11	11	25	23	21	20	11	11	31	34
75+	10	4	19	14	21	19	12	13	38	50

Prevalence in European countries (% population 35-64 years) (Source: WHO-MONICA, 2002; Blokstra et al., 1997; Mennen et al., 1995).

	Risk classes (systolice blood pressure mmHg)					
	< 120		120-160		≥ 160	
	m	f	m	f	m	f
Belgium	26	47	71	49	3	4
Luxembourg	23	34	72	57	6	9
Denemark	40	52	55	46	5	3
Finland	11	21	74	65	16	14
France	26	46	66	49	7	5
Germany	17	30	72	60	11	10
Italy	22	32	67	60	11	8
Sweden	26	38	65	54	9	8
Switserland	22	44	72	53	6	4
United Kingdom	23	37	68	56	9	7
Netherlands	39	55	57	42	4	3

Total cholesterol

Prevalence in the Netherlands (% population 25 years and older) (Source: Blokstra et al., 1997; Mennen et al., 1995).

	Risk classes (total cholesterol mmol/l)							
	< 5		5.0-6.5		6.5-8.0		≥ 8.0	
age	m	f	m	f	m	f	m	f
25-44	56	64	37	33	6	3	1	0
45-64	30	29	54	52	14	18	2	2
65-74	36	19	48	45	14	27	2	9
75+	58	41	33	36	8	16	1	6

Prevalence in European countries (% popualation 35-64 years) (Source: WHO-Monica, 2002; Blokstra et al., 1997; Mennen et al., 1995).

	Risk classes (total cholesterol mmol/l)					
	< 5.2		5.2-7.8		≥ 7.8	
	m	f	m	f	m	f
Belgium	24	26	69	66	7	8
Luxembourg	13	17	74	68	13	15
Denemark	23	31	72	64	5	4
Finland	23	32	72	64	6	4
France	24	28	72	68	4	4
Germany	20	24	72	70	8	6
Italy	28	31	67	65	5	4
Sweden	31	36	61	57	8	7
Switserland	13	22	74	69	13	9
United Kingdom	23	27	72	66	6	8
Netherlands	35	37	62	60	3	3

Body weight

Prevalence in the Netherlands (% population 25 years and older) (Source: Blokstra et al., 1997; Mennen et al., 1995).

	Risk classes (Quetelet Index)					
	< 25		25-30		≥ 30	
age	m	f	m	f	m	f
25-44	59	70	33	22	7	8
45-64	35	46	51	38	14	16
65-74	34	36	55	42	12	22
75+	46	50	46	32	8	18

Prevalence in European countries (% population 35-64 years) (Source: Leifman, 2002; Blokstra et al., 1997; Mennen et al., 1995).

	Risk classes (Quetelet Index)					
	< 25		25-30		≥ 30	
	m	f	m	f	m	f
Belgium	35	43	49	37	16	20
Luxembourg	42	49	45	33	14	18
Denemark	46	62	41	26	13	12
Finland	30	42	47	36	23	23
France	37	55	46	28	17	17
Germany	30	45	52	35	18	21
Italy	34	52	51	30	15	18
Sweden	38	56	48	32	14	12
Switserland	36	58	50	29	15	13
United Kingdom	36	48	46	33	18	19
Netherlands	42	54	46	33	12	13

Data sources

Prevalence data for the Netherlands

Smoking

Stivoro-survey: age range 15 years and older, year of data collection 1998 (StiVoRo, 1999).

Nutrition: saturated fatty acids/ fruit and vegetables

Food consumption survey-3: age range 20-65 years, year of data collection 1997-1998 (TNO Voeding, 1998). Data for age categories 65 and older have been extrapolated by RIVM.

Physical (in)activity

Survey on the Dutch physical activity standard: age range 16-89 years; year of data collection 1998 (Hildebrandt et al., 1999).

Alcohol consumption

Periodiek Onderzoek Leef situatie ('POLS'; keeping a finger on the pulse in health and work): age range 20 years and older; year of data collection 1998. Data are directly obtained from CBS.

Blood pressure, total cholesterol and body weight

MORGEN-project: age range 20-59 years; years of data collection 1993-1997 (Blokstra et al., 1997); ERGO-research: age range 55 year and older; year of data collection 1990-1993 (Mennen et al., 1995).

All data have been converted to the age categorisation used by VTV: 25-44, 45-64, 65-74 and 75 years and older.

Prevalence data for other European countries

Smoking, blood pressure, cholesterol and body weight

MONICA-project: age-range 35-64 years; year of data collection begin/middle 1990s. In this project, regions in ten European countries are represented (Belgium, Luxembourg, Denmark, Finland, France, Germany, Italy, Sweden, Switzerland and the United Kingdom). These regions are often not representative for the whole country (WHO-MONICA, 2002). In order to get just one prevalence figure per country, RIVM calculated the unweighted average of the regions in each particular country. To determine the most favourable and unfavourable prevalence levels within Europe, Dutch age range and cut-off points have been adjusted to those of the MONICA-project. More recent international comparable data than the data that were used are not readily available.

Physical activity

PAN-EU survey: age range 15 years and older (not sex-specific); year of data collection 1997. In this survey, fourteen countries are represented (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Portugal, Spain, Sweden and the United Kingdom). Greece, Ireland, Portugal and Spain are not included in the analysis to be consistent with other risk factors, for which data was collected. The prevalence refers to 'a typical recent week' (IEFS, 1999)

Alcohol consumption

ECAS-study: age range 18-64 years; year of data collection: 2000. In the study six countries are represented (Finland, France, Germany, Italy, Sweden and the United Kingdom). At the request of RIVM, data for these countries have been converted to the Dutch criteria of alcohol abuse (Leifman, 2002).

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Health on course? The third Dutch Public Health Status and Forecasts (PHSF) report once again contains a large amount of up-to-date information about public health status, prevention and healthcare in the Netherlands. International comparisons and regional comparisons within the Netherlands are presented as well. Dutch life expectancy has increased over the past decades, but less quickly than in most other EU countries. Unhealthy behaviour is the major cause underlying this stagnation. A new, powerful, approach to prevention may turn the tide, however. Besides the need for strengthening prevention the future will bring a demand for more care, caused by ageing and population growth. In addition a further shift from cure to care will be necessary. Not only more healthcare will be needed, but also good quality care: effective, safe and accessible to all.

The 2002 PHSF report aims to be an important source of information for the Ministry of Health, Welfare and Sport (VWS), but also for local governments, other ministries and many players in the field of Dutch public health and healthcare. Besides the 'Health on course' summary report, our PHSF activities also include publishing a series of 'theme' reports, about various public health topics, such as 'Health in the larger cities', and 'Cost of Illness in the Netherlands'.

Finally, three websites are part of our PHSF activities: The National Compass for Public Health and Healthcare (www.nationaalkompas.nl), the National Atlas for Public Health and Healthcare (www.zorgatlas.nl) and a Cost of Illness website (www.costofillness.nl).

Research for man and environment

A publication by
The National Institute for Public Health and the Environment
PO Box 1, 3720 BA Bilthoven
The Netherlands
www.rivm.nl

Bohn
Stafleu
Van Loghum