OUTLINE

for a

Public Health Status and Forecasts for the European Union

REPORT

Achterberg PW, Helder JC, Hollander AEM de, Kramers PGN, Kromhout D, Smit HA.

Contents

Back cover: **Raison d'Etre**

Summary

Article 129 of the Maastricht Treaty on the European Union (February 1992) has presented the Commission with new responsibilities in the field of Public Health. In several policy documents evaluating this new mandate the need to coordinate policy and programme development and stimulate collaboration between Member States has been stressed. The importance of consultation and participation mechanisms, using a variety of organisations and networks, is also seen as essential. The actions of the EU will focus on the harmonised collection, evaluation and dissemination of health information, on the mutual exchange of know-how and experience between Member States and, eventually, on the definition of common health policy objectives and strategies.

To support these actions a European Public Health Status and Forecast (PHSF) report is proposed, comprising:
- a comprehensive, explanatory and comparative analysis of health status in the EU
- Public Health forecasts for major health issues, based on demographic extrapolation, trend analysis and dynamic system analysis

This document presents the outline for a such a policy-oriented, comprehensive PHSF report, which must be produced as a collaborative, European, effort.

The backbone of the proposed PHSF report is a conceptual model that describes the various components of Public Health and their interrelationships. A systematic line of analysis is devised to arrive at a comparative assessment of major aspects of health status and their determinants in the EU and its Member States. This analysis will produce an appreciation of important trends in major health issues, an estimate of the changing impact of underlying causes and, finally, an appraisal of the future health gains that can be expected to result from a range of policy options. In this approach aggregated health measures, such as health expectancy will be assessed incorporating other data (e.g. on cause-specific mortality, on morbidity and quality of life) and, where possible, linked to determinants of health.

The added value of a successful PHSF exercise will be the establishment of a comprehensive, uniform and consistent data structure containing health indicators tailored to the European situation. This will assist Member States in undertaking cooperative ventures in the field of Public Health. The report will expand on information collected previously in descriptive documents and contribute to regular reporting on Public Health in the EU, a necessity already recognised by the Commission.

In a feasibility study following this outline a number of the issues addressed here will be elaborated in more detail. Key institutions and networks active in collecting, analysing and comparing international health data will be identified. Expert collaborators must be involved and data requirements and sources must be specified. The feasibility study should also include details related to the organisation, costs and planning of a PHSF report for the European Union.

1 Introduction

9

Article 129 of the Maastricht Treaty on the European Union (February 1992) has exten-ded the mandate of the European Commission in the field of Public Health. The Commission now has an explicit obligation to 'ensure a high level of human health protection by encouraging cooperation between Member States and, if necessary, lending support to their action'.

Both the Commission and the European Parliament have issued documents that outline the possible consequences for Public Health policy development at the European level: 'Framework for action in the field of Public Health' (COM (93)559) and 'Public Health Policy after Maastricht' (PE 205.804). These documents stress the need for coordination and collaboration among Member States, and for improving consultation and participation mechanisms, through various organisations and networks. 'Major health scourges' have been identified as well as important 'influences on health and disease' in Europe (see also Appendix 1: Public Health from the perspective of the European Union).

The actions of the EU in the field of Public Health will focus on coordinating health policy and programme development and stimulating collaboration among Member States by:
- fostering the mutual exchange of information and experiences
- harmonising data collection mechanisms
- defining common Public Health objectives and strategies
- coordinating the compilation, integration and evaluation of health information
- creating networks for information and consultation
- providing financial support for international pilot programmes.

To support these actions it is argued here that a European Public Health Status and Forecasts report would be very supportive. It should comprise:
- a comprehensive, explanatory and comparative analysis of the health status in the EU
- Public Health forecasts for major health issues, based on demographic extrapolation, trend analysis and dynamic system analysis.

The European Commission has asked the RIVM to submit a project proposal for a feasibility study for a European Public Health Status and Forecasts report along the lines of a report it has already produced for the Netherlands.

This outline describes the proposed scope of a European PHSF report and the way in which it could be produced. An additional potential benefit from the proposed PHSF project is the fact that it will stimulate collaboration among Member States, Public Health institutions and scientists, and that it will facilitate the harmonisation of data collection mechanisms within the European Union.

2 Objectives and Attributes of a PHSF Report

Aims and objectives

A PHSF report, as proposed here, aims to support the development and evaluation of health policy within the European Union by providing:

- a comprehensive, explanatory and comparative analysis of the Public Health status in the EU
- forecasts for important European Public Health issues, based on demographic projections, trend analysis and dynamic system analysis (mathematical modelling).

These analyses (elaborated in Chapters 3 and 4) aim to identify and assess current and future health problems and to support the setting of goals for Public Health policy. The approach should be consistent with the requirements of the European Union, i.e. the principles of subsidiarity.

Focusing on the policy perspective of the European Union

The preparation of a European PHSF report will be guided by the policy perspective of the European Union. Therefore, the final report will focus on major health scourges and important influences on European health status as identified by the Commission (see Appendix 1). Among the latter are the ageing of the European population, its effects on the prevalence of chronic diseases and the associated rise in health care costs. Another priority is increasing socio-economic differences that affect health, including the phenomenon of the recent emergence of 'new' deprived groups such as homeless people and drug/alcohol addicts. Other examples are increased mobility resulting from tourism or migration (that may cause the re-emergence of communicable diseases) and an increase in immigration (that can contribute to the emergence of a deprived underclass).

Key issues to be addressed in the European PHSF report are:

- major health scourges, such as cancer, cardiovascular diseases, drug abuse, AIDS, accidents
- 'areas for concern' in the EU, such as ageing, increasing mobility, environmental and occupational health, rising expectations in relation to health and health care, and socio-economic problems such as social exclusion
- the effectiveness of prevention, health protection and health promotion programmes.

Furthermore, a PHSF report may contribute to:

- enhancing health information systems, disease monitoring and surveillance
- improving consultation and participation mechanisms in the area of health information.

The production of a PHSF report can facilitate *collaboration and coordination* between Member States (a major commitment of the EU) by encouraging mutual exchange of information and experience, standardising data collection mechanisms, *including a review of data definition, coding practices and record format*, and by creating new networks or improving existing information structures.

A PHSF report as a coordinated but collaborative effort

It is strongly emphasised that preparing the final report is intended to be a collaborative effort, involving a large number of participating organisations and key experts. The focal point for coordination must be a large institute with recent experience of coordinating the production of comprehensive Public Health reports. Recently, the RIVM has coordinated a major project which produced a PHSF report for the Netherlands. This report, which was published in 1993, involved ten leading Dutch Public Health institutions and approximately 150 authors. Similar collaborative efforts have been accomplished in the United States ('Healthy People 2000'), in Denmark ('Lifetime in Denmark'), in France ('Santé en France') and the United Kingdom ('Health of the Nation'). Central coordination ensures the uniformity of concepts, data presentation and standardisation, enhancing comparability and quality control. Many of the elements of this outline are based on experience gained in producing the Dutch PHSF report.

Features of the proposed PHSF report

To meet the objectives described above, a European PHSF report should be:

- *policy-oriented.* The approach, assessments and forecasts will focus on subjects that are important for European health policy. The report will assist in the identification of feasible and effective policy options in the domain of Public Health

- *conceptual.* The report will follow a conceptual approach, using a model which interrelates demographic factors, determinants of health (risk factors), and health policy with indicators of health status and with the projected impact on health care use
- *comprehensive.* The report will cover the whole field of Public Health as defined by the conceptual model, although some choices will have to be made in order to focus on priorities
- *consistent.* The report will aim to handle the material as uniformly as possible to ensure maximum comparability.
- *quantitative.* As far as possible the results will be quantitative and give quantitative explanations of health differences and trends.
- *integrative* or *explanatory.* It will present the material as coherently as possible, dealing with multi-cause and multi-disease situations and developments in time, explaining differences and trends in health status and providing a basis for forecasts
- *prospective.* Where feasible, extrapolations or model studies will be performed to create a picture of the future state of health in the EU.
- *collaborative* throughout the process of preparation.

The required quality of the final report depends on the validation of the contents by international experts and on central coordination that will ensure quality.

The combination of the essential features described above will give the proposed PHSF report a clearly defined position among other reports that have described aspects of European health (see Chapter 6).

The aims and objectives can be translated into a num-

ber of questions that will be addressed in a PHSF report: Are there differences in major health problems within the EU? Can these differences be explained by variations in known determinants? How will these differences change in the future? How will the ageing of the population affect future health and the costs of future health care systems? Which health policy options hold the promise of the most added value? What important data are lacking?

The comparative analysis of differences in health profiles between EU Member States may provide clues for differentiated priority setting among EU Member States. The results may also point to issues where exchange of information and experience between Member States may be particularly fruitful.

The intended features of the PHSF report will clearly distinguish it from previous, more descriptive health documents. It will thus contribute to accomplishing the goals set by the Commission in the area of health information.

The objectives of the proposed PHSF report project are ambitious. However, at the conceptual level, an ambitious starting point is necessary to present a comprehensive framework within which more specific and detailed studies can be carried out. Not all goals and objectives can be reached immediately, of course. As a first obstacle a lack of adequate or comparable data in certain areas is to be expected.

Next in this outline we will indicate how the proposed PHSF report may acquire the intended characteristics. We start with the description of a conceptual model for Public Health in the next chapter.

3   A Conceptual Model for Public Health

The first step towards the successful realisation of the objectives formulated above will be to lay down a framework of definitions and concepts that reflects reality but that can also be used as a basic instrument for a structured approach to Public Health assessment. We will therefore now describe a conceptual model that will be used throughout the proposed PHSF study. A conceptual model explains the concepts and their interrelationships in a consistent and comprehensive way, identifies the boundaries of the area of study and is the basis for extensions in the direction of forecasting. We start our presentation of the model with some definitions.

Definitions and concepts

The 1948 WHO definition of *health* states: 'Health is a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity'. This is a positively oriented definition as it centres on well-being and it is a broad definition as it includes mental and social well-being without being defined in terms of diseases or infirmities. A comparable distinction can be made between forms of unhealthiness as indicated by the words 'disease' (applying to situations where a disease is present in a medico-biological sense), 'illness' (the subjective experience of people feeling ill) and 'sickness' (not functioning well in a social or judicial sense). These distinctions largely correspond to the classification made by Susser et al. (1985), who defines health in organic, functional and social terms. These three categories overlap to a certain extent. Someone may have a disease without feeling ill or accepting the disease. Conversely, people may say that they feel ill or handicapped without a disease in the medical or organic sense being detectable or someone may be unable to work from a legal point of view without feeling ill or having a disease. More recent discussions focus on health as a state of 'dynamic equilibrium' between an individual's potential and the influence of exogenous factors and circumstances. In this light the term illness acquires the general meaning of 'out of balance', or 'failure to function as required or desired'. This may apply to the total person or to an organ system. We have opted for a concept of health as a dynamic process (or equilibrium) between endogenous and environmental factors, taking into account the aspects mentioned above (physical, mental and social, objective and subjective etc.).

To make the concept of health operational, the term *health status* is used in this document as a condition that can be described in objectifiable and measurable quantities which can be attributed to individuals and populations.

By the term *Public Health* we not only mean a neutral description of phenomena of significance for the state of health of a population as a whole, or for subgroups such as age groups, ethnic groupings, or for groups which differ with respect to living conditions or socio-economic status. Public Health also comprises 'the science and art of preventing disease, prolonging life, and promoting health through organised efforts of society' (Anonymous, 1988).

A conceptual model for Public Health

A conceptual model is a description of a part of the world from a certain point of view. It simplifies communication about the subject, defines boundaries, and provides a framework for further extension such as mathematical modelling. In a conceptual model the key items (objects) are depicted together with their most important relations. These relations are not necessarily of a causal nature and each object can be considered in more detail.

The conceptual model for public health, originally devised for the Dutch PHSF document (Ruwaard & Kramers, 1993) contains elements of previously published models (e.g. Lalonde, 1974) and is shown in its basic form in *Figure 3.1*. The model shows that health

Figure 3.1 The conceptual model for PHSF
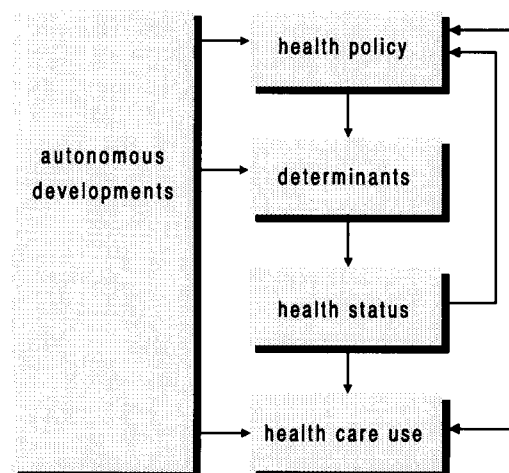
status is influenced by factors called determinants. Health policy influences health status indirectly via the determinants. Health status also contributes to the direction of health policy. Health status influences the use of health care, which is also subject to health policy effects. This whole process is influenced by autonomous developments. We will now discuss the different building blocks of the conceptual model, extending them where appropriate. We start with health status.

Health status

Health status can be described in objectifiable and measurable quantities. These quantities are called 'indicators of health status' or simply 'indicators'. An indicator is defined here as a measurable quantity which elucidates a particular aspect of health status. Examples are: the frequency of occurrence of a particular disease, mortality figures, self-perceived health, the presence of certain disabilities, the inability to work, and certain specific aspects of mental health. Subjective elements such as the perception of one's own health can be objectified by using standard questionnaires.

It should be mentioned that the term 'indicator' is sometimes used more broadly than is the case in this document. In environmental studies an indicator is defined as a part of a specific management process and can be compared with the objectives of that process (Bakkes, 1994). Sometimes indices are used to compare various aspects of health. An index is a set of aggregated/weighted parameters or indicators which describe a particular situation (OECD, 1993). In addition to 'indicators' in the sense used in this outline (mortality and particular aspects of physical or mental health) the WHO HFA programme (WHO, 1985) also includes categories which are referred to here as 'determinants' (such as physical environment, life-style, social environ-ment and health-care facilities). Although health status can essentially be regarded as a neutral concept, free from value judgements, most indicators are considered to be either 'positive' (e.g. life expectancy) or 'negative' (e.g. mortality).

The model elaborated for health status

Figure 3.2 shows the interrelated indicators for health status within a four-layered structure.

The *first layer* includes disease-specific indicators. These are indicators which are defined from a medico-diagnostic point of view, e.g. in terms of the ICD classification (WHO, 1975). They include, for example, incidence and prevalence figures for specific diseases.

In the *second layer* is mortality, which is a consequence of diseases, disorders or external causes. Data on age-specific mortality rates can be used to compute life expectancy at specific ages.
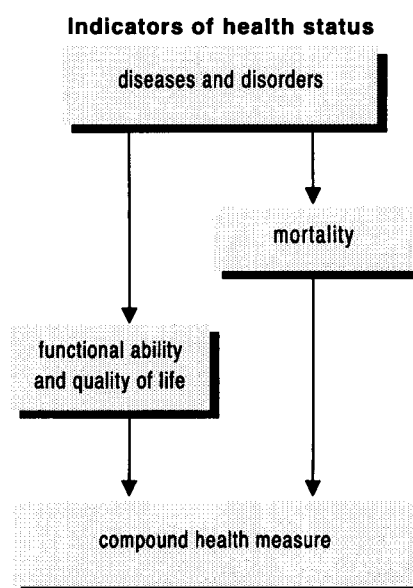
Indicators of health status

Figure 3.2 The conceptual model for PHSF: elaboration for indicators of health status

The *third layer* contains the indicators for physical, mental and social functioning. These include indicators such as the prevalence of disabilities or handicaps (according to the ICIDH classification), measures for aspects of the quality of life including the ability to work, and measures for mental well-being. It is important to note that such measures are to some extent independent of the prevalence of a disease: health may be perceived as bad even in the absence of disease. Where mental health is concerned, it is more difficult to distinguish between the first and second layers, because the diagnostics here focus much more upon an individual's functioning as a whole than is the case with somatic illness. The third layer can also accommodate some of the social consequences of disease such as the use of medical facilities and disablement. Although quality of life is not necessarily disease related, the best available data to fill this layer of the conceptual model may be quality of life data that have been collected in relation to specific diseases.

The *fourth layer* involves compound (integrated) health measures or indices. Here, information on health in terms of disability or a 'quality-of-life' measure is integrated with information on mortality (or more specifically, life expectancy or premature mortality) to give a single overall measure, i.e. 'health expectancy'. Measures of this kind can integrate both the length and the quality of life. One example is the disability adjusted life year (DALY) introduced by the World Bank (World Bank, 1993). By adding the total DALYs lost for all diseases in a population the index 'Burden of Disease' (BOD) is derived. It is also in these terms (reduction of

the Burden of Disease, or extending health expectancy) that the main objectives of health policy may be formulated, e.g. by Member States of the EU.

As one moves from top to bottom in *Figure 3.2* the indicators become increasingly integrated. This layered data structure also indicates that data can be analysed to answer questions like: 'How much of health expectancy is determined by specific functional disabilities or deficiencies in the quality of life?', or: 'How much of mortality is determined by disease a, b or c?', or: 'How much of reduced quality of life is determined by disease d, e or f?'. Behind this, there is in turn the question: 'How much of disease d is the result of determinants g, h or i?'.

Determinants

In this document, a determinant is defined as a factor which has an effect on health status. This implies that there is more than a statistical association between factor X and health effect Y, although in most cases it is not a question of a simple cause-and-effect relationship, but of a complex of causes, of which at best only part has been clarified by means of research (Rothman, 1986).

We distinguish various groups of determinants: biological or endogenous factors, the exogenous factors which encompass physical environment, life-style, social environment, and finally prevention and the health-care system, which is a determinant for health, but also occurs as a separate item (health care use) in the conceptual model. In the model the effects of the health care system (as a determinant) are separated from the use of health care (see further: health care use in the model). The distinction between endogenous and exogenous arises because of the interaction (or equilibrium) between an individual's possibilities and the influence of environmental factors. These endogenous and exogenous determinants can be influenced via the health-care system ('cure and care') and by prevention.

*The model elaborated for the determinants*
In *Figure 3.3* the larger categories of determinants are subdivided. Endogenous determinants may be genetic or acquired during life. Gender, for example, is a genetic factor which may affect a person's state of health. As far as genetic predisposition is concerned, on the one hand clear abnormalities such as haemophilia or colour blindness may be involved, while on the other a particular susceptibility in a population may show a genetically determined variation. Here it is not so much a question of a simple relationship with health but rather of differences in susceptibility to pathogenic factors. Examples of the latter are variations in the ability to detoxify exogenous substances, or skin pigmentation (in connection with damage caused by UV radiation). Many endogenous determinants have both a genetic and an acquired component (for example stature, blood pressure, personal psychological attributes).

Acquired attributes are built up in the course of life. Examples are: physical condition built up through sport, acquired immunity, permanently reduced lung function as a result of an earlier infection, or acquired insight which means that certain information does not cause anxiety. Age (and the ageing process associated with it) is an important endogenous 'acquired' determinant. A person's 'resilience' with regard to the effect of exogenous determinants may alter with age.

Endogenous determinants lie closest to the state of health itself. The boundary between the two is not always sharp. Some personal attributes can be taken as both indicators and determinants. This is true, for example, of a genetic constitution which determines the occurrence of a disease, or of high blood pressure, which is regarded as a determinant of cardiovascular disease but also as an   indicator of state of health. Diseases or disorders can also act as determinants of other diseases (e.g. diabetes mellitus as a determinant of cardiovascular diseases).

With exogenous determinants, a distinction is made between physical environment, life-style factors and social environment. The physical environment includes for instance radiation, noise and heat (physical factors); oxygen supply, nutrients, environmental pollution in the indoor and outside environment and hazardous substances in the work environment (chemical factors) and bacteria, viruses and other micro-organisms which have a

Figure 3.3 The conceptual model for PHSF: elaboration for determinants and health policy

15
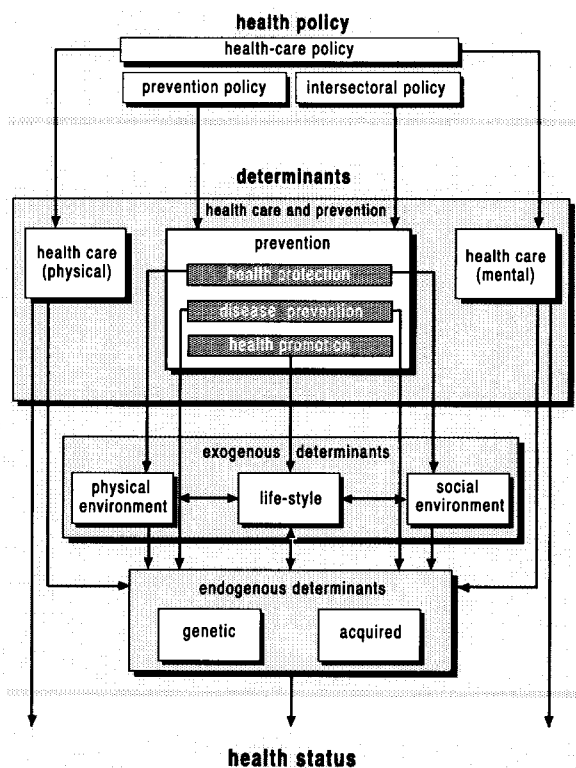
positive or negative effect on humans (biotic factors). Life-style factors are taken to include such behavioural factors as choice of diet, use of stimulants, and doing physical exercise. Social environment includes the pattern of social networks, working environment, housing conditions and socio-economic status (SES).

Exogenous determinants generally act on endogenous ones. Within the group of exogenous determinants, life-style has a special relationship with endogenous determinants. There are also interactions with other exogenous determinants. Thus life-style is to a considerable extent associated with social environment (e.g. family situation, work situation). Aspects of life-style (or behaviour) such as sunbathing, smoking and hygiene can be held largely responsible for exposure to factors from the physical environment such as UV radiation, toxic substances, or pathogenic organisms, respectively.

Health care and prevention as determinants of state of health involve the effect of medical action (treatment, nursing and care) or of preventive measures, i.e. activities aimed at preventing loss of health or promoting and protecting health. An example would be the level of vaccination against poliomyelitis via a national vaccination programme.

Health care affects endogenous determinants or acts directly on the state of health itself (e.g. surgery). Within the 'prevention' block, disease prevention acts above all on endogenous determinants (e.g. the effect of vaccination on the immune system), health protection above all on the physical environment (e.g. safety of food, clean air) and on the social environment (e.g. working conditions), and health promotion above all on life-style (information, education).

Figure 3.3 gives the network of major interactions between various determinants. As an illustration of the complex network underlying this general scheme we show in *Figure 3.4a* the pattern of associations of determinants of coronary heart disease (CHD) and diabetes. In this 'causal network', one particular disease is associated with more than one determinant, and it is clear that the determinants have an influence on each other. For CHD this results in a complex picture of interacting determinants (both endogenous and life-style factors), with direct influences, such as smoking and indirect ones, such as diet. *Figure 3.4(b)* adds a few other important diseases (stroke, COPD, lung cancer) which are in part associated with the same determinants as CHD.

It is obvious that a schematic representation of all the relevant patterns of determinants for all the 'top diseases' (insofar as such information is already available) would be extremely complex. *Figure 3.4(b)* does not even show the influences of prevention and medical care.

For infectious diseases, similarly complex figures can be drawn. The main determinants for infectious diseases are immune status (and vaccination) and the probability of contact with biotic contamination, which, to a large extent, is determined by life-style factors such as unsafe sexual behaviour, intravenous use of drugs, travel to high risk areas and the biological quality of food and water.

Health policy

Health policy in the broadest sense is characterised here as the actions of governments and others in the field which are aimed at maintaining and improving the population's state of health. Within the European Union this part of the model first points to options for policy making under the responsibility of the individual

Figure 3.4 a,b Influencing relationships between determinants and diseases.
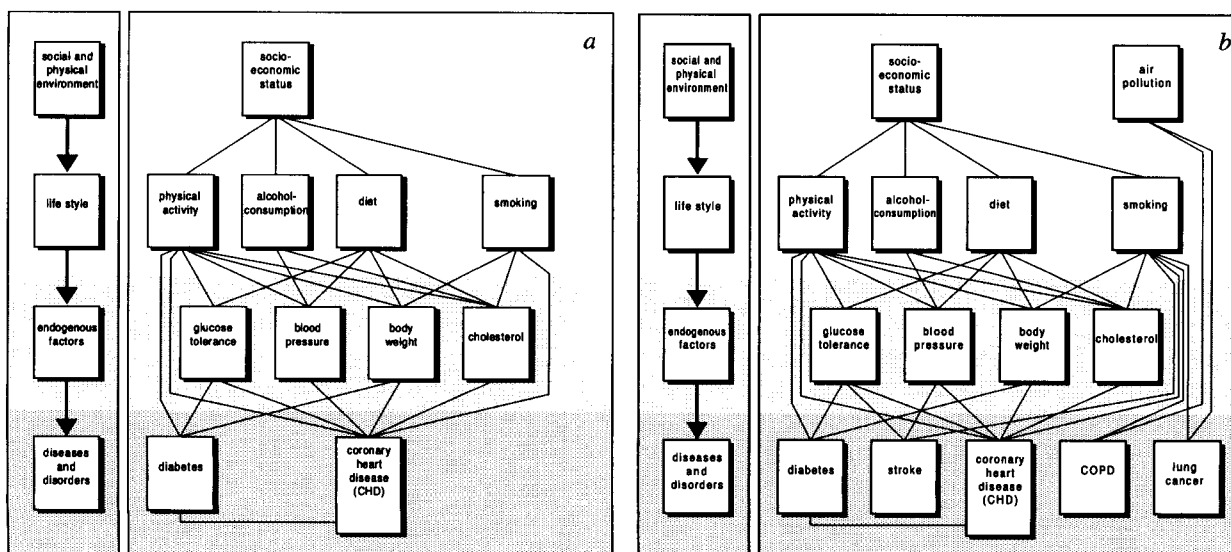
Member States (principle of subsidiarity). The role of the European Union in Public Health policy making is described in Appendix 1. When looking more closely at health policy in the model a distinction can be made between health-care policy, prevention policy and intersectoral health policy.

Health policy in the model

Health policy works by influencing determinants *(Figure 3.3)*. The health care provided is affected by health care policy, whereas prevention is determined both by the prevention policy of a Ministry of Health and by) intersectoral policy for which other ministries are responsible. The (supposed) effectiveness of health policy can be assessed from improvements in indicators of health status, but also (especially when a causal relationship is plausible) from changes in the determinants of health status (e.g. in risky habits like smoking).

Health-care policy is understood to comprise the organisation of diagnostics, treatment, nursing and care('cure and care'). Broadly speaking, it covers activities aimed at people who already have health problems. Prevention policy is geared to measures and activities whose purpose is to prevent health problems from occurring or deteriorating. It may involve collective measures to prevent specific diseases (vaccination programmes, screening programmes), measures to promote health (health information and education), and measures to improve safety (health protection, for example regulations on the safety of food).The term intersectoral policy is used for health-related policy which lies outside the official Public Health sphere, but still involves the prevention of damage to health. Examples are: traffic safety policy, house-building regulations, employment policy, and agricultural policy.

Health care use

We have already discussed health care in the section on determinants where we included the effect of medical interventions on health status in the model. The separate reference here to the use of health care is mainly intended to highlight the use of health care as a consequence of ill health and the resulting economic aspects of medical care.

Medical care, including nursing and cure, is subjected to the laws of supply and demand. The health state of the population together with attitudes and expectations about medical care (socio-cultural developments; see below) determine the growing demand side. Improvements in health status due to positive developments in the determinants - among them medical care itself - can paradoxically increase the demands of the ageing population for cure and care. In many situations medical care results in a prolongation of unhealthy life, requiring even more care and cure. So, the equilibrium

between demand and supply is inherently unstable. Growing expectations about medical care is another factor that increases this instability. Medical technological developments, the economic capacity of the medical establishment and health policy influence the supply of health care. Technological developments offer new but expensive possibilities for cure and care that did not previously exist. Their use is eagerly adopted by health care workers and by patients, leading to the widest possible use of medical care.

The factors described above lead to a growth in the volume of health care use and to an increase in the price of the specific activities. Since the individual costs of medical care and cure are covered by compulsory or voluntary insurance's in a large number of developed countries, the normal economic price mechanism does not operate there. In a number of these countries the volume and the prices of health care are being controlled by health policy measures affecting price and/or volume, e.g. budgeting.

Health care can be divided into ambulatory medical services (including first-line medical care), in-patient care, pharmaceutical goods, and miscellaneous. Relative expenditure for these categories differs considerably between the European countries (OECD, 1993). This is at least partly due to differences in the organisation of national health care systems.

Autonomous developments

Finally, the model considers a group of 'autonomous' developments belonging to the demographic, socio-cultural, economic and technological areas. These developments are at the macro level and are considered to fall beyond the scope of health policy. They affect determinants of health, policy making, and the use of medical care, however. Developments in medical technology, for example, influence the use of health care resources and the effectiveness of care. Other effects are the influence of socio-cultural changes on the demand for care, and the effect of economic developments on spending choices and levels of service. Demographic developments have a major influence on public health. This is immediately clear with respect to the age composition of a population. Immigration also has health consequences at the population level.

Autonomous developments are clearly beyond the direct sphere of influence of health policy. However, the effects of health feeding back into demographic and economic developments can be considerable. These influences are not shown in *Figure 3.1* for reasons of clarity. The autonomous factors belong to realms of policy influence (social affairs, agriculture, technological developments, biomedical research and development), where the European Union has been very influential.

Implications of using a conceptual model for health assessment and forecasting

The conceptual model describes the different compo-
nents of Public Health and their qualitative interrelation-
ships. It also provides a general structure for data collec-
tion and for the approach that can be followed in a com-
prehensive assessment of health status for a geographical
area. Next, it presents a framework for a more dynamic
approach, i.e. an analysis that encompasses all relevant
interactions between the various compartments of the
model. In addition, the conceptual model can be elab-
orated into mathematical models that allow the simula-
tion of alternative future developments or scenarios. In a
final analysis, the current and future health status in
Member States have to be compared to obtain a view on
the possible implications for health policy making by the
European Union. In the next chapter we present a more
detailed description of a systematic approach to health
status assessment and forecasting using the model and
concepts defined above.

References

Anonymous. Public Health in England. The report of the Commit-
tee of Inquiry into the future development of the Public Health
Function ('Acheson Report'), London, 1988.

Bakkes JA, Born GJ van den, Helder JC, Swart RJ, Hope CW,
Parker JDE. An Overview of Environmental Indicators: State of
the art and perspectives. UNEP/EATR: 94-01; RIVM/402001001
Environmental Assessment Sub-Programme, UNEP, Nairobi,
1994.

Lalonde M. A new perspective on the health of the Canadians,
Ottawa, 1974.

OECD. OECD Group on the State of the Environment Workshop
on Indicators for Use in Environmental Performance Reviews,
Draft Synthesis Report, Paris, August 1993.

Rothman KJ. Modern Epidemiology. Little & Brown, Boston,
1986.

Ruwaard D, Kramers PGN (eds.) Volksgezondheid Toekomst
Verkenning. De gezondheidstoestand van de Nederlandse
bevolking in de periode 1950-2010. RIVM. SdU uitgeverij, Den
Haag, 1993 (partly translated as: Ruwaaard et al., 1994)

Ruwaard D, Kramers PGN, Van den Berg Jeths A, Achterberg PW
(eds.). Public Health Status and Forecasts. The health status of
the Dutch population over the period 1950-2010. RIVM. Sdu
Uitgeverij Plantijnstraat, The Hague, 1994.

Susser M, Watson W, Hopper K. Sociology in Medicine, third
edition. Oxford University Press, Oxford, 1985.

WHO. International Classification of Diseases (ICD). Ninth
Revision. WHO, Geneva, 1975.

WHO. Targets for health for all: targets in support of the European
regional strategy for health for all. WHO Regional Office for
Europe, Copenhagen, 1985.

World Bank. Investing in Health, World Bank, New York, 1993.

4 Health Status Assessment and Forecasting

This chapter demonstrates how the structure provided by the conceptual model can be used for health status assessment, forecasting and the identification of health policy options, highlighting the need for specific data. Next, problems associated with international comparisons of health data are discussed and finally, the potential and limitations of forecasts are reviewed.

The approach to health status assessment

In Chapter 3 'integrated' or compound measures of a population's health, such as health expectancy, were introduced as indicators suited to evaluate health policy. How health expectancy or related compound measures of health can be optimised may be deduced from a line of investigation that follows the conceptual model (Chapter 3) from bottom (health status indicators) to top (health policy). This approach is elaborated below and will illustrate the topics and data to be addressed in the proposed PHSF report.

Several questions arise when such a line of analysis is followed: How much of the lack of optimal health expectancy is due to premature mortality and how much to functional limitations associated with disease? What are the main diseases that cause ill health or premature death? What are the most important determinants of these diseases? What are the most feasible interventions on these determinants? Which policy options are most efficient in terms of desired outcomes and associated costs? Finally, what are the possible implications for the European Union and its Member States?

Measures of overall health status
The overall health status of a population can be expressed in terms of health expectancy, i.e. the average

number of years people live without functional limitations, such as those associated with chronic diseases. This index is constructed from two other indicators: life expectancy and number of years spent in good health *(see Table 4.1)*.

Table 4.1 shows examples of health expectancy comparisons for Western countries (Romieu & Robine, 1994). In 1990 life expectancy at birth was 73.8 years for Dutch men and 80.1 years for women. In addition, Dutch women can expect to spend about 25% of their lives in ill health, while for men this proportion is 19%. Expressed more positively, from birth, Dutch women will spend about 75% of their lives in good health and men approximately 81%. The longer lifetime of women is therefore not spent in very good health. Considerable differences are observed for both sexes between countries and for individual countries between sexes. However, the observed differences are, at least partly, the result of methodological problems associated with international comparison.

Recently (World Bank, 1993), other integrated measures for health status have been proposed that aggregate both the years of life lost and the loss of healthy life by attributing disability weights to discount for years spent with chronic diseases (disability adjusted life years or disability adjusted life expectancy). Regardless of which compound health status measure is used, the important issue remains whether Public Health interventions leading to an extended life expectancy will increase health expectancy as well, or whether these interventions will only increase the average number of years spent in ill health. The next question to be addressed in this line of analysis is whether it is possible to distinguish between interventions that predominantly affect life expectancy or healthy life years.

Table 4.1 Disability-Free Life Expectancy at birth in a selection of Western countries

Country	LE**	DFLE**	DFLE/LE*	LE**	DFLE**	DFLE/LE*
		men			*women*	
France '82	70.7	61.9	87.6	78.9	67.1	85.5
Spain '86	73.2	60.8	83.1	79.6	62.6	78.6
UK '88	72.4	58.5	80.8	78.1	61.2	78.4
Netherlands '90	73.9	60.4	81.7	80.1	59.9	74.8
USA '85	71.2	51.9	72.9	78.2	57.9	74.0
Canada '86	73.0	61.3	84.0	79.8	64.9	81.3

* DFLE/LE = percentage; ** LE: Life Expectancy and DFLE: Disability-Free Life Expectancy (both in years)
Source: Romieu & Robine, 1994

Life expectancy and premature mortality

Life expectancy is still improving slowly in EU countries as mortality from a number of causes is decreasing or shifting to an older age. The absolute and relative contributions of various causes of death changes over time. For instance, after considerable successes in reducing the infant mortality caused by infectious diseases, the mortality pattern in developed countries has now shifted towards degenerative chronic diseases, suffered later in life.

The observed variations in life expectancy, between sexes as well as between countries, appear to be largely determined by differences in premature mortality from a limited number of important causes of death. Improvements in the prevention or cure of one disease category, such as cardiovascular diseases, will inevitably lead to a shift towards other, sometimes even less desirable causes of death, such as cancer or dementia. Analysis of differences in the development of life expectancy between Member States may provide relevant clues for policy makers. A recent Danish report (The Life Expectancy Committee, 1994), has revealed the fact that over the last 15 years Danish life expectancy has been increasing more slowly than in other Northern European countries. Health data analysis has shown that this difference can be attributed to a small number of causes of death (cancers of lung, breast and intestines, cardiovascular diseases, chronic lung diseases, accidents, suicide and infant mortality).

Mortality data are readily available, and premature mortality and life expectancy can be easily computed and reliably attributed to important underlying causes (e.g. diseases). Differences in coding practices may, however, introduce bias into international comparisons. Mortality data determine the average number of years lived but data on the functional ability and quality of life during these years is also required.

Functional ability and quality of life

An assessment of quality of life can be made on the basis of population surveys of self-reported health. The association of handicaps and disabilities with chronic diseases may be assessed and combined with data for the incidence or prevalence of these diseases. It is then necessary to grade the severity of the disability or functional limitations associated with a particular disease. Weighing and thereby implicitly comparing the severity of various health states is highly subjective, however, and may provoke a great deal of controversy. Recent proposals for compound health measures that include estimates of disability, such as the DALY (disability adjusted life years), deserve further elaboration (see also Appendix 2).

Other aspects of quality of life that deserve attention are absenteeism or inability to work in association with ill health. However, comparable data on these and other quality of life measures are often extremely hard to find.

As both mortality and quality of life can be associated to specific diseases, the further approach to health status assessment also requires data on the incidence and prevalence of important diseases.

Incidence and prevalence of diseases

Data on the incidence and prevalence of diseases are highly relevant for a health status assessment, as they provide an approximation of the disease burden within populations. Furthermore, differences in these indicators between sub-populations or developments over time (trends) may indicate opportunities for effective policy intervention, i.e. prevention.

Criteria for determining which diseases should be treated in health status reports are whether diseases contribute significantly to the total burden of disease (high prevalence and/or severity) or whether they are preventable. Appendix 2 gives a list of diseases for which data on incidence and prevalence should be reviewed within the framework of a European PHSF report.

Incidence and prevalence data have been systematically collected throughout Europe, but only for a limited number of diseases (e.g. cancer registrations). In other cases ad hoc health surveys and more or less incomplete information systems or data collections will be the only sources. A number of important diseases are clearly associated with well-defined determinants or risk factors and therefore the next question to be answered concerns the contribution of determinants of health to health status.

Determinants of health

The conceptual model has defined three main groups of determinants: endogenous determinants, exogenous determinants and the system of health care and prevention *(see Chapter 3)*. These determinants influence the health status in an extremely complex manner, which is often not yet fully understood, but usually involves multiple interactions *(for examples, see Figure 3.4)* A single disease can be caused by several determinants, while one determinant may be associated with a number of diseases. Most scientific information pertains to the relation between measurable 'negative' indicators of health (disease incidence or prevalence) and determinants, which are often called risk factors. Less is known about determinants of good health.

Basic biomedical and epidemiological research have provided some well-defined determinants for a number of important diseases. It is therefore possible to quantify the contribution of various determinants to a number of important diseases at the national level. This has, for instance, been done for the USA and the Netherlands. An analysis of causes of excess deaths from nine chronic diseases in the United States (1986) made it possible to quantify the role of a number of endogenous and lifestyle factors (Hahn et al., 1990). In a similar way the determinants of important chronic diseases have been

quantified in the Netherlands (Ruwaard et al., 1994). For a number of diseases/determinant relationships, the population attributable risks (PARs) were calculated, defined as the proportion of deaths in a population attributable to a particular determinant. Diseases included were coronary heart disease, stroke, diabetes, lung cancer, breast cancer. The associated risk factors were smoking, high total serum cholesterol and low HDL-cholesterol levels, glucose intolerance, high blood pressure, and physical inactivity. Both studies agree that interventions that affect these risk factors may positively influence the already relatively high life expectancy in Western society.

Up to this point in the approach the focus has been on determinants which contribute to ill health and premature mortality. However, there are a number of positive determinants which have to do with the maintenance of a good health status, such as *health protection* (e.g., improving or maintaining the quality of the environment and sanitary conditions), *health promotion* (e.g. education on healthy dietary habits) and *disease prevention programmes*. Health care is another important positive determinant. A major question is to what extent changes in levels of investment in health care will lead to appreciable and quantifiable changes in health status. Data are therefore needed which relate medical interventions to both costs and effects in terms of measurable entities like 'years of life gained' or 'years with enhanced quality of life'. Health care and prevention play an important role in health status assessments. In Appendix 3 a selection is presented of determinants for which data are required in the final PHSF report.

The provision, use and costs of medical care
In the elaboration of the conceptual model *(Chapter 3)* the importance of these aspects of Public Health was discussed in some detail. Key questions are how health policy options translate into changes in determinants and thereby into changes in morbidity and mortality and whether such changes will be related to changes in the use and costs of medical care. Data that relate to the effects of health care on health status will be included under medical care as a *determinant* of health. At this point in the general approach, however, data are required on the use and costs of medical care in relation to the incidence and prevalence of diseases and handicaps. Basic data on health care, its use and costs are hard to find at this moment for the whole of the EU and, where present, it will be very difficult to link the data to the burden of disease.

Autonomous factors
Determinants of health may be influenced by so-called 'autonomous factors', such as demographic, economic, technological and socio-cultural developments, which in addition can influence health policy. Factors like ageing, levels of education, and socio-economic class are asso-ciated with the distribution of diseases and determinants in the population. Major changes in these factors and their distribution need to be taken into account in analyses of international health status. These factors are especially important if future developments in health status and its impact, e.g. on the use and costs of health care, are to be estimated. Changes in demography (ageing) and in socio-economic status, e.g. as measured by education, occupation or income, are strongly associated with health differences within and between populations. Data on these factors are needed to analyse the changing distribution of health within demographic or socio-economic groups, as this may provide extremely valuable information for developing a broad Public Health policy.

The approach to health forecasting

The assessment of health status gains additional value and policy relevance when a view of the possible future can be added. Forecasts or scenarios should therefore be included in these studies. This approach may 'predict' future developments, but not in the sense of inevitable consequences. It rather indicates what might happen in the future if certain assumptions prove to be valid, or what could happen if these assumptions are changed. Indications from forecasts are very valuable, as they provide possibilities for feed-back and policy evaluation. Forecasting may also be used to test alternative strategies. It can thus enable and support strategic policy development, or warn against potentially threatening developments (Taket, 1993). Predictions for the near future are performed with the use of current and historical data, combined with quantitative knowledge about risk factors, their relative risks and prevalence. There are several forecasting methodologies which will be discussed below.

Demographic extrapolation
A first, relatively simple, forecasting method is demographic extrapolation. Its central assumption is that given a constant age and sex distribution of the occurrence of an indicator future changes in, for instance the total numbers of patients, can be predicted from demographic changes, i.e. from expected changes in the age structure of the population. Demographic projections give a good first order approximation when the demography is changing fairly rapidly and when the health indicator under consideration is strongly age-dependent. This is the case for a large number of health indicators in the European Union, especially chronic conditions and may aspects of health care use and costs. Demographic projections use population projections which use assumptions about future fertility and also mortality. As the latter may also be the outcome of a demographic extrapolation it may occasionally be necessary to correct the previously made assumptions.

Table 4.2 Demographic projection of a selection of highly prevalent chronic diseases in the Netherlands over the period 1990-2010.

Disease/disorder	Number of patients		Increase
	1990	2010	(%)
arthrosis	773,900	1.045,600	35.1
COPD (incl.asthma)	543,300	>666,900	>22.7
hardness of hearing	475,600	637,800	34.1
atopic eczema	378,100	397,300	5.1
diabetes mellitus	245,200	377,600	54.0
depression	292,400	364,300	24.6
myocardial infarction	255,500	<343,000	<34.2
cataracts	181,700	242,700	33.6
stroke	147,800	184,900	25.1
dementia	102,600	142,400	38.8

COPD: *Chronic Obstructive Pulmonary Disease*

Source: *Ruwaard et al., 1994.*

Glossary
* *population projections*
  estimates of future population compositions according to age and sex, based upon expected fertility, mortality and migration.
* *demographic projections*
  estimates for (chronic) disease prevalence or use of medical care under assumed constant age and sex specific occurrence
* *trend extrapolation*
  extrapolations of age-specific and disease-specific morbidity and mortality and of expected alterations in PYLL and life expectancy, e.g. for selected causes of death and diseases
* *dynamic forecasts (model studies)*
  mathematical health models to indicate possible health changes, e.g. from interventions (policy options) affecting determinants

Table 4.2 provides an example of a demographic projection of disease prevalence. It presents the estimated changes in numbers of patients suffering from the ten most prevalent chronic diseases in the Netherlands (base year 1990) over the period from 1990 to 2010, calculated according to demographic projections. The results show that a rather large (20-40%) increase may be expected in the number of patients for most of these chronic conditions. This can have significant consequences for the provision of health care and the costs involved.

Trend extrapolation
Demographic changes are generally insufficient to explain all observed changes in health related variables. Given sufficient data for a specific variable over time, it is possible to perform a trend analysis plus extrapolation into the future. The assumption is that observed changes in the past will continue in the future. Changes in the exposure to determinants are implicitly taken into account. A time series analysis yields values for the future, corrected for seasonal influences and statistical 'noise'. As a general rule, the time period that is extrapolated into the future should not be longer than the interval for which past data were used. Trend analysis will of course not 'predict' sudden changes that may occur, when, for instance, a new effective therapy emerges.

Dynamic forecasts
A dynamic forecast is performed by using a mathematical model that explicitly describes the quantitative interactions between determinants and indicators of health and, if necessary, the relationships with health care use and costs. The contribution of determinants to health status can also be calculated more 'statically' (as for population attributable risks, or PAR). The present state

of health, however, may have been determined by exposure to determinants many years ago, and/or over a long time period. In such instances data for determinants are necessary that are representative for both the present and past time periods. This kind of modelling also requires information about relative risks of determinants for disease occurrence or mortality by a specific cause.

A simulation approach can explore and explain the effects of measures that are undertaken to reduce exposure to one or more determinants and can take into account possible 'perturbation' effects such as the occurrence of 'competing' diseases and mortality. The intricate relations between determinants, their influence on health, together with a lack of reliable data, restrict the applicability of this type of forecasting to a limited number of diseases and causes of death. Mathematical models are more versatile than other methods as they may be used to answer 'what if' questions, but the results are approximations of a complex reality. As such mathematical models are not necessarily more accurate than other forecasting methods.

International comparisons: the added dimension

International comparisons add an important dimension to health status assessment. Studying differences in health profiles between countries (or regions) may assist in differentiating priorities for health policy. The results may indicate common research fields in various countries and areas where exchange of knowledge could fruitfully take place. International comparisons may confirm trends in diseases which had been previously observed in other countries (OTA, 1993). In addition,

identifying differences in health between populations can be a first step towards establishing associations between determinants and diseases, e.g. at the ecological level. Comparisons may thus add weight to conclusions about changes in national health status. Such comparisons also create the possibility of identifying areas in which one country may benefit from another countries experience. Differences in known risk factors between countries may indicate potential differences in the effectiveness of intervention programmes, in terms of desired outcomes and related costs. Differences in trends in risk factors may confirm or challenge the feasibility of reducing health differences between countries. As the main burden of responsibility for health policy will remain with the Member States, the proposed PHSF report will have to be relevant to individual countries as well as to the EU.

Given the fact that Public Health is a comprehensive and complex concept, the health status of populations cannot be compared by means of one simple indicator, as an indicator generally measures a limited aspect of health. Therefore, a comparison between populations should consider a selection of indicators, determinants, and autonomous factors which are relevant to the goals of a comparative analysis. Comparisons based on aggregate health measures, such as health expectancy, have the advantage of simplicity and political appeal. To analyse the underlying causes of differences in health status and to identify policy options for interventions a desaggregation of data is required. This necessitates the step-wise analysis of health status - as discussed above - and comparisons between countries should also be made along these lines and include comparative forecasts.

Conclusions

A conceptual approach to health status assessment and forecasting, as presented here, can lead to a better understanding of the dynamics of health status and determinants in the EU and its Member States. Major trends in demographic, socio-cultural and economic factors are included to provide a clear view of a possible future. Important differences in indicators between countries are highlighted, together with the major determinants of health and disease that can be influenced by health policy. Data on trends and developments will indicate the changing burden of disease for the Member States and for the EU as a whole. This will suggest policy options and areas for collaboration between Member States. The assessment will also identify important subjects where data is currently lacking or incomplete. A major challenge will be to reduce and focus the amount of data needed to describe the relevant public health issues for the EU and its Member States, for instance by applying a set of 'target indicators', 'health gauges' or other measures of important aspects related to health.

The line of analysis presented here provides an initial indication of the kind of data that is required to employ the PHSF conceptual model and quantify the relations between parts of the model. In Chapter 6 we identify existing sources for health data in the EU and the expertise that is available within the Member States that may contribute to the collaborative production of a PHSF report. First we present the proposed chapter structure for the final PHSF report in the next chapter.

References

Hahn RA, Teutsch SM, Rothenberg RB, Marks JS. Excess deaths from nine chronic diseases in the United States, 1986. J Am Med Assoc 1990; 264: 2654-2659.

OTA. US Congress, International Health Statistics: What the Numbers Mean for the United States; OTA-BP-H-116, Washington DC, US Government Printing Office, November, 1993.

Romieu I, Robine J-M. World Atlas on Health Expectancy Calculations. Proceedings. VIIth REVES International Meeting, Canberra, Australia, February 22-25, 1994.

Ruwaard D, Kramers PGN, Berg Jeths A van den, Achterberg PW (eds.). Public Health Status and Forecasts. The health status of the Dutch population over the period 1950-2010. RIVM. Sdu Uitgeverij *Plantijnstraat, The Hague,* 1994.

Taket A. Health Futures in support of health for all. Report of an international consultation convened by the World Health Organization, Geneva, 19-23 July, 1993.

The Life Expectancy Committee. Lifetime in Denmark.. 2nd report from the LEC. Ministry of Health, Copenhagen, 1994. World Bank. Investing in Health. The World Bank, New York, 1993.

5 Proposed Chapters in a PHSF Report

Here we present the proposed structure of the final PHSF report and the items to be covered in it. The previous description of the conceptual model and approach to health status assessment and forecasting have provided important elements for which data are to be collected for EU Member States. Where EU is written the EU Member States are implicated rather than the weighed average in the EU. The proposed table of contents of a PHSF report for the EU is given below.

Public Health Status and Forecasts for the European Union

Table of Contents

Preface

Chapter 4 DETERMINANTS OF HEALTH
Opportunities for health improvement in the EU
4.1   Life-style and endogenous factors as health determinants in the EU
4.1.1   Life style and endogenous risk factors
4.1.2   Genetics and health
4.2   Physical environment and health in the EU
4.2.1   Environmental health risks
4.2.2   Occupational health risks
4.3   Social environment and health in the EU
4.3.1   Health differences according to socio-economical background
4.3.2   Health differences according to ethnic background
4.4   Effects of medical care and prevention in the EU
4.4.1   Positive and negative effects of medical care
4.4.2   Health protection and safety
4.4.3   Collective prevention
4.4.4   Health promotion
4.5   Summary of determinants of health in the European Union
4.5.1   A summary of the contribution of determinants to important diseases
4.5.2   A summary of preventive health measures

Chapter 5 THE PROVISION AND COSTS OF HEALTH CARE
Investing in health in the European Union
5.1   Health care provision and use within the EU
5.2   Health care costs within the EU
5.3   Summary of health care provision, use and costs in the EU

Chapter 6 FORECASTS FOR SELECTED AREAS OF HEALTH
The future pattern of diseases, causes and consequences in the EU
6.1   Trend extrapolations for indicators and determinants
6.1.1   The future of premature mortality in the EU
6.1.2   Expected trends in important diseases in the EU
6.1.3   Risk factor estimates for the future EU
6.2   Demographic projections for diseases and health care needs
6.3   Scenarios and model studies for health futures
6.4   Summary of health futures and potential policy targets for the EU

Chapter 7 INTEGRATION, SUMMARY AND CONCLUSIONS
Public Health and the European Union
7.1   Summary of health in Europe
7.2   Availability of health data for the EU
7.3   Implications for health policy

The systematic elaboration of chapters and sections

The various chapters and sections in the final PHSF report should contain comparable information for the various Member States of the EU.

In a feasibility study to follow this outline the precise information needed in each chapter should be defined in more detail. This can, for instance, be achieved by collecting the answers to a structured set of questions. *Table 5.1* contains examples of questions that can structure the collection of information about indicators, determinants of health and their interrelationships in a way that will be useful to the European Union and its Member States.

Table 5.1   Questions to obtain systematic information on indicators and determinants

- How is the indicator/determinant defined measured and quantified?
- Which are the important determinants with which the indicator is associated?
- Which are the important health problems with which the determinant is associated?
- Is the determinant related to other determinants? (e.g. is there an uneven spread of exposure over different SES classes or between ethnic groups?)
- How is the indicator/determinant spread over the European population by age and sex?
- What are the trends in incidence/prevalence in time?
- If data are not uniformly available, can a reasonable 'guesstimate' of the EU average (or the total number of people exposed) be made for the prevalence/incidence?
- What is the range of age/sex-specific or average (sex-specific, standardised) occurrence in EU countries? (what is the estimate for incomplete data sets?)
- Are the observed differences between EU countries attributable to known causes?
- Is there a good quantitative estimate of the risk (relative risk) associated with an indicator (the risk of contracting or dying from a disease) and being exposed to a determinant?
- Are there any existing policies or programmes related to this indicator/determinant?
- Are there any international organisations, networks or concerted actions that have a co-ordinating function with regard to this indicator/determinant?
- What relevant information or data on the indicator/determinant is still required?
- Which literature references correspond to the answers to the above questions?

6 Data Sources and Expertise for use in International Health Comparisons

Any effort to collect and interpret comparative health data for the European Union should involve an appreciation of current activities and the main players in this field. The present and future role of the EU must be considered together with the role of Member States, nongovernmental and other organizations, agencies, institutions, working parties, networks and individuals that are active in collecting, comparing and harmonising international health data. The subject areas of these organizations and networks may cover geographical areas that are larger than the EU or smaller than one European country. The different activities may be financially supported at the global level, by individual countries, by local or regional disease-oriented organizations or, for instance, by the European Commission. In addition, individual experts in research institutes and university departments are engaged in collecting, reviewing and meta-analysing epidemiological data relevant to Public Health in the EU. Taken together they constitute the nucleus of potential partners for collaborative activities such as producing a PHSF report or consultations about Public Health in the EU. Here we present a short, non-exhaustive overview of these highly divergent efforts and players.

Efforts by the European Commission

Working Party on community health data and indicators
In the process of implementing the Article on Public Health in the European Union, the High Level Committee on Health decided in June 1993 to establish a Working Party on Community health data and indicators with the Danish Ministry of Health acting as rapporteur. This Working Party has been charged with the task of assessing the validity and comparability of available health data in the EC, and the feasibility of accumulating uniform basic data sets with which to monitor health status and measure or indicate the potential impact of prevention policies. Documents were issued by this Working Party in which a preliminary assessment has been made of the quality and availability of data contained in databases from OECD, WHO and EUROSTAT (Working Party, 1994). The Working Party has recommended that a Community core set of indicators be established together with a set of background indicators for monitoring Community actions in Public Health. In addition it was recommended that the feasibility of a consistent system of health statistics be examined and that a Community health information system be developed. The Working Party has evaluated aspects of the

quality of the datasets under study (comprehensiveness, validity, comparability, consistency, timeliness, homogeneity), but, given the available time and resources, could not yet provide conclusions on reliability, precision and sensitivity.

Concerted actions and research projects funded by the EU
The European Commission has financially supported MHRs (Medical and Health Research Programmes) within which research networks have been built that may be relevant for data collection and for the enhancement of expertise in the field of Public Health. The Commission has been assisted by a general management and advisory committee on medical and health research (CGC) and four COMACs (COMité d'Actions Concertées; Concerted Action Committees) for Epidemiology, Biology, Biomedical Engineering and Health Services Research. An initial review of research carried out under the umbrella of the COMAC 'Epidemiology' has recently been published (Vuylsteek & Hallen, 1994). It contains information about risk factors for cancer, age-related health problems and environment and lifestyle-related health problems.

An evaluation of the research programme MHR4 (Larédo et al., 1992) describes the development and outcomes of the activities of a large number of concerted actions. Surveillance services, development of treatments and technologies, harmonisation of practices, joint research facilities and special communities have been set up as concerted actions. Some of the surveillance networks are engaged in database aggregation, epidemiological research or with the establishment of national registries. These collaborative actions are concerned with health areas such as AIDS, cancer survival (EURO-CARE), diabetes mellitus (EURODIAB), osteoporosis, asthma prevalence and risk factors, blindness prevention and nosocomial infections. Some other examples of ongoing concerted actions are EURODEM (European community Concerted Action Epidemiology of Dementia; Hofman et al., 1991; Launer et al, 1992.) and EUROCAT, which operates in the subject area of congenital anomalies (EUROCAT Working Group, 1991). In MHR4 six countries have participated that did not belong to the EU under the 'COST' agreement (European Co-operation in Scientific and Technical Research) and more countries may be included in the future.

Most EU funds for health related research, however, have been directed towards research aiming at the elucidation of disease mechanisms and towards the develop-

ment of medical and biomedical technologies. A relatively small research effort has been aimed at the comparative description and analysis of the occurrence of diseases and determinants within the European Union. The European Commission did, however, fund the production of documents that describe various aspects of Public Health in the EU. An example of such a descriptive Public Health study sponsored by the Commission is the 'Overview on tobacco and health in the EU' (BASP, 1994). WHO has compiled a descriptive report for the Commission on the state of health in the EU, which is based on data collected for the HFA programme (WHO, 1994c). Other sponsoring by the Commission involves efforts to bring experts together to describe aspects of current and future European Public Health such as the 'Europe without frontiers' project (Normand & Vaughan, 1993).

EUROSTAT

EUROSTAT is the organization that has the responsibility for providing the European Commission and others with an effective system of official statistics as a sound basis for decision-making. Important data for Public Health status assessment collected at EUROSTAT are data on socio-demographic factors including data on population structure, births, fertility, social conditions and employment.

International organizations

The World Health Organization

In 1977 the thirtieth World Health Assembly came to an agreement on the programme that is now known as 'Health for All by the year 2000' (HFA or HFA 2000). In 1983 the World Health Assembly agreed on a minimum set of indicators, including a number of determinants. These can be used by all Member States when reporting their findings to WHO, to facilitate the global monitoring of the HFA strategy. WHO is the most influential international organization in the field of international health policy. It collects and disseminates health data, co-ordinates joint efforts, and supports international networks that cover a range of Public Health issues.

The major concern of WHO's regional office for Europe (WHO/EURO; Copenhagen) is to support and monitor the 'Health for All' strategy for Europe. The European region of WHO comprises over 50 countries, including geographically distinct countries like Iceland, Turkey and the Newly Independent States (NIS countries, i.e., Kazachstan, Tadjikistan, etc.). WHO Copenhagen is a major source of relevant health data for the European Union, as it oversees the HFA database for the European Region - a database which contains data collected for the purpose of evaluating the HFA strategy (WHO, 1994 a,b). The WHO will be the main primary source of mortality data in a European PHSF report.

Data that relate to the HFA programme are, however, not always available in a form that is useful for making forecasts.

Various Working Parties and other expert groups are operating under the flag of WHO and are active in collecting, comparing and interpreting epidemiological data on specific diseases or other Public Health aspects. Some examples are the WHO/EURO Working Group on Preventive Practices in Suicide and Attempted Suicide (Platt et al., 1992), the ESDA project: European Summary on Drug Abuse (Klingemann et al., 1992) and the efforts in the field of nutrition policy making (Becker & Helsing, 1991).

The MONICA project (Monitoring of Trends and Determinants in Cardiovascular Diseases) is a major effort, supported by WHO headquarters in Geneva, to collect data on ischemic heart disease, cerebrovascular accidents and a number of relevant risk factors (The WHO MONICA Project, 1988).

IARC (the WHO linked International Agency for Research on Cancer) is probably the best known organization involved in the collection, interpretation and dissemination of data that pertain to cancer (Coleman et al., 1993), often in collaboration with other organizations such as the International Union Against Cancer and the International Association of Cancer Registries. WHO's data on cancer mortality have proved to be very useful for the analysis of European cancer mortality trends and have been used in international collaborative efforts such as the 'Europe against Cancer Programme' of the Commission (Franceschi et al., 1994).

OECD

OECD (the Organization for Economic Co-operation and Development) presents a systematic selection of data on key aspects of the health systems in the 24 OECD countries. Most of the data are derived from the national statistical data systems. The emphasis is on data relevant for the economic appraisal of health status, health care efforts and health-related costs. The OECD database and related publications (OECD, 1990 and 1993) are relevant sources of European health data. Difficulties will rise, however, when comparing the extremely diverse European health systems and therefore in comparing data on health care use.

Other international organizations

Other large international organizations (UNEP, UNICEF, FAO, World Bank) also collect data that are relevant to public health, either on a regular basis or more incidentally, i.e. for a special report (e.g. World Bank, 1993; UNICEF, 1994). Data on the environment, with direct or indirect relevance to health, are systematically collected by UNEP (United Nations Environmental Programme). International data on food production and food consumption are systematically collected by FAO, the Food and Agriculture Organization of the United Nations (see:

Becker & Helsing, 1991.). Both the United Nations (UN, 1993), and IIASA produce and disseminate population forecasts, incorporating data from national censuses, surveys and civil registrations.

Other international organizations collect and disseminate data that are either indirectly or partially related to health.. The International Road Federation, for instance, publishes 'World Road Statistics' which also contain data on deaths caused by driving and on the amount of kilometres people travel in cars in various countries of the world (IRF, 1992). Part of this road data is 'secondary', i.e. it is derived from other sources, such as WHO's collection of mortality statistics.

International networks and other collaborative efforts
The initiation and co-ordination of international networks can originate from within or outside the EU and, as already mentioned, the data that are collected may not fully coincide with the boundaries of the EU. Initiatives from the United States (CDC/DHHS) have led to the appearance of international networks for specific health areas. One example is the ICE (International Collaborative Effort) on Perinatal and Infant Mortality (US DHHS, 1992) in which scientists from a number of EU countries have participated, together with experts from the US and other developed countries.

One international network particularly relevant to Public Health is the REVES network (Réseau Espérance de Vie en Santé; network on health expectancy). This group of experts is active in harmonising of data collection and methodologies for the calculation of health expectancies in various - mostly developed - countries, including those of the EU (Robine, et al., 1993).

Initiatives for international collaborative efforts frequently originate from disease-oriented organizations. An example is the European Region of the International Union Against Tuberculosis and Lung Disease, which has participated in a European Task Force (Rieder et al., 1994), collecting data on tuberculosis in Europe in relation to migration.

A number of organizations may be important to the process of European data harmonisation without directly collecting or comparing data themselves. The EUPHA (European Public Health Association) and ASPHER (Association of Schools of Public Health in the European Region; Laaser, 1994) are just two examples that may influence Public Health policy making within the EU. Examples of other networks active in this field are disease oriented and concerned with, for instance, data on cardiovascular diseases (Williams, 1994).

Further initiatives for international health data collection and comparison
A number of Scandinavian countries have joint efforts on health statistics, which has led to both more uniform and more comparable health statistics (NOMESKO, 1994).

National statistics bureaux throughout the European Union work together to compare and harmonise health data within the European Union. A joint effort by CBS (Netherlands Central Bureau of Statistics) and WHO has provided a comparison of European health interview survey data (Evers, 1990).

Recently the Danish Ministry of Health has issued a report containing a comparative assessment of health in Denmark and other European countries (The Life Expectancy Committee, 1994). Another comparative study with relevance for international health data comparison was issued by the US Office of Technology Assessment (OTA, 1993). Such national initiatives contribute to the international comparison of health status and determinants of health in countries of the European Union. In addition, specific research projects may include world-wide comparisons of health data that are relevant to the EU. A good example is the project on mortality from smoking in developed countries (Peto et al., 1994), which is also associated with the 'Tobacco and Health Program' from WHO.

Finally, the international literature contains the efforts of individual scientists in collecting and comparing international data sets on a variety of issues, for a variety of time periods and a random selection of populations. On occasion, this literature contains information relevant for the assessment of health status in the European Union.

Conclusions

The collection and comparison of health data relevant to the European Union is undertaken within a huge scientific field comprising a large number of organizations, institutions, networks and individuals. The overview presented above also provides an indication of potential expert collaborators and data sources for the description and assessment of health in the European Union as proposed in this outline. Key data sources are WHO, OECD and EUROSTAT. Various networks, and especially some of the concerted actions initiated by the EU, may also contribute significantly to the collection of health information for the EU and its Member States. Important questions that remain relate to the comparability, representativeness and relevance of the available data *(see: Appendix 4)*. Judging the feasibility of the production of the final European Public Health Status and Forecasts report requires a more detailed appreciation of available European health data and expertise. Especially in cases where there is no obvious set of comparable, representative data, consultation with experts may answer the question as to precisely which data may be used.

References

BASP. Bureau for Action on Smoking Prevention. Tobacco and health in the European Union. An overview. BASP, Brussels, September 1994.

Becker W, Helsing E, eds. Food and health data. Their use in nutrition policy making. WHO Regional Publications, European Series, No. 34. WHO Regional Office for Europe. Copenhagen, 1991.

Coleman MP, Estève J, Damiecki P, Arslan A, Renard H. Trends in Cancer Incidence and Mortality. IARC Scientific Publications No. 121. IARC, Lyon, 1993.

Eurocat Working Group. Prevalence of Neural Tube Defects in 20 Regions of Europe and the Impact of Prenatal Diagnosis, 1980- 1986. Journal of Epidemiology and Community Health. 1991; 45: 52-58.

Evers S. Health for all indicators in health interview surveys. Second consultation to develop common methods and instruments for health interview surveys. CBS, Voorburg, 1993.

Franceschi S, Levi F, La Vecchia C, Lucchini F, Negri E. Comparison of cancer mortality trends in major European areas, 1960-1989. Eur J Cancer Prevention 1994: 3: 145-206.

Hofman A, Rocca WA, Brayne C, Breteler MMB, Clarke M, et al. The prevalence of dementia in Europe: A collaborative study of 1980-1990 findings. Int J Epidemiol 1991; 20: 734-748.

IRF. International Road Federation. World Road Statistics 1987-91. Washington DC, 1992.

Klingemann H, Goos C, Hartnoll R, Jablensky A, Rehm J. European Summary on Drug Abuse. First Report (1985-1990). WHO report: EUR/ICP/ADA 527/A. WHO Regional Office for Europe, Copenhagen, 1992.

Laaser U. ASPHER's support for Article 129 and the European Commission's Communication on the framework for action in the field of public health. Policy summary of the Athens Memorandum on training and research in public health. Eur J Public Health 1994: 4: 305.

Larédo P, Kahane B, Meyer JB, Vinck D. The Research Networks built by the MHR4 Programme. Office for Official Publications of the European Communities; CG-NA-14700-EN-C; Luxembourg, September 1992.

Launer LJ, Brayne C, Dartigues J-F, Hofman A. European Studies on the Incidence of Dementing Diseases. Neuro-epidemiology 1992; 11 (suppl 1): 2-122.

NOMESKO (Nordisk Medicinal statistisk Komite). Health statistics in the Nordic Countries. Helsestatistik for de nordiske lande 1992. Copenhagen, 1994.

Normand CEM, Vaughan P, eds. Europe without frontiers. The implications for health. London School of Hygiene and Tropical Medicine Second Annual Public Health Forum. John Wiley & Sons, Chichester, 1993.

OECD. Health care systems in transition: the search for efficiency. OECD, Paris, 1990.

OECD. OECD Health Systems. Facts and Trends 1960-1991. Health Policy Studies no. 3. Vol. I and II. OECD, Paris, 1993.

OTA. International Health Statistics: What the numbers mean for the United States. Background Paper. OTA-BP-H-116. Washington (DC), November 1993.

Peto R, Lopez AD, Boreham J, Thun M, Clark Heath jr. Mortality from smoking in developed countries. 1950-2000. Indirect estimates from national vital statistics. Oxford University Press, Oxford, 1994.

Platt S, Bille-Brahe U, Kerkhof A, Schmidtke a, Bjerke T, et al. Parasuicide in Europe: the WHO/EURO multicentre study on parasuicide. I. Introduction and preliminary analysis for 1989. Acta Psychiatr Scand 1992: 85: 97-104.

Rieder HL, Zellweger J-P, Raviglione MC, Keizer ST, Migliori GB. Tuberculosis control in Europe and international migration. Eur Respir J 1994: 7: 1545-1553.

Robine J-M, Mathers CD, Bone MR, Romieu I. Calculation of health expectancies: harmonization, consensus achieved and future perspectives. 6th REVES International Workshop. Colloques INSERM/John Libbey Eurotext Ltd, Paris, 1993.

The Life Expectancy Committee. Lifetime in Denmark. Second report of the life expectancy committee of the ministry of health, Denmark. Copenhagen, Ministry of Health, 1994.

The WHO MONICA Project. Geographical variation in the major risk factors of coronary heart disease in men and women aged 35-64 years. Wld Hlth Statist Quart 1988: 41: 115-140.

UN. United Nations. World Population Prospects, The 1992 Revision, New York, 1993.

UNICEF. Central and Eastern Europe in transition. Public policy and social conditions. Crisis in Mortality, Health and Nutrition. Economies in transition studies. Regional monitoring report. No 2. UNICEF, Florence, August 1994.

US DHHS. US Dept of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Health Statistics: Proceedings of the International Collaborative Effort on Perinatal and Infant Mortality, Vol III. DHHS Pub. No. (PHS) 92-1252, Hyattsville (MD), 1992.

Vuylsteek K, Hallen M (eds.). Epidemiology. Biomedical and Health Research. Volume 4. IOS Press, Amsterdam, 1994.

WHO. Implementation of the Global Strategy for Health for All by the Year 2000. Second evaluation. Eight report on the world health situation. Volume 5: European region. WHO regional publications. European series; No. 52. WHO, Copenhagen, 1994 a.

WHO. Health in Europe. The 1993/1994 health for all monitoring report. WHO regional publications. European series. No. 56. WHO, Copenhagen, 1994 b.

WHO. A Healthier Europe 1994. The state of health in the European Union, Copenhagen, 1994.

Williams C. Measuring the burden of Cardiovascular Disease in Europe: Steps towards establishing comparable data. Report of the European Heart Network's EURODATA CONFERENCE: A Meeting of European Experts on the Collection of Statistics on Cardiovascular Mortality, Morbidity and Risk Factors. Bilthoven, The Netherlands, Netherlands Heart Foundation, 1994.

World Bank. World Development Report 1993. Investing in Health. The World Bank. Washington (DC), April 1993.

Working Party on Community Health Data and Indicators. Recommendations to the High Level Committee on Health. Ministry of Health, Denmark, October 1994.

7 Organization and Planning

The preceding chapters have presented an outline of what the proposed European PHSF report will contain. In this section an indication is given of how we envisage that this project could be accomplished. The steps in this process are shown in *Figure 7.1*.

After approval by the EU of the request for funding (t=0 in *Figure 7.1*) a *feasibility study* will be undertaken. This study should clarify to which extent the approach and scope as defined in this outline can be realised. It will therefore focus on the two critical success factors for this

study: collaboration with key institutes, networks and experts to investigate the potential for cooperation. This cooperation could take the form of advising, sharing of data, or full collaboration in the production of the final PHSF report .

The feasibility study will also outline a detailed procedure for quality control in order to be able to monitor the appropriateness of the overall approach as well as to assess the scientific validity of the results and their usefulness for the purpose of supporting health policy. In

Figure 7.1 Schematic plan for the preparation of a European PHSF report
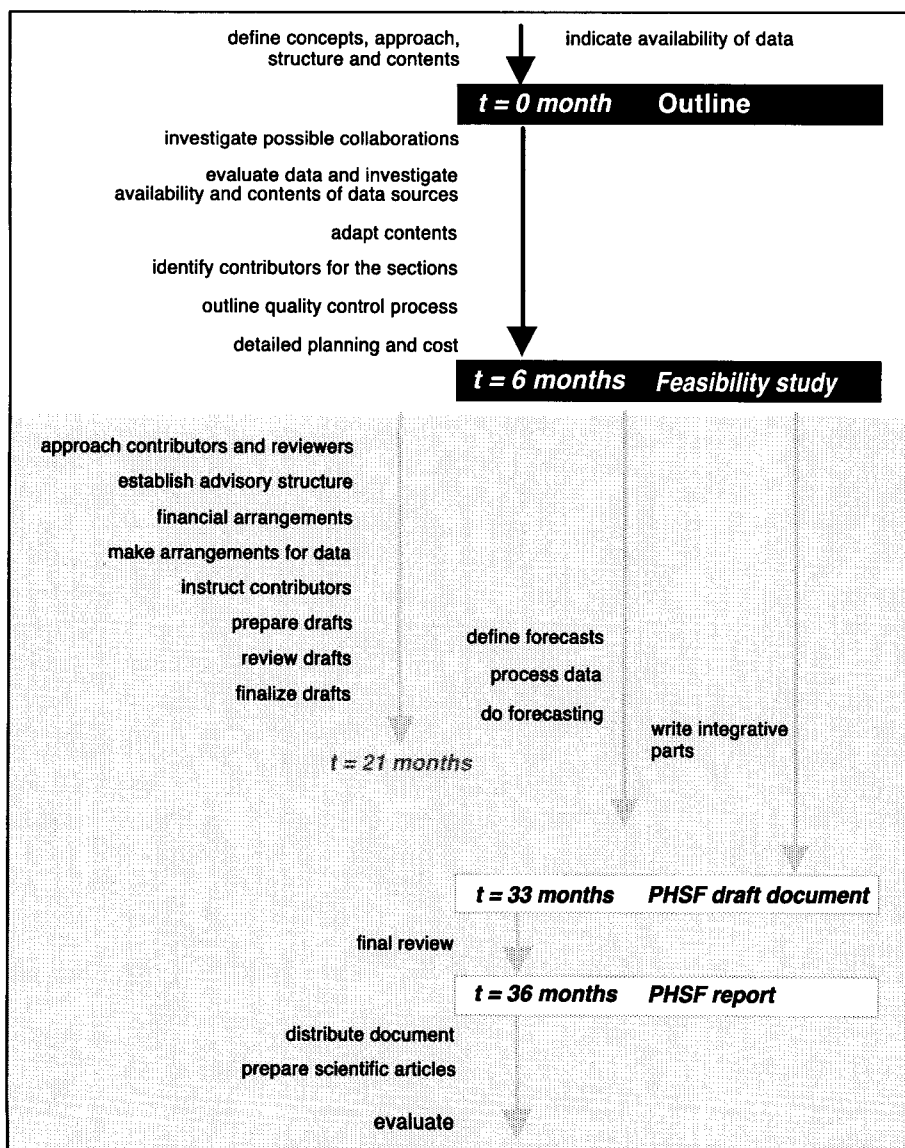
addition, the feasibility study will provide a detailed indication of the planning and costs involved in preparing the proposed PHSF report. This will include the cost of personnel at the coordinating institute, allowances for the contributing experts, the purchase and handling of data, allowances for reviewers, travel expenses associated with coordination and plenary review meetings, and production costs.

A request for funding a feasibility study for a PHSF report has been submitted by RIVM to the European Union. The funding request states that a period of six months from the moment of approval will be necessary to complete the feasibility study. On the basis of the feasibility study, an agreement can be reached with regard to the assessment of contents, data, procedures to be followed and collaboration in the production of the final PHSF report.

A first, preliminary, indication of the timing in the *production phase* has been indicated in Figure 7.1. It includes making final arrangements with collaborating institutions and experts, data providers and reviewers. The preparation of parts of the report by experts or expert institutions will run partly in parallel with the forecasting and the preparation of the integrative parts. The total time schedule is estimated at approximately 36 months, including the feasibility study phase. Steps that are decisive to the total time required for each phase are: the investigation of data sources in the feasibility study phase, writing and reviewing the various contributions *(Figure 7.1, left-hand side)* and the production of the forecasts and integrative parts (right-hand side). One of the desired outcomes of the feasibility study is a precise time planning.

The scientific quality of the PHSF report must be assured by advisory expert scientists. The relevance of the final report for European health policy will be safeguarded by representatives of Member States, such as the 'High Level Committee'. The scientific advisors will be able to validate the various chapters and stimulate uniform and comparable treatment of data throughout the report and can advise on which peer reviewers to invite. Peer review of draft contributions and review of the integrative and forecasting parts of the completed report by international experts are important quality requirements. An additional editing review will ensure the correct use of language and consistency of terminology.

The preparation of the final PHSF report as proposed here depends on extensive collaboration among those working in the field of Public Health in the EU. Participants are primarily the Commission with its responsibility for the general steering and funding of such a project alongside the collaborating and contributing experts (authors, and reviewing peers) and international institutes in the field of Public Health such as the RIVM, which opts to coordinate this project. This coordination will include establishing and monitoring the time schedule, organising meetings of advisory panels, safeguarding the quality assurance process, the data flow and the general timing, coordinating the contributions of collaborators and guiding the production of the integrative parts and forecasts.

The proposed feasibility study should specify the details of the project approach along the lines described in this outline for a PHSF report for the European Union.

Appendices

A1   Public Health from the perspective of the European Union

A2   Selection of diseases

A3   Selection of determinants

A4   Data requirements for Public Health assessment
     and forecasting

A5   The geographical scope of the PHSF report

A 1   Public Health from the Perspective of the European Union

Maastricht and article 129

Article 129 of the Maastricht Treaty on the European Union (1992) states that the Commission has an explicit obligation to 'ensure a high level of human health and protection by encouraging cooperation between Member States and, if necessary, lending support to their action'. Before this Treaty there had not been a well-defined basis for Community action in the field of Public Health.

Several subjects with relevance for Public Health policy have, however, traditionally been included in many other sectors of Community responsibility. Examples are: safety at work, environmental protection, consumer safety and public information programmes, e.g. for AIDS and cancer. It should be noted that EU policy is concerned with Public Health in the collective sense and explicitly not with health care services for the individual.

Developments in EU health policy

The Commission and the European Parliament have responded to the challenge of the Maastricht treaty with several documents that further outline policy developments for health.

In the document 'Public Health Policy after Maastricht' (PE 205.804) the Committee on the Environment, Public Health and Consumer Protection describes a wide range of Community Policy areas with Public Health implications. Among them are environment, health and safety at work, food and pharmaceuticals, biotechnology and the free movement of citizens. The Committee has also pointed out that the Treaty does not provide a basis for Public Health legislation, but instead has stressed the need for coordination of policy development among Member States and for the development of wide consultation mechanisms (for the exchange of information and to encourage participation). Of course, the principle of subsidiarity must always be taken into account.

The monitoring of the effects of EU policy in sectors with potential significance for Public Health, such as environment, labour, transport and agriculture will continue to be present implicitly in future EU activities. The comparative economics of health care systems in Member States is also of interest to the EU.

The 'Framework for action in the field of Public Health' (COM 93 559, 1993), issued by the Commission (DG V), states that action of Member States should be supported by promoting the coordination of their policies and programmes, which involve cooperation with international organizations and with third countries. This support should focus on information, education and health promotion, training and research, and ensure 'added value'. In the document the Commission identified 'major health scourges' as well as European developments with regard to the important determinants of these health scourges, including:

- ageing of the population
- increasing population mobility
- environmental changes and conditions in the workplace
- rising public expectations concerning health
- socio-economic problems, in particular social exclusion

Eight priority areas have been distinguished using selection criteria related to 'added value at the EU level' and 'burden of disease'.

- health data and indicators, including the monitoring and surveillance of diseases
- health promotion, education, information and training
- cancer
- drugs (abuse)
- AIDS and other communicable diseases
- accidents and injuries
- pollution-related diseases
- rare diseases

Five-year programmes will be developed by the EU in these areas.

Activities in the field of health data collection

In chapter 6 an indication has been given of current, past and future activities by the European Commission and other players in the large area of collection, comparison, harmonisation and dissemination of health data. The High Level Committee on Health and related working parties on health data play a central role in this area. The regular provision of a European Public Health Status and Forecasts report could catalyse and guide further efforts in the area of health data harmonisation and set a path for further collaboration between Member States. The Commission has recognised the need for regular reporting on health in the European Union.

PHSF content and EU perspective

The utility of a European PHSF report is, as proposed in this outline, will, above all, be in supporting the development, monitoring and evaluation of Public Health policy at the European level. Based on published EU policy documents, a number of topics that deserve attention in the PHSF report have been identified. As is will be shown below, these topics relate to indicators, determinants and autonomous factors (see also Chapters 3 and 4 and Appendix 4. Data requirements).

Indicators
An important area is the comparative analysis of the 'burden of disease' in EU Member States, i.e. the uneven distribution of diseases over Member States as well as over certain sub-populations. Special attention should be given to health indicators associated with socio-economic differences, with the ageing of populations, and to associated differences in health care utilisation (see also Appendix 2. Selection of diseases).

The availability of health data and statistics should be further analysed, for example for data needed to compare major health problems in the EU such as cancer, drug abuse, communicable disease (AIDS) and injuries (both occupational and by traffic).

Disease incidence data may occasionally be used as so-called sentinel events, i.e. for 'rare' diseases, such as re-emerging communicable diseases, pollution-related transmissible diseases (e.g. mad cow disease) or congenital abnormalities. In some instances these diseases may serve as an early warning, indicating that 'something is going wrong' in health protection, sanitation or immunisation.

Determinants
An important priority in the context of EU policy is the accumulation of health risk factors within certain populations, such as deprived groups that combine low SES, an unfavourable life-style, poor housing, poor immunisation, poor local environmental quality, unemployment, a high proportion of immigrants and other problems related to urbanisation. Transboundary environmental health threats, such as air pollution, major technological accidents, and risks associated with the transport of hazardous substances deserve special EU attention. The free movement of persons and goods may give rise to an increased incidence of pollution-related communicable diseases, for instance through widely available, processed foods and tourism (see also Appendix 3. Selection of determinants).

Demographic and socio-economic factors
Demographic and socio-economic factors have also been included in the 'autonomous' factors described in the conceptual model for a European PHSF report. Trends in the population age structures of Member States are of major important for future changes in health status and for developments in the use of health care. Trends in international migration patterns are related to Public Health problems, such as poverty, poor immunisation status, poor education and other ethnic/urbanisation-related health problems.

References

COM 93 559. Commission communication on the framework for action in the field of Public Health, COM (93) 559 final, 24 November, 1993.
Document PE 205.804. Report (by K Collins) of a meeting of the committee for environment, health and consumer protection

A 2.   Selection of Diseases

As the number of existing diseases is large, a selection of major diseases has to be made. In order to make this selection, the following criteria are proposed:
• burden of disease
• preventability

Burden of disease

Healthy life expectancy is a central issue of the proposed European PHSF report. Therefore, and with respect to the first criterion, diseases should be selected that contribute most to the burden of disease within the EU as can be expressed in terms of lost years of life expectancy and years spent with disabilities or in ill health. In the World Development Report, 1993, 'Investing in health', the World Bank has, in a joint exercise with the World Health Organization, introduced a compound measure for this burden of disease: Disability Adjusted Life Years (DALYs). To quantify the full loss of healthy life this measure accounts for loss of life expectancy for all possible causes of death and for loss of healthy life (weighted disability) for about 95% of the possible causes of disability. Diseases have been grouped into six classes of severity of disability. Death and disability losses are then combined, and allowance has been made (a discount rate of 3 percent) for the decreasing value of future years of healthy life, and for age weighting, attributing different values to years of healthy life lost at different ages. Then global distributions of DALY loss by cause and demographic regions have been constructed based on 1990 data using available mortality records, on community surveys for demographic regions and on expert judgement when data were not available (World Bank, 1993).

DALY calculations for the established market economies (EME) were used by us to select diseases with the highest burden in Western societies. Table A2.1 lists the diseases for which the calculated number of DALYs in EME countries exceeds an arbitrary cut-off point of 0.9 million DALYs (about 1.0 % of the total burden of disease in DALYs). Together they account for 59.7 million DALYs lost (63 % of total).

Preventability

The preventability of a disease indicates the potential for effectively reducing the disease burden with policy interventions. For instance, there are those interventions targeted at known determinants (health protection or health promotion programmes), and those that enhance the future effectiveness of cure (e.g. by early detection,

or screening). Finally, other measures for collective prevention (immunisation programmes) are aimed at preventable diseases.

The Maastricht Treaty has provided the EU with special responsibilities for health protection, including areas such as the management of environmental and occupational health risks, and health risks associated with food and consumer products.

Table A 2.1 Primary list of selected diseases (high burden of disease*)

Diseases/causes of death	DALYs (millions)
All causes	94.78 = 100%
perinatal	2.04
Infectious and parasitic diseases	5.31
AIDS	2.78
STD (excluding HIV)	1.56
Neoplasms	17.90
cancer of trachea, bronchus or lung	3.07
cancer of colon or rectum	1.96
cancer of breast (females)	1.57
cancer of the stomach	1.13
Diseases of the circulatory system	21.89
ischemic heart disease	9.36
cerebrovascular disease	4.97
diabetes mellitus	1.33
cirrhosis of the liver	1.68
Neuro-psychiatric disorders	14.02
dementia (e.g. Alzheimer)	3.99
depressive disorders	2.11
drug dependence	1.57
alcohol dependence	2.82
Diseases of the respiratory system	3.61
chronic obstructive lung disease	1.60
pneumonia (lower respiratory infections)	1.69
Musculo-skeletal diseases	3.89
osteoarthritis	2.24
rheumatoid arthritis	1.37
Congenital abnormalities	2.35
External causes	11.09
motor vehicle accidents	3.32
suicide	1.95
homicide and violence	1.71
accidental falls	1.53

* criterion: > 0.9 DALYs lost in Established Market Economies (World Bank, 1993)

This stresses the need to include diseases for which there are indications that the physical environment is an aetiological factor (such as pollution-related infectious disease, occupational acci-dents, hardness of hearing caused by exposure to noise, melanoma, and leukaemia).

Table A 2.2 presents a selection of diseases that are considered important from the viewpoint of (partial) preventability. In addition, the estimated burdens of disease are also given

Based on their relevance from the point of view of prevention, the following diseases can be added to the first selection: 'childhood vaccination cluster' (mainly pertussis) and tuberculosis, leukaemia, cancer of cervix or uterus, bladder cancer and melanoma, occupational accidents, hardness of hearing (when caused by loud noise) and atopic eczema. These diseases add another 2.3 % to the primary selection, which constitutes 63% of total DALYs lost by all causes *(Table A 2.1)*.

Table A 2. 2 Additional list of diseases (preventability)

Diseases/causes of death	DALYs (millions)
Infectious diseases	
tuberculosis	(0.16)
childhood cluster[1]	(0.08)
Neoplasms	
leukaemia	(0.61)
cancer of cervix or uterus[2]	(0.46)
cancer of the bladder	(0.44)
melanoma	(0.27)
subtotal	(4.03)
Accidents	
occupational accidents	(0.20)
Diseases of sense organs	
hardness of hearing	no data
Diseases of the skin	
atopic eczema	no data

1 Infectious childhood diseases: polio, diphtheria, measles, tetanus and pertussis (90% of DALYs in this subgroup).
2 Cancer of cervix or uterus taken together (possible diagnostic difficulties).

A 3   Selection of Determinants

In this appendix the determinants of health are specified for which information is proposed to be included in the final European PHSF report. In Chapter 3 determinants were defined as factors that influence health status. The conceptual model introduced three main groups of determinants: endogenous determinants, exogenous determinants and the health care system (including prevention).

Considerations

For the selection of determinants to be included in a European PHSF report several considerations are relevant:
- coverage of all main determinant groups
- association with selected diseases
- possibility for quantitative description
- the policy perspective of the EU

Coverage
To achieve good coverage of the total area of determinants it is not sufficient to select the three main groups of determinants as they may each contain subgroups with associations with different diseases. Coverage of all main determinant groups has therefore to be achieved by the discussion subgroups of further specified determinants. In *Table A 3.1* determinant subgroups are presented in more detail, but still consistent with the conceptual model that was presented in Chapter 3. These sub-

groups can be covered in subsections of the chapter on determinants of health of the final PHSF report, when other criteria have also been fullfilled.

Quantitative association with selected diseases
Special attention should be given to a group of risk factors (primarily endogenous and life-style factors) for which a quantitative association with important chronic diseases has been established and quantified at the national level in health data analyses (e.g. Hahn et al., 1990; Ruwaard et al., 1994). This type of quantitative association plays an important role in explanatory and comparative analyses, as well as in health status forecasts. For a selection of these strongly interrelated life-style and endogenous fac-tors a more integrated analysis of quantifiable determi-nants of major chronic diseases appears possible *(see Table A 3.2)*. Both quantification and association with important diseases will be achieved in this way.

Several of the endogenous factors presented in *table A 3.1*, such as ageing, psychological factors, genetic factors and immune system rather refer to broad areas of investigation than to well defined and quantifiable variables. Genetic background, however, is a large subject area, where quantification is possible in some more detailed areas and, in addition, genetic background may influence other determinants. This warrants a separate section in the final report. The demographic effects of

Table A 3.1 Overview of determinants of health

Endogenous determinants	
genetic factors	
acquired attributes	blood pressure, serum cholesterol, body weight, glucose tolerance, immune system, ageing, personal
(psychological) characteristics	

Exogenous determinants	
life-style	diet, smoking, consumption of alcohol, sexual behaviour, physical activity, use of drugs, travel
physical environment	chemical factors, physical factors, biotic factors
social environment	socio-economic status, ethnic background, work, social environment and mental health

Medical care and prevention	
medical care	*positive effects* of medical care on morbidity and mortality
	negative effects of medical care: antibiotics resistance, side-effects of medication, hospital infections
	prevention *disease prevention:* monitoring infectious diseases; vaccination; preventive health care for children and adolescents; screening for phenylketonuria and congenital hypothyroidy; screening during pregnancy for rhesus(D) factor, syphilis and hepatitis B; screening for breast cancer; screening programmes for cervical cancer
	health promotion: health education programmes
	health protection: legislation, health risk management

Table A 3.2 Selection of life-style and endogenous risk factors

Life-style factors	Endogenous factors
Smoking*	Hypercholesterolaemia*
Alcohol abuse*	Obesity*
Unhealthy diet*	Glucose intolerance*
Physical inactivity *	High blood pressure*
Unsafe sexual behaviour	
Drug abuse	

* quantitative associations with chronic diseases possible

ageing will receive sufficient attention (demographic and sociocultural background factors). The influence of the immune system will be treated, in a limited fashion, in sections on infectious diseases and vaccination.

EU policy perspective

The EU policy perspective (see also Appendix 1) will be addressed by giving separate and detailed attention to two important groups of exogenous determinants: the physical and the social environment. Traditionally, these areas have been the subject of EU policy development as they comprise important socio-economic sectors such as agriculture (food safety), industry (consumer product safety, occupational health), and transport (air pollution, traffic safety).

EU policy priorities such as migration and demographics (ageing) will be discussed in a section on health differences by ethnic background and on socio-economic health differences, both to be placed under the heading Social environment and health.

Disease prevention (including vaccination and screening programmes for certain cancers) closely follows the EU focus on health protection. Health promotion is an integral part of any serious health policy.

Because of the prior interest of the EU in socio-economics, a chapter will be devoted to health care consumption and its costs. Positive and negative effects of

Table A 3.3 Proposed sections in PHSF chapter on determinants of health

Life-style and endogenous factors as health determinants in the EU
    Life-style and endogenous risk factors
    Genetics and health

Physical environment and health in the EU
    Environmental health risks
    Occupational health risks

Social environments and health in the EU
    Health differences by socio-economical background
    Health differences by ethnic background

*Medical care and prevention in the EU**
    Positive and negative effects of medical care
    Health protection and safety
    Collective prevention
    Health promotion

* Health care use and costs are to be included in a separate chapter

medical care can be introduced as a separate section in the chapter on determinants, where the concept of avoidable mortality - mortality due to causes amenable to medical intervention - may be used (Holland, 1988).

All these considerations have led to the specification of separate sections (Table A 3.3) in the chapter on determinants of health in the proposed PHSF report (see Chapter 5).

References

Ruwaard D, Kramers PGN, Van den Berg Jeths A, Achterberg PW (eds.). Public Health Status and Forecasts. The health status of the Dutch population over the period 1950-2010. National Institute of Public Health and Environmental Protection. Sdu Uitgeverij Plantijnstraat, The Hague, 1994.

Hahn RA, Teutsch SM, Rothenberg RB, Marks JS. Excess deaths from nine chronic diseases in the United States, 1986. J Am Med Assoc 1990; 264:2654-2659.

Holland WW (ed.) European Community Atlas of Avoidable Deaths. Oxford University Press, Oxford, 1988.

A 4   Data Requirements and Availability for Public Health Assessment and Forecasting

This appendix indicates general data demands and requirements, it summarises the data needs for the various parts in the conceptual model outlined in Chapter 3 and following the line of analysis elaborated in Chapter 4. Finally, this appendix gives a preliminary appreciation of the availability of these data. For almost all data classes this overview of data requirements and availability must be further detailed and more exactly specified in a feasibility study that is to follow this outline.

General data demands

In addition to the data needed to describe the health of a certain population, an interpretation of its health status requires knowledge of the prevalence of determinants in the population and the quantitative relationship between determinants and health. Since the influence of determinants on health is usually the result of a long period of exposure, historical data relating to the prevalence of determinants are needed. A forecast requires even more data, such as estimates of the future population and trend data for phenomena that cannot be calculated by a dynamic model (See also Chapter 4). The three goals: description, interpretation and forecasts determine the full demand for data.

Quality of data
Data specifications must be accompanied by quality requirements. The Working Party on Community Health Data and Indicators (Working Party 1994) is currently evaluating sets of European health data according to such criteria as the *quality of the data itself* (e.g. precision, sensitivity and reproducibility), *the usefulness of the data* (e.g. validity, consistency, comparability, coverage [geographical and in time] comprehensiveness, aggregation level) and *availability* (e.g accessibility and timeliness).

General data specifications

Several, more general, specifications for health data that are needed for a PHSF study may be defined here. These specifications concern the geographical coverage, age and gender specification, standard population and standard year(s) for data collection.
Countries:
The actual and 'soon-to-be' members of the EU and, in several cases, other countries for purposes of comparison (see: Appendix 5).

Gender:
Male and female, where possible and relevant.
Age classes:
see *Table A4.1* for a full definition of the preferred subdivision of age classes. Not all defined subclasses are always necessary. Preferred are subclasses that are thought contain age-specific health problems. From that perspective, it is not uncommon to subdivide into the following age classes: 0-14, 15-24, 25-44, 45-64, 65-74, 75 years and older. It is preferred to use these age classes, or broader age classes that are comprised of two or more of these subclasses;
Standardisation:
Data will be standardised using the (new) European standard population (UN, 1991).
Target year(s):
To ensure maximum comparability, data should be taken from the same year(s), here proposed as 1992. A final choice will depend on the availability of data. Trend data will, wherever possible, be collected over a period of about 20 years (1972-1992) to allow extrapolations or forecasts for a similar 20-year period. Considerations concerning the full availability of data may occasionally warrant the use of another target year. For future estimates we will use the period 1992-2015.

Table A4.1 Age categories

Age class (number)	Ages included	
1	0 (from birth to one year old)	
2	1 - 4	
1+2 (A) a		*0 - 5*
3	5 - 14	
1+2+3 (B)		*0 - 14*
4	15 - 24	
5	25 - 34	
6	35 - 44	
5+6 (C)		*25 - 44*
7	45 - 54	
8	55 - 64	
7+8 (D)		*45 - 64*
9	65 - 74	
10	75 - 84 (1-10: PYLL calculations)b	
11	85+	
9+10+11 (E)		*65 +*
1-11 (B+4+C+D+E)		All ages

a In italics: secondary data requirements (can be constructed from other categories)
b For calculation of PYLL (potential years of life lost) 85 years will be used as the reference point (years lost before 85)

Availability of health data

Table A 4.2 summarises the health data classes required to fill the various chapters of a PHSF document as indicated in Chapters 3, 4 and 5. Their availability has been indicated.

Table A 4.2 Overview of data needs and availability of health information and data classes

Health data	Required data class	by sex	by age group[a]	disease-specific	availability of data
Indicators of health					
mortality	mortality rates		x x	x	WHO World Health Statistics provides mortality rates derived from civil registrations in each country. These data are cause, age and sex specific. From these mortality rates crude mortality rates and total number of death can be calculated, as well as PYLL (potential years of life lost) and life expectancies.
morbidity	incidence[b] - chronic non-communicable diseases - neuropsychiatric diseases, suicide and addictions - accidents - infectious diseases, congenital and perinatal health problems		x	x	There are no comprehensive data sets. Sources per disease or disease group exist, mainly from concerted actions and collaborative studies such as MONICA (for cadiovascular diseases) or IARC(cancers). Neither full geographical coverage nor similar time periods are ensured. For some diseases morbidity data can be estimated from mortality data.
	prevalence[b]		x	x	Similar to incidence
functional ability and quality of life	self-reported health	x	x		National health interview surveys that collect subjective health data are performed in a number of countries in the EU (Denmark, quality of life Finland, Germany, Ireland, Italy, the Netherlands, United Kingdom). The intercomparability among the countries is low.
	prevalence of handicaps or disabilities	x	x		not yet investigated
	days lost from work	x	x		OECD: some data for absenteeism due to illness in days per capita (ILO)
Determinants of health					
life style and endogenous	prevalence of life style and endogenous factors[c]	x	x		Various incomplete sources (WHO HFA, OECD, FAO). Some data from concerted actions (see above for prevalence and incidence of diseases). For a few determinants (related to consumer goods) estimated averages for a population as a whole can be made by economic methods using crude calculations such as *consumption = production + import - export - waste*.
	incidence of genetic factors at birth[c]	x			ICBDMS (Eurocad)
	estimates of sexual behavior	x	x		
physical environment	environmental indicators for: - exposure to air pollution - soil and groundwater pollution - residential noise - food/drinking water contamination				results of European air pollution monitoring networks Concern for Europe's Tomorrow database
socio-economic environment	description and subdivision of indicator prevalences by socio-economic class/ethnic background	x	x		
	description and subdivision of determinant prevalences by socio-	x	x		
	economic class and ethnic background				
medical care and prevention	screening rates for breast cancer	f	x		
	screening rates for cervical cancer	f	x		
	immunization rates for childhood infectious diseases		x		WHO HFA

Table A 4.2 Overview of data needs and availability of health information and data classes

Health data	Required data class	by sex	by age group[a]	disease-specific	availability of data
Demographic and socio-economic factors					
demographic ing factors	population numbers for the years 1972-1992	x	x		UN database on Population estimates and Projections, contain-demographic indicators, population estimates, fertility data and urban, rural and city estimates
	extrapolated population numbers for the years 1992-2015 total number of births annual immigration[d]	x x	x x		
	number of settled immigrants[d]		x		UN demographic yearbooks contain data on foreign born residents per country
socio-econo-mic factors	trends in educational level	x	x		Eurostat
	GDP in absolute and current prices trends in income distribution	x	x		many sources, e.g., OECD, Eurostat Eurostat
	trends in work participation and unemployment	x	x		OECD and Eurostat, also ILO. It is not certain whether any connection has been made between unemployment and health in these data.
	number of homeless people	x	x		FEANTSA (Féderation Européen d'Associations nationales Travaillant avec les Sans-Abri)
Health care use					
	total expenditure on health				OECD: with a split between private and public expenditure, expenditure for in-patient care, ambulatory care and medical material.
	total days of hospital care		x		Can be calculated from bed occupancy rate (OECD) and total number of beds.
	disease-specific days of hospital care		x	x	OECD: average length of stay in ICD-9 categories and in diagnostically related groups (DRG).
	number of available hospital beds				WHO: comparability limited due to differences between countries OECD: subdivision in in-patient care, acute care, psychiatric care and nurse home beds

a   Age group-specific data together with the age group-specific population
    data yield & age-adjusted (standardized) data
b, c Data are required for a selection of diseases and risk factors
d   Immigrant data for selected areas of origin (e.g. Mediterranean, African)

References

Eurostat Publications and Electronic Services, 1994
OECD Health Systems, Facts and Trends 1960-1991, OECD
    Paris 1993
Working Party on Community Health Data and Indicators,
    Draft Report, 1994

UN. United Nations World Population Prospects 1990. New
    York, UN, 1991
World Health Statistics Annual 1993, WHO, Geneva, 1994
    Worldbank. Investing in Health, World Bank, New York,
    1993

A 5

Geographical Scope of the PHSF Report

Table A 5.1 presents a selection of countries to be covered in the final European Public Health Status and Forecasts report. The report will focus on actual and candidate EU Member States, as well as on countries that are strongly EU-oriented. Occasionally, however, health data on (groups of) non-EU countries may be presented for purposes of comparison. In *Table A 5.1* membership of the European Region of WHO and OECD has also been indicated, as these NGOs collect and disseminate health data for their member states (e.g. WHO's 'Health for All' report, 1992).

Table 5.1 Countries to be covered by the PHSF report

Countries	Abbreviations	Remarks
Euroean Union 1995[2]		
Austria[1]	AUT	
Belgium[1]	BEL	federal organisation, implications for heath data collection
Denmark[1]	DEN	
German Democratic Republik	GDR	reunited as Germany (DEU)
Federal Republic of Germany[1]	FRG	reunited as Germany (DEU)
Finland[1]	FIN	
France[1]	FRA	
Greece[1]	GRE	
Ireland[1]	IRE	
Italy[1]	ITA	
Luxembourg[1]	LUX	
Netherlands[1]	NET	
Portugal[1]	POR	
Spain[1]	SPA	
Sweden[1]	SWE	
United Kingdom[1]	UNK	historicial data often separately for England and Wales (EWA), Northern Ireland (NIR) and Scotland (SCO)
Strongly EU-oriented[2]		
Norway[1]	NOR	
Switserland[1]	SWI	
Iceland[1]	ICE	
PHARE countries[2]		
Bulgaria	BUL	
Czechoslovakia	CZE	now; Czech Republic and Slovakia
Hungary	HUN	
Poland	POL	
Romania	ROM	
Other developed countries[1]		
Australia	AUS	
Canada	CAN	
Israel[2]	ISR	
Japan		
New Zealand	NZE	
United States of America	USA	

Table 5.1 Countries to be covered by the PHSF report

Countries	Abbreviations	Remarks
Other Eastern Europe countries[2]		
former USSR	SSR	Now divided into Newly Independent States (NIS)[2]: Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
former Yugoslavia	YUG	now divided into: Bosnia/Herzegovina, Croatia, Slovenia, Former Yugoslav Republik of Macedonia and Yugoslavia[2]

1 *members of the Organization for Ecnomic Cooperation and Development (OECD)*
2 *belonging to the European region of the Word Health Organization (WHO);*
   this reion also includes Albania, Malta, Monaco and San Marino.