Equal care, equal cure?

Socioeconomic differences in the use of health services and the course of health problems

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Equal care, equal cure?

Socioeconomic differences in the use of health services and the course of health problems

Gelijke zorg, gelijke genezingskansen?

Sociaal-economische verschillen in het gebruik van gezondheidszorg en in het beloop van gezondheidsproblemen

Proefschrift

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aan de Erasmus Universiteit Rotterdam
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Prof.dr W.P.M.M. van de Ven

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Mackenbach JP, Looman CWN, van der Meer JBW. Differences in the misreporting of chronic conditions, by level of education: the effect on inequalities in prevalence rates. *Am J Public Health 1996;86(5):706-11.*

Chapter 4

van der Meer JBW, van den Bos J, Mackenbach JP. Socioeconomic differences in the utilization of health services in a Dutch population: the contribution of health status. *Health Policy 1996;37:1-18.*

Chapter 5

Bongers IMB, van der Meer JBW, van den Bos J, Mackenbach JP. Socio-economic differences in general practitioner and outpatient specialist care in the Netherlands: a matter of health insurance? *Soc Sci Med 1997;8(44):1161-8.*

Chapter 6

van der Meer JBW, Mackenbach JP. Low education, high GP contact rates: the effect of psychosocial factors. *J Psychosom Res (in press).*

Chapter 7

van der Meer JBW, Mackenbach JP. The course of health status among chronically ill persons: differentials by level of education. *J Clin Epidemiol (in press).*

Chapter 8

van der Meer JBW, Mackenbach JP. The care and course of diabetes: differences according to level of education. *Submitted for publication.*

Chapter 9

van der Meer JBW, Mackenbach JP. The heart of the matter: differences in the course of heart disease according to level of education. *Submitted for publication.*

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All analyses in this thesis are based on data from the Longitudinal Study on SocioEconomic Differences in the Utilisation of Health Services (LSSEDUHS). This project was supported by a grant from the Health Insurance Council (Ziekenfondsraad). It is part of the GLOBE-study ('Gezondheid en LevensOmstandigheden Bevolking Eindhoven en omstreken'), a large-scale research project on health and living conditions of the population of Eindhoven and surroundings. The GLOBE-study is being carried out by the Department of Public Health, Erasmus University Rotterdam, in collaboration with the Public Health Service of the city of Eindhoven and the Public Health Service of the region Southeast Brabant. The GLOBE-study is supported financially by the Prevention Fund ('Preventiefonds'), the ministry of Public Health, Welfare and Sports, the Netherlands Organization for Scientific Research (NWO), the National Committee on Chronic Diseases (NCCZ) and the Erasmus University Rotterdam.

We are all individuals...
- No, I'm not!
(Monty Python, Life of Brian)

Voorwoord

Toen ik in 1990 mijn eerste werkdagen bij het instituut Maatschappelijke Gezondheidszorg (iMGZ) achter de rug had, was ik lichtelijk wanhopig. Ik had, vers uit de witte jas, het glibberige pad der wetenschap betreden. Ja, ik had het zelfs gewaagd mij bezig te willen houden met sociaal-economische gezondheidsverschillen, en was onderzoeker geworden in het GLOBE-onderzoek (Gezondheid en LevensOmstandigheden Bevolking Eindhoven en omgeving), al heette dat toen nog niet zo. De meest onbekende en esoterische onderwerpen vlogen mij om de oren. Gelukkig waren daar Dike van de Mheen en Karien Stronks, om mij de eerste beginselen van al dat onbekende en esoterische bij te brengen. Niet veel later kwam Carola Schrijvers het onderzoeksteam versterken. Hoewel we met de data wel eens wat 'koppelingsprobleempjes' gehad hebben, was zulks met de onderlinge samenwerking binnen het GLOBE-team nooit het geval. Ik ben ieder van hun ook veel dank verschuldigd voor altijd weer constructief en relevant commentaar op al mijn stukken en stukjes. Nog weer later werd het GLOBE-team uitgebreid met Inez Joung, Heleen van Agt, Jeanet Simon, Mariël Droomers en Hans Bosma. Koppelingsprobleempjes waren ook hier ver te zoeken. Bovendien heb ik aan Heleen en Jeanet tot het laatst toe prettige en belangstellende kamergenoten gehad. In dit verband mag ook Johanna Madalinska niet onvermeld blijven.

In mijn eerste maanden bij iMGZ heeft Suzanne van de Vathorst mij geassisteerd met het vinden van geschikte diagnosespecifieke vragenlijsten; later, toen we geen directe collega's meer waren, hadden we altijd leuke discussies over het vak en gezellige lunchafspraken die ik wel zal missen. Ook Suzanne heeft kritisch meegelezen en deed concrete suggesties, wat met name leidde tot een face-lift van de inleiding. Tussentijds kreeg ik ook versterking van Inge Bongers, die een lastig stuk van de analyses zeer adequaat ter hand nam.

Wat de dataverzameling betreft is het een goede gelegenheid om ook alle respondenten te bedanken, die vaak jaren achtereen zich het hemd van het lijf lieten vragen over niet altijd even gemakkelijke onderwerpen. Het is goed om zich te realiseren dat achter respondentnummer 2391 diabetes=1 gescheiden=1 sociale steun=4 een mens van vlees en bloed steekt. Soms werd ons in de witte ruimte voor opmerkingen onderaan de vragenlijst veel ellende toevertrouwd, ondertekend met naam en adres en wel. De nood is soms hoog in Nederland (als ik mag generaliseren buiten het onderzoeks-

gebied). Ook de huisartsen in Eindhoven en omgeving die soms over meer dan 20 patiënten een ingevulde vragenlijst terugstuurden moet ik hier bedanken.

Data zijn er om geschoond en vervolgens gemanaged te worden. Heel veel schoningswerk en andere arbeidsintensieve klussen werden gedaan door Xandra Savelkouls. Michel Provoost heeft heel veel nuttig werk gedaan als datamanager, zodat we nu tenminste altijd weten waar welke gegevens zich bevinden. Ton Gerritsen heeft daarmee een begin gemaakt, maar was vooral bezig met het creëren van een automatiseringsomgeving met de juiste spullen die het bovendien allemaal (bijna) altijd doen, en daarin is hij, samen met Hans Verdoes, onovertroffen.

Moge het pad van de wetenschap glibberig zijn, op dat van de statistiek had ik lelijke buitelingen gemaakt als Caspar Looman er niet was geweest, altijd bereid tot weer meer, of opnieuw dezelfde, uitleg en pijlsnel rekenwerk. Later heeft Hans van den Bos als GLOBE-statisticus een enorme hoeveelheid rekenwerk verricht met analyses die deels tot dit proefschrift hebben geleid. Inzicht in de statistiek heb ik voor een groot deel aan deze beide heren te danken.

Als al die analyses dan eindelijk tot het schrijven van een publikatie leiden, is de kennis van de wetenschappelijke literatuur onontbeerlijk. Als documentaliste van het documentatiecentrum Sociaal-Economische Gezondheidsverschillen duwde Hanneke van Trirum mij regelmatig interessante en relevante publikaties onder de neus, die ik in een later stadium dan ook nog eens probleemloos kon terugvinden. En als ik weer eens met een lijstje artikelen kwam die ik wilde hebben, lagen ze vaak de volgende dag al in mijn postvak: het werk van Aty Slikkerveer scheelde handenvol tijd.

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Geduldig en accuraat, dat rijmt op secretariaat. Else van den Engel maakte haar naam meer dan waar, maar ook achter minder bloemrijke achternamen gingen kwaliteiten schuil: Saskia Drent voor type- en lay-out werk, Ilse Philips voor het maken van figuren. Ook past een woord van dank aan Anna Bosselaar, voor de definitieve en fraaie opmaak van het proefschrift, en aan Frans Slebos voor zijn technische assistentie bij het maken van het omslag.

Het onderzoek dat aan de basis staat van dit proefschrift had ook een beleidingscommissie. Het constructieve commentaar op het werk heeft aan dit proefschrift zeker een positieve bijgedrage geleverd. Ik dank hierbij de leden van de begeleidingscommissie (drs A.M. Bertens, mw prof.dr G.A.M. van den Bos, drs J.W.M. Collaris, ir J.I.M. de Goeij (voorzitter), drs L.J.R. van der Meulen, mw dr J.A.M. Hulshof, drs J.H. Jansen (secretaris), ir J.L.A. van Sonsbeek, drs B.H. Posthuma, prof.dr F.S. Sturmans, drs G.D.J. van der Speld en A.G. Tenhaeff, arts) daarvoor.

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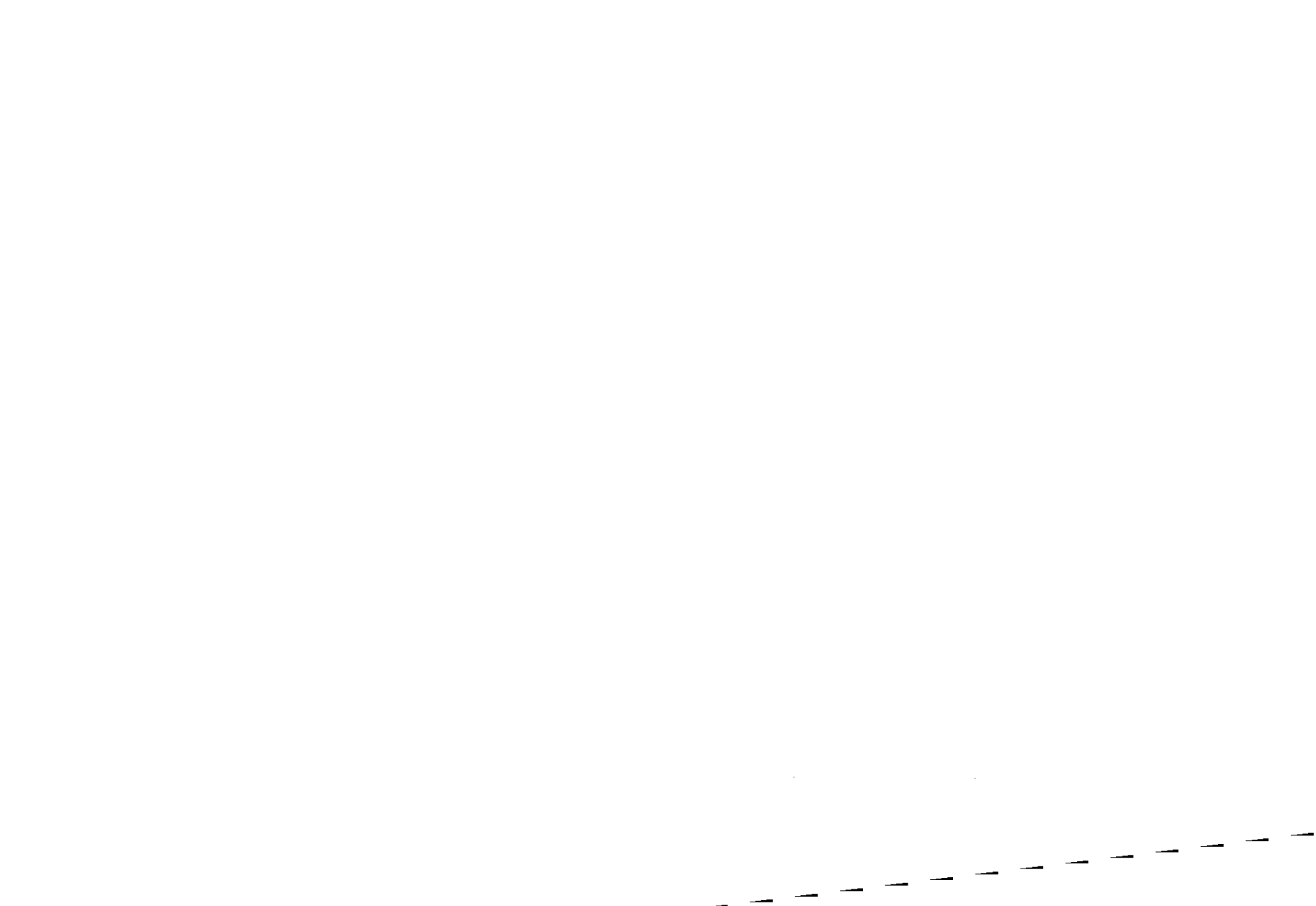
Een proefschrift komt er ook niet zonder vrienden en familie. Met Gilles de Wildt had ik altijd prettige gesprekken over het wezen van public health, Han Steynebrugh waakte over mijn zieleheil (of is het nu zielenheil?). Ook alle andere lieve vrienden wil ik bedanken voor hun belangstelling of, op sommige momenten, gepast zwijgen. Aan mijn vader en moeder heb ik dit proefschrift ook te danken: ze hebben mij altijd gestimuleerd tot verder leren en stelden altijd belang in mijn vorderingen, ook al was het schrijven van een proefschrift moeilijker voor te stellen dan het dokterswerk waarin bloed, speeksel en urine je om de oren vliegen.

Een bijzondere plaats ten slotte is er voor Anne-Lore. Met het omslagontwerp tekende zij voor de finishing touch, en daarmee staat zij ook een beetje op de voorkant. Het symboliseert een beetje het thuiskomen na een – altijd tè lange – dag werken. Ook dan was ze er voor de finishing touch en bestond er gelukkig ook nog iets anders dan IMGZ. Misschien is zij nog wel blijer dat dit proefschrift af is dan ik.

Part I



1 Introduction

1.1 Background to this study

Access to health care for all in need of that care is a basic social right.[1] Most governments consider the level and provision of health care to be their concern. The way this concern is enacted varies greatly between countries, from direct government responsibility for health care services (as in the UK and the Scandinavian countries) to providing arrangements for certain groups only, like Medicaid and Medicare for old and poor people in the United States. The Netherlands has a mixed system, leaving provision of care largely to private parties, while the state is involved in the provision of some services and in regulating provision and finance of health care. In the Netherlands the responsibility of the state for health care is constitutionalised in article 22: "The government shall provide measures to promote public health". Since all people should be treated equally (article 1 of the Constitution) people are entitled equal opportunities to participate in society. If this participation is threatened by health problems, access to essential health care is a prerequisite to limit the dangers and disadvantages arising from diseases and handicaps.[2]

Equity in health care refers to *equal access for equal need*, meaning care should be provided according to the burden of disease, not according to status or ability to pay.[3-5] The Dutch health care system traditionally is committed to the value of equal access to care for those in need.[6] An annual representative survey on Dutch public opinion illustrates that equity in health care is adhered to explicitly by 75% of those interviewed.[2] In the newspapers there is a public outcry when a gap between the well-off and the less well-off threatens to develop.

At first sight, inaccessibility of the health service does not seem to be a problem in the Netherlands, on the contrary: in comparison with those in more advantaged positions, people at the lower end of the socioeconomic spectrum seem to have higher utilisation rates of services such as the general practitioner, the specialist, the physiotherapist, hospital admissions, and the use of prescription drugs.[7-9] One could therefore conclude that the Dutch health care system seems to work well, as those who are sick make a higher demand on health services. However, before drawing such a conclusion we should ask whether the higher utilisation of health care services is proportional to the less favourable health status of those with a disadvantaged social position. And indeed it seems it is not. When set against their unfavourable health situation, fewer people in lower socioeconomic groups visit a specialist or a physiotherapist than those in the higher socioeconomic groups. Higher contact rates among people with a low social position are only reported for the general practitioner.[7] We now should conclude that the accessibility of health services is not as good as we thought before as far as the specialist and physiotherapist are concerned, and that the use of these

services and the general practitioner is not exclusively determined by need. In other words, beside health status more factors play a role in the use of health services.

There is a growing interest in socioeconomic differences in the use of health services in relation to health status. Studies in the US,[10-14] but also in European countries like the United Kingdom,[15] Italy[16] and Norway[17] address socioeconomic differences in the use of health services. In the Netherlands, the link between deprivation, distribution and need for health services has been studied as far back as 100 years ago.[18] More recently, the Central Bureau of Statistics publishes basic data from the Netherlands Health Interview Survey about service use related to socioeconomic status and health status, and published a separate report about this subject.[7] The association between socioeconomic status, the use of health services and health status has also been explored in a population of elderly people in Amsterdam.[9]

A comprehensive understanding of the association between socioeconomic status, health and use of health services, however, is lacking. Systematic data on the explanation of socioeconomic differences in health care use other than through medical need are rare, and little is known about the consequences of differences in health care use for the health status of different groups in society.

The Longitudinal Study of SocioEconomic Differences in Utilisation of Health Services (LS-SEDUHS) has been carried out to describe and explain socioeconomic differences in the use of health services, and to describe and explain socioeconomic differences in the course of health problems or (chronic) illness. Each of these two subjects will be addressed in more detail in the next two paragraphs.

1.2 Socioeconomic differences in the use of health services

Before discussing the two main themes of this thesis a short explanation of the concept 'socioeconomic status' should be given. Socioeconomic status refers to the position of an individual in the ranks of society, which is stratified according to material assets, knowledge, prestige or power. Education, occupation and income are frequently used indicators of socioeconomic status in epidemiology.[19,20] In this thesis, education is used as the indicator for socioeconomic status. This has several theoretical and practical reasons. One of them is that in adults the education attained usually remains stable while occupation and income may change, which is a drawback especially in longitudinal analysis. Education can be used equally well for men and women, unlike occupation which will not apply to many women in older generations. A theoretical argument in favour of level of education is its

growing importance for the relative position of the individual in the distribution of other important assets such as paid labour, occupational status, and income level.[21] A similar consideration seems appropriate in the context of a study about health and health service utilisation. Although the words socioeconomic status, social class and social position have different connotations in sociology, we will use them here interchangeably.

Many studies of the use of health services according to socioeconomic position pay attention to the principle of equal access for equal need. Results of these studies differ according to the country studied, with a clear distinction between the US and other industrialised societies. In the US, a larger share of all physician visits takes place among those with a high socioeconomic status,[13,22,23] while the emergency room is attended more by those with a low socioeconomic status.[22,24] Although some older publications have reported no association between primary care physician use and socioeconomic variables,[25,26] primary care physicians outside the US usually see more patients with a low socioeconomic status even when allowing for the worse health situation of these patients. This has been reported for Canada,[27] Norway[17,28] and the UK.[15,29,30] Secondary care services like the specialist are consistently less used by those with a low socioeconomic position compared with their counterparts higher in the social hierarchy, taking medical need into consideration.[17,26] Less consistency exists regarding hospital data, mainly from the US. Sometimes the association of socioeconomic status with hospital admissions is not clear.[23] Some find a higher income associated with more nights in hospital,[13] whereas others report a longer length of stay among the socially disadvantaged.[11,31] There is some consistency concerning data on certain high tech services: cardiological procedures are used less by those with a low socioeconomic status in the US as well as in the UK.[32-34]

Developments in health care, in the Netherlands as much as in other countries, underscore the growing interest in research on health service use with the principle of equal access for equal need in mind. Recent health care reforms emphasise a reduced government involvement in health care. Governments withdrawing from this area leave important decisions regarding provision and finance of health care to other players in the health care field, such as health insurance companies and care providers. This implies that the ideal of equal access for equal need is handed over to these parties to some extent. The introduction of market forces to the health insurance system in the Netherlands is one example where this happens, while being a potential menace to the equity principle under declining government control. Convergence between former non-profit public insurers ('sickness funds', obligatory for those below a certain income level) and traditionally profit-oriented insurance companies (offering health insurance for those with higher incomes) is central in Dutch health care reform. Both types of insurers now have to compete for each other's traditional markets. In this system

selection of healthy people ('good risks') at the expense of ill people ('bad risks') may occur, and may result in unequal (financial) access and unequal use of the health care system for the relatively unhealthy persons with a low socioeconomic status even when some provisions to prevent this so-called cream-skimming are made, such as obligatory acceptance.[35]

The framework we will use to explain socioeconomic differences in the use of health services in the LS-SEDUHS is the widely used behavioural model of Andersen.[36] The framework distinguishes factors on an individual level as well as factors on the level of health care provision. The main determinants of health service use discerned in the Andersen model are:

- **Medical need,** which reflects an individual's health status, either self-perceived or according to professional standards.[27,37-40]
- **Enabling factors.** Although people may be in need of health services and have a certain propensity to use them, they also must have means to do so. Income can thus be regarded as an enabling factor. Health insurance is a factor which enables people to use health services.[41-44] Travel distance and waiting time, in other words the availability of services, are other examples of enabling factors.[45]
- **Predisposing factors.** These factors exist before illness develops, and are associated with the social, psychological and cultural background of the propensity to use health services. Sociodemographic factors like age and sex can be ranked among them,[27] but also psychosocial variables like attitudes towards health and health care,[46,47] coping,[48] locus of control,[48] social support [38,45,49] and psychosocial stress.[48,50]

Important issues or hypotheses in the study of differences in health care use according to socioeconomic status can be formulated within the Andersen model.

In order to monitor whether the service goes where the dollar flows or whether health service use is equal among those with a different socioeconomic status, one must be absolutely certain that need, or health status, is measured adequately to allow for health differences between social groups. Does a range of health dimensions do better than just one health aspect?

Still, differences in health are not the entire explanation for socioeconomic differences in the use of health services, as we have seen. For example, it is sometimes argued that the relatively high use of the specialist among people with a high socioeconomic status in the Netherlands is driven by enabling factors, i.e. some private insurance policies. Some of these private policies, in spite of convergence, differ in coverage from sickness fund policies by reimbursing the specialist's bill while not paying for general practitioner consultations. This is an incentive to avoid the general practitioner and turn to the specialist instead.

Psychological factors may also help us understand differences in health care use according to social status. Lower educated people are thought to have a psychological make-up that predisposes them to the use of health services, for example because of differences with higher educated people in levels of psychosocial stress, social support, coping styles, locus of control and attitudes towards health and health care.[51-55]

Although the Andersen model was meant as a general model of health service use and not explicitly designed to explain socioeconomic differences, it is likely to be suitable to study these differences. After all, all factors just mentioned are likely to differ by socioeconomic status[55,56] and may thus potentially contribute to an explanation of socioeconomic differences in the use of health services. Figure 1.1 visualises the research model within the Andersen framework, and allows the following specification of the research questions:

(1) Are there socioeconomic differences in the use of health services?
(2) To what extent can these differences be explained by differences in:
    (a) medical need;
    (b) enabling factors;
    (c) predisposing factors.

1.3 Socioeconomic differences in the course of health problems

Socioeconomic differences in health status have been documented in cross-sectional analyses, or as studies of incidence or mortality. Differences in the course of a disease or health state according to socioeconomic status have, up to now, enjoyed little attention. With the exception of socioeconomic differences in survival, the dynamics of socioeconomic health differences are a largely uncultivated area which needs attention as survival from important chronic diseases improves, partially owing to advances in medical treatment.[57-61]

Research in this area becomes even more relevant if lower rates of health service use contribute to a less favourable course of health problems among those with a lower socioeconomic status. This would reinforce the necessity to realise equal access for equal need and, at the same time, suggest opportunities to reduce socioeconomic inequalities in health in certain chronic conditions.

Socioeconomic health differences are frequently found in cross-sectional surveys, for instance in perceived general health, health complaints, self-re-

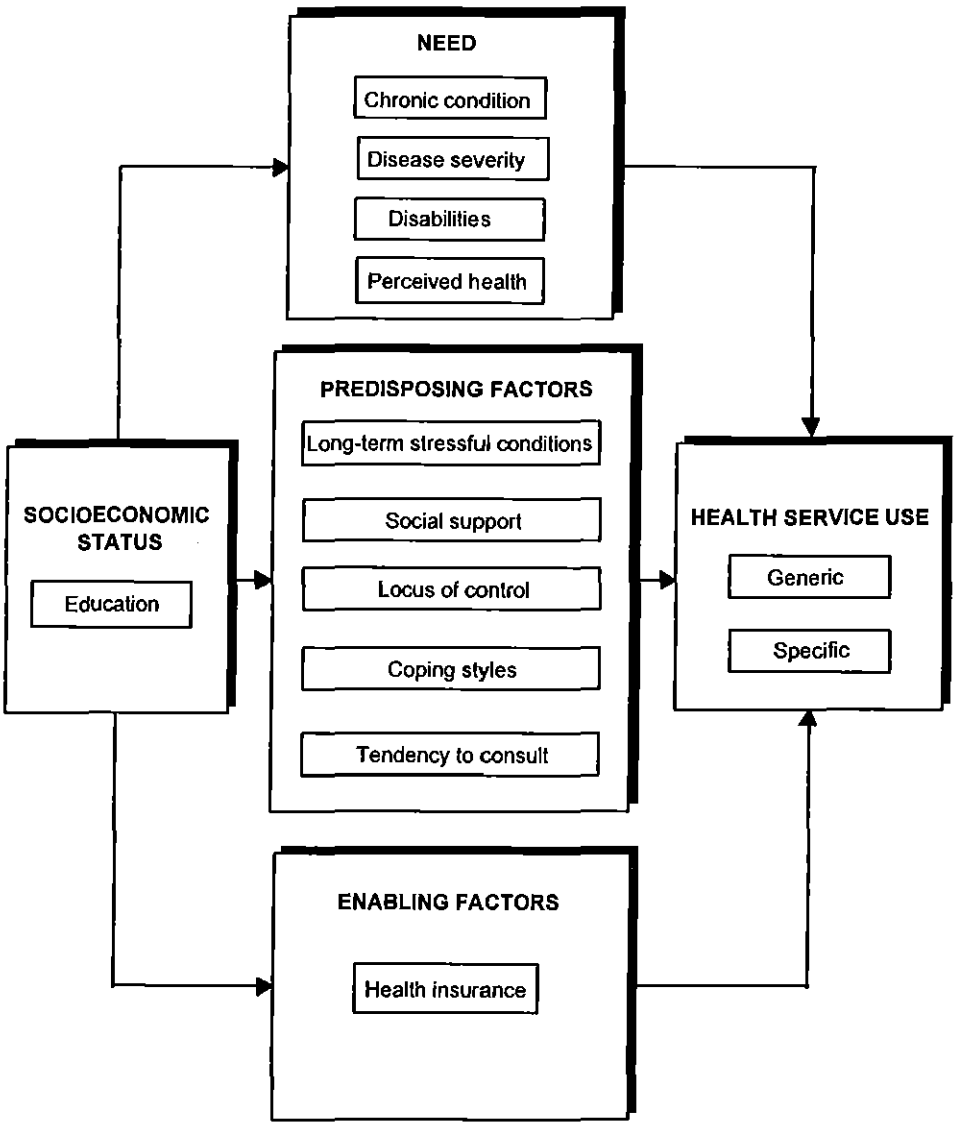


Figure 1.1 – Research model of the relation between socioeconomic status and health service use in the LS-SEDUHS (based on the Anderson model)

ported chronic diseases and disabilities.[8,62,63] Socioeconomic health differences observed in the Netherlands may be considered large.[56,64]

The incidence of chronic diseases such as cancer,[65,66] asthma,[67-69] heart disease[70] and type II diabetes mellitus[71,72] is higher among those with a low socioeconomic status in comparison with people with a higher position in society.

All-cause mortality,[73-75] but also many cause-specific mortality rates are higher among socially disadvantaged persons.[76] Higher mortality rates from cancer,[66,77] asthma,[78,79] ischaemic heart disease[80-82] and insulin dependent diabetes mellitus[83] among groups with a lower socioeconomic status have been reported.

Equally, survival from cancer,[84-86] heart disease,[70,87,88] and chronic obstructive lung disease[89] is shorter when one's socioeconomic status is lower.

It is likely that the pattern of mortality according to socioeconomic status, and the often large socioeconomic differences in health encountered cross-sectionally, are partly the result of a higher *incidence* of health problems in lower socioeconomic groups plus a less favourable *course* of existing health problems in these strata.

Explanations for differences in the course of health problems by socioeconomic status are important because they may provide clues in targeting specific interventions to reduce socioeconomic health differences, not only to healthy people with a low socioeconomic status (primary prevention) but also to their fellow citizens with health problems (secondary prevention).

The LS-SEDUHS has the longitudinal design necessary to extend existing knowledge in this field through a yearly follow-up of the same individuals. This implies a description of the course of their health problems during the study period. The contribution of health services use to the explanation of socioeconomic differences in the course of health problems can be evaluated with the same design, while also considering other explanatory factors. Differences in base-line health status are important: someone with two chronic diseases is likelier to experience a decline in health status than someone who has one chronic disease. Behavioural factors associated with the incidence of certain diseases, like smoking, alcohol consumption and physical exercise may influence the course of these diseases. Smoking may speed up pathophysiological changes in pulmonary function or biochemical parameters which may be important for the progression of asthma or ischaemic heart disease.[89,90] Moderate alcohol consumption seems to have a protective effect in mortality from ischaemic heart disease and may thus also contribute to a slower progression of the disease.[91] Also physical exercise has shown its favourable influence on the course of chronic disease, for instance in diabetes.[92] Psychosocial stress may play a mediating role by influencing biochemical parameters,[90,93] which may speed up disease processes. All factors are differentially distributed by socioeconomic status. Figure 1.2 summarises possible associations.

Questions related to socioeconomic differences in the course of health problems are:

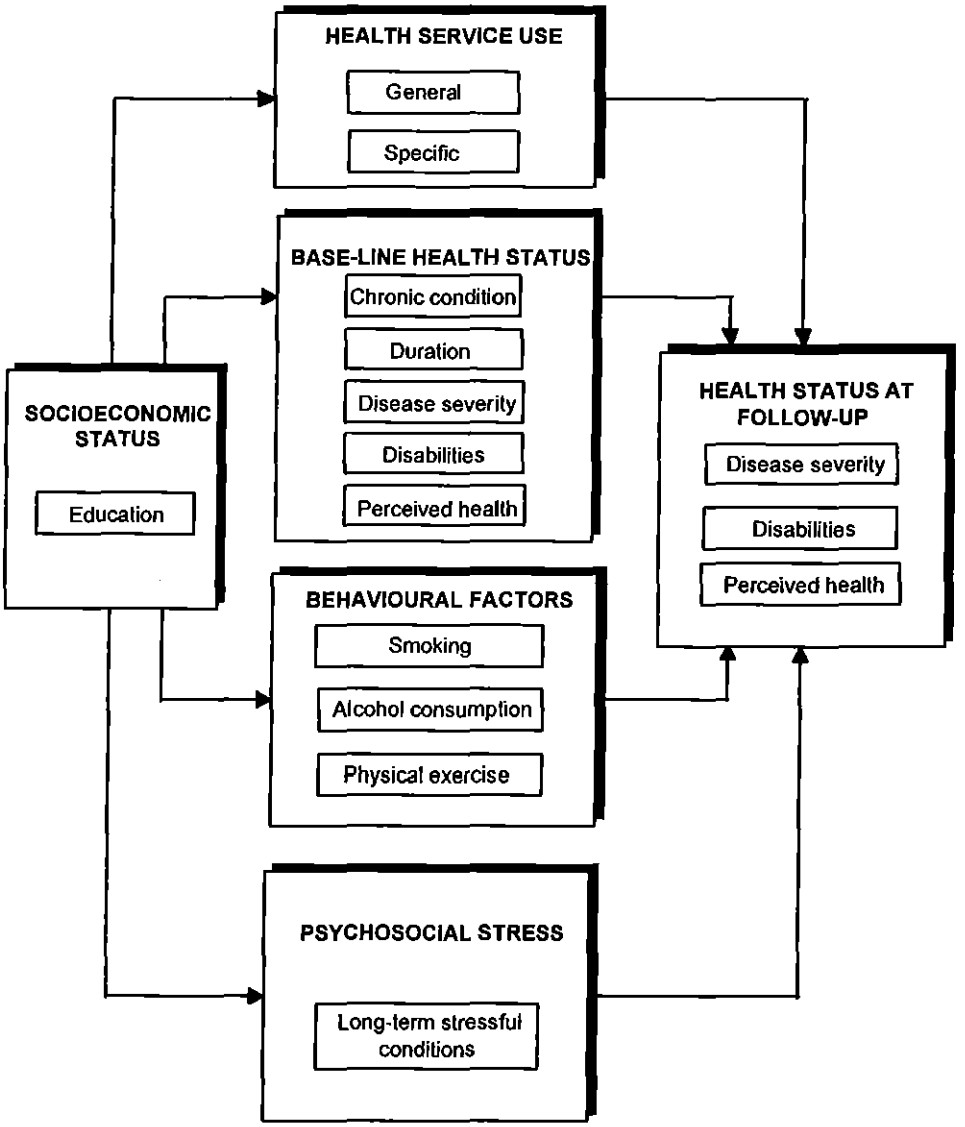


Figure 1.2 – Research model of the relation between socioeconomic status and the course of health problems in the LS-SEDUHS

(1) Are there differences in the course of health problems by socioeconomic status, with regard to chronic conditions, disabilities, and handicaps as well as subjective aspects of health (complaints, perceived health)?
(2) To what extent can these differences be attributed to differences in:
  (a) base-line health status;
  (b) use of health services;
  (b) behavioural factors, psychosocial stress?

The contribution of base-line health status will be studied in a population with a mixture of chronic conditions; the contribution of health services use and other possible explanations will be studied in populations with specific chronic conditions.

1.4 Aim and structure of this thesis

The aim of this thesis is twofold:

1. To describe socioeconomic differences in the use of health services and to explain these differences in terms of medical need, enabling factors and predisposing factors.

2. To describe socioeconomic differences in the course of health problems, and to explain these differences in terms of health service use, behavioural and psychosocial factors.

Chapter 2 provides information about the design of the study and the data collection procedures. Chapter 3 discusses some issues regarding the data with respect to socioeconomic differences in self-reports of disease.

Chapters 4, 5 and 6 contain the descriptive and explanatory studies of socioeconomic differences in the use of health services. Chapter 4 begins with a detailed description of differences according to level of education in the use of a broad range of health services. The contribution of health status to these differences will be assessed with a quantitative approach. In other explanations of differences in use by socioeconomic status the focus will be on the use of general practitioner and specialist services, while attention will be paid to the contribution of health insurance (chapter 5) and psychosocial factors (chapter 6).

The main theme of chapters 7, 8 and 9 is the description and explanation of socioeconomic differences in the course of health problems. The starting point is a description of these differences in a chronically ill population, discussing several dimensions of health status (chapter 7). The following chapters limit the analysis to two groups of highly prevalent chronic conditions, diabetes (chapter 8) and heart disease (chapter 9). They examine some explanations for the differences according to level of education in the course of these conditions.

Chapter 10 is a general discussion about the validity of the results. This chapter also addresses some issues in the interpretation of the results and it ends with recommendations for health policy and research.

Relevant literature will be discussed throughout all subsections of this thesis. Because part of this thesis contains previously published papers, overlap between some sections is inevitable.

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Data source

2.1 Introduction

This chapter starts with an introductory description of the GLOBE study, of which the LS-SEDUHS was a part. GLOBE is a Dutch acronym for 'Health and Living Conditions Population Eindhoven and Surroundings'. The GLOBE study is a longitudinal study in the South East of the Netherlands which started in the Spring of 1991, with the aim of explaining socioeconomic inequalities in health. The concluding section of this chapter is a description of the data collection of the LS-SEDUHS.

2.2 The LS-SEDUHS within the GLOBE-study

Data collection for the LS-SEDUHS was carried out in the context of the GLOBE-study. Besides the LS-SEDUHS, the GLOBE-study was made up of several other studies:

- the Longitudinal Study on SocioEconomic Health Differences (LS-SEHD), a study of the explanation of socioeconomic inequalities in health in the Netherlands;[1,2]
- a study of socioeconomic inequalities in cancer survival in the Netherlands;[3]
- a study on the background of the association between marital status or living arrangement and health;[4]
- a study of the financial situation of the chronically ill.[5]

The GLOBE study started with a postal survey in Spring 1991. The LS-SEDUHS is a longitudinal cohort study, drawn from respondents of the GLOBE postal survey. The longitudinal design is imperative since the study aims at demonstrating socioeconomic differences in the course of health problems. Participants completed an interview and a self-administered questionnaire at baseline (Autumn 1991) and were followed up yearly with a mailed questionnaire.

For practical considerations the GLOBE-study was carried out in a geographically restricted area. In Eindhoven and seventeen surrounding municipalities co-operation with the local authorities could guarantee the implementation of the study. The region has a population of approximately 350,000 inhabitants.

Approximately 27,000 persons, stratified by age, degree of urbanisation and socioeconomic status were sampled from population registries. In Spring 1991 (March) these persons received a postal questionnaire, which was returned by 18,973 persons. This represented a response of 70.1%.

Data collected with the Spring 1991 postal questionnaire which were used in the LS-SEDUHS were:

- health status, including perceived health and chronic conditions;
- socioeconomic status: level of education;
- determinants of health: length, weight, alcohol consumption, smoking, life events, physical exercise;
- sociodemographic characteristics, such as marital status, age and sex.

Because one of the aims of the LS-SEDUHS was to study health services use, it was desirable to overrepresent people with an illness in the study sample in order to obtain sufficient events of health care use. The GLOBE postal survey provided the information to include all persons reporting "chronic bronchitis, asthma, emphysema ('overstretched' lung) or chronic nonspecific lung disease", "severe heart disease or myocardial infarction", "diabetes mellitus" or "persistent back trouble". A random sample of the remainder of the postal survey population -those with other conditions or without any chronic condition- was also included.

Data collection included socioeconomic status, health services use, health status, determinants of health service use and determinants of the course of health status.

Data collection for the LS-SEDUHS started in October 1991. Participants were asked to consent to collection of additional data from their general practitioner. These general practitioners received a short questionnaire. Participants were followed up yearly with a postal questionnaire. Removals and deaths were recorded in an administrative system in co-operation with the registry offices in the respondents' places of residence.

2.3 Data collection for the LS-SEDUHS

2.3.1 Population, size and sampling

The LS-SEDUHS population contains an oversampling of respondents with four selected chronic conditions. This was essential to arrive at sufficient cases of use of various health care facilities. Also the study of the course of health problems requires an overrepresentation of (chronically) ill persons in order to examine the change of health problems or illnesses.

The following considerations underpin the choice of the overrepresented conditions:

- the condition must have a potential to investigate socioeconomic differences in the use of health services or course of health status, evident from the literature;
- specific, validated Dutch questionnaires permitting severity assessment must exist for the condition to be selected;

- the condition must have a sufficiently high prevalence to draw conclusions about socioeconomic differences in health service use or differences in the course of health status on a disease-specific level;
- the condition should allow measurement of the use of a sufficiently diverse range of health services;
- the condition should allow the study of its course through several dimensions of health status.

Selection of chronic conditions on the basis of previous research of socioeconomic differences in the use of health services is difficult, since these differences have rarely been studied in specific chronic conditions. Socioeconomic differences in the course of health status, understood as survival, are well-documented for cancer[3,6,7] but cancer is too rare to meet the third criterion. The course of ischaemic heart disease has been well-studied for mortality in particular.[8-10] This group of conditions also meets the other criteria and was therefore included in the study. Apart from ischaemic heart disease, disease-specific, validated, Dutch questionnaires allowing verification of the diagnosis and some sort of staging or severity assessment are rare. The second rule was therefore the most restrictive one. Questionnaires about the conditions which also met the other inclusion criteria were available for asthma or COPD, diabetes and low back trouble.

Information from the Spring 1991 GLOBE-survey enabled oversampling of these chronic conditions.

Those eligible were all respondents of this survey[a] who reported "presently suffering from, being treated for or being kept control on for":
- chronic bronchitis, asthma, emphysema (='overstretched' lung) or chronic nonspecific lung disease;
- severe heart condition or myocardial infarction;
- diabetes mellitus;
- persistent back trouble, hernia, or 'worn' back.

Comorbidity among these four chronic conditions was allowed, but the selection of respondents was based on one chronic condition. For power considerations respondents reporting the least prevalent condition were selected first, then respondents of the second least prevalent condition, etc. All persons reporting diabetes (N=329) were selected first, followed by all persons reporting heart disease (N=512) asthma/COPD (N=648) and low back trouble (N=1148). An additional random sample from the remainder of the participants of 1333 individuals completed the sample, including persons with other chronic conditions or no chronic condition at all.

[a] excluding those sampled for additional data collection for other purposes (n=3750)

Table 2.1 contains the sample data (N=3970). Two persons with a rejected questionnaire were inadvertently included in the sampling, and were excluded later.

In October 1991, all persons in the sample received a personally directed letter signed by the head of the Department of Public Health and the head of the municipal health authority, announcing the interview and containing a request to complete the enclosed questionnaire. Interviews were conducted by a commercial company with experience in health surveys, with trained interviewers. Response was 72.3%, item nonresponse was approximately 1%. A further discussion of the enrolment rates follows in paragraph 2.5.

2.3.2 The base-line measurement

Data collected in the base-line LS-SEDUHS measurement supplemented those of the GLOBE postal survey. Data are summarised in table 2.2. The LS-SEDUHS questionnaire contained questions on the use of health services, in a general sense as well as in connection with chronic diseases (if applicable). Health status was extensively measured with generic measures and disease-specific measures, encompassing complaints, disabilities and handicaps. Possible determinants of health service use and the course of health status completed the base-line measurement.

The use of existing questionnaires ensured validated measurements whenever possible. The Netherlands Health Interview Survey (NethHIS)[11] was the source of most generic health status measures and questions regarding the use of health services. These questions have been subjected to meticulous methodological research,[12-15] and allow cross-comparison of the results.

Table 2.1 The LS-SEDUHS sample

Group	Number of persons in sample
Diabetes mellitus	329
Severe heart condition or myocardial infarction	512
Chronic bronchitis, asthma, emphysema (='overstretched' lung) or chronic nonspecific lung disease	648
Persistent back trouble, hernia, or 'worn' back	1148
Subtotal of persons with oversampled condition	2637
Random sample from the remainder of the population	1333
Total sample	3970

Note: 2 cases were later excluded from the sample, because their postal survey was rejected

Table 2.2 **The base-line and follow-up data in the Longitudinal Study on SocioEconomic Differences in the Utilization of Health Services (LS-SEDUHS)**

Measurement	Source
Health status (generic)	
-Perceived General Health (PGH)[a]	CBS 1992[11]
-Nottingham Health Profile (NHP)[a]	Hunt 1986[16]
-Chronic conditions[a]	CBS 1992[11]
-Diasbilities (Activities of Daily Living)[a]	CBS 1992[11]
-Long-term disabilities (OECD questionnaire)[a]	McWhinnie 1981[17]
Health service use (generic):	
-General practitioner consultations past 2 months[a]	CBS 1992[11]
-Specialist consultations past 2 months[a]	
-Hospital admissions past year[a]	
-Physiotherapy consultations past year[a]	
-District nurse contacts past year[a]	
-Prescription medicines past 14 days[a]	
-Over-the-counter medicines past 14 days[a]	
If applicable:	
-Asthma/COPD: severity[a], specific health service use[d]	van der Lende 1975[18]
-Heart disease: severity[a], specific health service use[d]	Baart 1973[19], Rose 1968[20]
-Diabetes: severity[a], specific health service use[d]	Pennings-van der Eerden 1984[21]
-Low back trouble: severity[a], specific health service use[d]	ERGO 1989[22], Kuorinka 1987[23]
Explanatory factors	
-Health insurance[a]	CBS 1992[11]
-Long-term stressful conditions[c]	Hendriks 1989[24]
-Social support[c]	van Tilburg 1988[25]
-Coping[c]	Schreurs 1988[26]
-Locus of control[c]	Ormel 1980[27]
-Tendency to consult[c]	Mootz 1981[28]
-Smoking[b]	ERGO 1989[22]
-Alcohol consumption[c]	Garretsen 1983[29]
-Physical exercise[c]	CIVO/TNO-RL 1986[30]
Miscellaneous	
-Age, sex[a]	CBS 1992[11]
-Marital status[b]	

[a] Also in all follow-up measurements
[b] In part of follow-up measurements
[c] Not in follow-up
[d] Partly in all follow-up measurements

Health status

Generic health status instruments can be applied independent of a disease. Disease specific instruments were applied when appropriate. The aim was to map as many dimensions of health status as possible. This encompassed subjective health status, such as the single-item perceived general health (PGH),[11] and a list of health complaints (Nottingham Health Profile – NHP).[16] The NHP is relatively short and has been well-studied in the Dutch context, while its wide application also allows international comparison.

Questionnaires on disabilities in activities of daily living (ADL) and long-term disabilities cover entirely different areas of the health status spectrum. Both instruments have been extensively used in the Netherlands Health Interview Survey.[11,17] Chronic conditions were reassessed with the checklist applied in the GLOBE-postal survey.[11]

Disease-specific questionnaires started with introductory questions to confirm the diagnosis. All participants answered these questions regardless of their disease status. If the answers required further assessment participants answered additional questions, even if they did not perceive themselves as suffering from a particular condition.

Questions on asthma and COPD, based on a British Medical Research Council (MRC) questionnaire, came from a large Dutch survey.[18] A translation[19] of the well-known WHO/Rose questionnaire[20] was used to assess angina pectoris. The Rose questionnaire lacks questions with respect to heart failure. Questions concerning this heart condition originated from a Dutch survey,[19] and had to be supplemented by a few newly developed questions. The diabetes questionnaire was an adapted version of a questionnaire used to measure self-care of diabetes patients.[21] Questions on back trouble were partly taken from the Rotterdam ('ERGO')-study by the Department of Epidemiology and Biostatistics of the Erasmus University Rotterdam[22] and partly based on the 'Standardised Nordic Questionnaires for the analysis of musculoskeletal symptoms',[23] together with a few new supplemental questions.

Use of health services

The aim of the questions concerning general use of services was to estimate (socioeconomic differences in) service use according to health care sector, not necessarily related to any of the overrepresented chronic conditions. Determining use related to each of the overrepresented conditions required specific information, focusing on care relevant to the diagnosis. This type of information was also collected and included the time between first symptoms and first seeking medical care, source of care, and health checks, medical procedures or interventions (including medication). Whenever possible existing questionnaires were used.[11] Some questions had to be developed.

Determinants of health service use

Aside from health, questions concerning determinants of health service use are operationalisations of the enabling factors and predisposing factors, distinguished in the Andersen model.

Enabling factors are operationalised as health insurance, the questions for which were directly taken from the NethHIS.[11] These questions comprise insurance type (public/private), coverage, and amount of deductible.

Questionnaires were available for all predisposing factors: long-term stressful conditions,[24] the extent to which someone can rely on help and support of friends or family (social support),[25] the way people deal with difficult situations (coping),[26] the extent to which someone believes him-/herself to be able to influence a situation (locus of control)[27] and propensity to consult a doctor (tendency to consult).[28]

Determinants of the course of health status

Standard questionnaires on determinants of the course of health status existed for smoking,[22] alcohol consumption[29] and exercise.[30] Other possible determinants, such as health service use and long-term stressful conditions, have already been discussed.

2.3.3 The survey among general practitioners

Only after the respondent's written consent, their general practitioners confirmed the diagnosis reported by the respondent and supplied a few additional details about the illness and therapy by means of a short questionnaire.

The mean number of registered participants per practice was 11, the minimum was 1 and the maximum was 38 respondents. To meet potential adverse effects on response of high numbers of patients, the physicians with more than 20 respondents received questionnaires on a random sample of 20 of their patients. 2384 (83%) respondents consented to additional data collection. This involved 222 general practitioners, of whom 154 (69%) returned the questionnaires about a total of 1497 respondents, 63% of those who gave their consent. Response of the general practitioners was not related to the number of patients registered. This survey yielded data about 52% (63% of 83%) of the total sample.

2.3.4 The follow-up measurements

All participants of the base-line measurement were eligible for the yearly follow-up. The main aim of the follow-up was the measurement of change in health status. The follow-up was carried out using a postal questionnaire, which constrained the number of questions to be included. Therefore, items which did not require annual measurement were asked less frequently according to a fixed schedule.

The central variable health status comprised most of the follow-up questionnaire. Measurement of health status was repeated with the same questionnaires used at base-line, including the disease-specific ones. Age and sex were always included in order to check if the person who participated was the same each time.

An adequate follow-up per mail required an updated data-base of addresses in order to minimise attrition. Population registries of the municipalities involved in the study (and other municipalities if cohort members had moved from the study area) tracked individuals with respect to place of residence, address, marital status and vital status.

The study population included persons reporting one, two, three or even all four overrepresented chronic conditions. Theoretically this implied sixteen different combinations of disease, which all occurred in practice. Apart from the administrative complexity of sending 16 versions of a questionnaire, the burden for some participants with comorbidity would be unacceptably high due to the number of disease-specific questionnaires to be answered. This could have adverse effects on response figures. However, comorbidity is very important in measuring health status and detailed measurement of it is almost inevitable. Participants, therefore, received a maximum of two disease-specific questionnaires. The following criteria applied to the selection of questionnaires of those who had three or more of the oversampled chronic conditions:

Table 2.3 Composition of questionnaire versions in the follow-up, according to the oversampled chronic conditions

Composition	*N*
No disease-specific questionnaire included	815
Asthma/COPD	212
Heart disease	402
Diabetes	124
Back trouble	415
Asthma/COPD and heart disease	397
Asthma/COPD and back trouble	82
Heart disease and diabetes	135
Heart disease and back trouble	296
Total	2878[a]

[a] Includes 11 respondents which were excluded later, because they could not be matched with a respondent in the postal survey

- statistical power: the least prevalent condition had to be selected;
- the combination of conditions that were interesting from a medical point of view was preferred.

For example, selection of diabetes from the combination heart disease, diabetes and back trouble was necessary because diabetes had the smallest prevalence of the three. Comorbidity of diabetes and heart disease is interesting from a medical point of view, which leaves out back trouble.

This procedure restricted the number of versions of the questionnaire to 9. The composition of these versions is displayed in table 2.3.

The follow-up was carried out in this way in 1992 and 1993, in the same months as the base-line measurement (October/November) to avoid seasonal effects.

Table 2.4 Respondents and nonrespondents to the GLOBE 1991 postal survey according to sex, age, prosperity level and degree of urbanisation

Characteristic	No. of respondents	No. of non-respondents	Response%[a]	*P* value[b]
Sex				<0.00
Men	9207	4376	67.8	
Women	9766	3721	72.4	
Age				<0.00
15-34 years	4762	2321	67.2	
35-54 years	6977	3111	69.2	
55-74 years	7234	2665	73.1	
Zip code group[c]				<0.00
1 (well-to-do)	4960	1845	72.9	
2	2727	1102	71.2	
3	3232	1305	71.2	
4	2853	1310	68.5	
5 (deprived)	5134	2472	67.4	
Degree of urbanisation				<0.00
1 (rural)	160	53	75.1	
2	1969	712	73.4	
3	3268	1194	73.2	
4	2521	1118	69.3	
5 (big city)	11055	5020	68.8	
Total	18973	8079	70.1	

[a] Those who returned a completed questionnaire
[b] *P* value of chi-square test
[c] Classification based on commercial zip code segmentation data; unknown for 121 persons in the net sample and 67 respondents respectively

2.4 Enrolment rates

2.4.1 Base-line measurement

To evaluate whether respondents in 1991 reasonably represented the source population, we first examined whether respondents and nonrespondents to the GLOBE postal survey (Spring 1991) differ according to certain characteristics (table 2.4) after which we compared respondents with nonrespondents of the LS-SEDUHS interview and questionnaire (Autumn 1991) for a number of background variables (table 2.5). The latter comparison could be quite extensive because the sample of the LS-SEDUHS was drawn from respondents to the GLOBE-survey of Spring 1991, from which additional information could be derived. Response percentages have been tested with the chi-

Table 2.5 Respondents and nonrespondents to the LS-SEDUHS 1991 interview by demographic, socioeconomic and health characteristics

Characteristic[a]	No. of respondents	No. of nonrespondents	Response %[b]	*P* value[c]
SOCIODEMOGRAPHIC INDICATORS				
Sex				0.39
Men	1476	550	72.9	
Women	1391	551	71.6	
Age				<0.05
15-34 years	390	252	60.7	
35-54 years	1059	356	74.8	
55-74 years	1418	493	74.2	
Marital status				<0.05
Married	2092	691	75.2	
Never married	363	224	61.8	
Divorced	206	93	68.9	
Widowed	172	73	70.2	
SOCIOECONOMIC STATUS				
Education				<0.05
Primary school	722	331	68.6	
Lower vocational, lower secondary school	1124	414	73.1	
Intermediate vocational, higher secondary school	546	201	73.1	
Higher vocational, university	406	122	76.9	
Other	17	6	73.9	
Occupation main breadwinner (EGP-classification)[31]				<0.05
Unskilled manual workers	453	198	69.6	
High and low skilled manual employees	637	240	72.6	
Self-employed	108	41	72.5	
Routine non-manual employees	449	156	74.2	
Lower grade professionals,	615	182	77.2	
Higher grade professionals	207	67	75.5	
N.a.[d]	334	177	65.4	

square test, which tests whether the distribution of the relevant variables differs between respondents and nonrespondents.

Response to the GLOBE postal survey was lower among men than among women, in the lower age groups, among those who were less prosperous and in more urbanised areas (table 2.4). Although chi-square tests were all statistically significant owing to the large numbers involved, the differences in percentages are not large.

The total number of valid questionnaires after response in the data collection of Autumn 1991 was 2878, which represents a response of 72.5% of the original sample of 3968 persons. 11 respondents were excluded later because their identity did not match with the GLOBE-sample, yielding a valid response of 72.3%. Table 2.5 contains the response in 1991 by sociodemographic, socioeconomic and health characteristics.

Table 2.5 (continued)

Characteristic[a]	No. of respondents	No. of nonrespondents	Response %[b]	*P* value[c]
Source of income				0.32
Minimum social security	105	47	69.1	
Other	2685	1004	72.8	
Financial situation				<0.05
At least some difficulty to manage financial situation	744	318	70.1	
No difficulty to manage financial situation	2070	744	73.6	
HEALTH STATUS				
Perceived General Health				0.63
Less than 'good'	1293	497	72.2	
'Good' or 'very good'	1498	556	72.9	
Chronic condition[e]				<0.05
Asthma, COPD	459	189	70.8	
Heart disease	384	128	75.0	
Diabetes	248	81	75.4	
Severe low back complaints	854	293	74.5	
Other	352	232	60.3	
None	570	178	76.2	
Total	2867	1101	72.3	

[a] Not all values add up to 2867 because missing values were excluded
[b] Response percentages are calculated by dividing the number of respondents by the total of respondents and nonrespondents in each row
[c] *P* value of chi-square test
[d] E.g. pupils, students
[e] As reported in GLOBE Spring 1991 survey

Response was lowest in the youngest age category and among the divorced. People with primary school education only and unskilled manual workers have the lowest response rates in their categories. Those with difficulty managing their financial situation have a slightly lower response than people who do not experience these difficulties. Response rates vary little by perceived general health, whereas there is some more variation according to chronic conditions.

The results of the comparison of respondents and nonrespondents of the LS-SEDUHS interview in 1991 show that response differs by several socio-demographic and socioeconomic indicators. When formally statistically tested with a chi-square test these differences are statistically significant ($P<0.05$). Expressed as response percentages, these differences are not very large, except the differences between the youngest and older age groups, the married and never married, and those with chronic conditions not belonging to the overrepresented ones. Some of these characteristics may be associated, e.g. never married people are likely to be young.

The conclusion of the combined information from tables 2.4 and 2.5 is that respondents are slightly older, have a higher socioeconomic status, have a slightly different pattern of chronic diseases and have less never married people among them than nonrespondents.

2.4.2 Follow-up measurements

The overall response in the follow-up measurements was satisfactory, 86.6% in 1992 and 79.1% in 1993. However, as table 2.6 shows, the gap in response rate between those reporting a 'very good' health and those who reported their health as 'bad' in 1991 grows over time.

Response in those with a bad perceived general health may be relatively low due to higher mortality rates. Mortality in these groups causes greater declines in the number of people alive and thus theoretically capable of response, relative to the fixed base-line value (the denominator). Nevertheless, by 1993 only some 2% of the population had died and attrition among those with bad health is largely due to 'true' nonresponse.

Chapter 10 contains a further discussion of the implications of nonresponse for the study results.

Aside from response, another important aspect of data from a health survey is the self-report of health status by respondents. If the aim is to analyse socioeconomic differences, the question is whether people with a low socioeconomic status are equally reliable reporters of their health status as people with a high socioeconomic status. This is of special importance in this study for the reporting of the four overrepresented conditions. It will therefore be discussed separately in the following chapter.

Table 2.6 Response 1991-1993 by level of education and perceived general health as measured in 1991

		response as % of LS-SEDUHS sample		
	*N**	1991	1992	1993
Education				
University	82	100	88.3	80.6
Higher vocational	324	100	89.3	86.2
Intermediate vocational, higher secondary school	546	100	86.5	82.9
Lower vocational, lower secondary school	1124	100	85.4	79.6
Primary education	722	100	77.5	70.4
Perceived General Health				
Very good	306	100	86.6	83.7
Good	1327	100	85.7	82.6
Fair	648	100	84.3	77.5
Sometimes good, sometimes bad	443	100	80.4	71.7
Bad	76	100	79.5	64.4

* Excluding those with missing values on the question about education and/or perceived general health (*N*=2867)

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Differences in the misreporting of chronic conditions, by level of education: the effect of inequalities in prevalence rates

Abstract

Many studies of socioeconomic inequalities in the prevalence of chronic conditions rely on self-reports. For chronic nonspecific lung disease, heart disease, and diabetes mellitus, we studied the effects of misreporting on variation in prevalence rates by respondents' level of education. In 1991, a health interview survey was conducted in the southeastern Netherlands with 2867 respondents. Respondents' answers were compared with validated diagnostic questionnaires in the same survey and the diagnoses given by the respondents' general practitioners. Misreporting of chronic lung disease, heart disease, and diabetes may be extensive. Depending on the condition and the reference data used, the confirmation fractions ranged between 0.13 and 0.93. Misreporting varied by level of education, and although various patterns were observed, the dominant pattern was that of more underreporting among less educated persons. The effects on prevalence rates were to underestimate differences by level of education to a sometimes considerable degree.

Misreporting of chronic conditions differs by respondents' level of education. Health interview survey data underestimate socioeconomic inequalities in the prevalence of chronic conditions.

3.1 Introduction

Many studies of socioeconomic inequalities in health rely on health interview survey data. These data are comprehensive, in the sense of covering a wide variety of health problems, and they also permit an easy linkage between information on the presence or absence of health problems and socioeconomic characteristics of the same individuals.[1-4]

A limited number of studies reported on the validity of health interview survey data, mainly on the validity of self-reports of respondents to a checklist of chronic conditions compared with either clinical examinations or medical records.[5-6] In general, the results are disappointing at the individual level, but it has remained unclear to what extent estimates of socioeconomic variation in the prevalence of chronic conditions are biased by the misreporting demonstrated by these validation studies.

We tried to assess the effects of differential misreporting on socioeconomic variation in the prevalence of three self-reported chronic conditions: chronic nonspecific lung disease, heart disease and diabetes mellitus.

3.2 Materials and methods

Data were collected within the framework of the GLOBE study. GLOBE is the Dutch acronym for 'Health and Living Conditions of the Population of Eindhoven and surroundings'. For this study, a postal survey was conducted in 1991 among 27,070 non-institutionalised inhabitants (aged 15-74 years) of Eindhoven and a number of surrounding municipalities, all in the southeastern part of the Netherlands. The sample was randomly drawn from the municipal population registries, and the response rate was 70.1%, which resulted in a study population of 18,973 respondents (hereafter referred to as the 'original study population'). The response rates were not substantially different by age, sex, marital status, urban or rural status, or socioeconomic status.[7]

After this postal survey was conducted, a subsample of 3,970 respondents was approached for an oral interview. The postal questionnaire contained a checklist of chronic conditions, and all individuals with self-reported chronic nonspecific lung disease, heart disease, diabetes mellitus and severe back troubles were selected for the subsample. In addition, a 10% random sample of persons who did not report one of these four conditions was taken. The response rate to the oral interview was 72.3%, which resulted in a study sample of 2,867 respondents. No selective nonresponse was found by sociodemographic variables or by health status.[8]

The oral interview contained a number of questions on health status. First, the checklist of chronic conditions was administered again. The question was, "Will you check for each chronic condition separately whether you currently have this condition or whether you are under treatment or control for this condition? Yes/no". Items included "chronic bronchitis, asthma, emphysema ('overstretched' lung) or chronic nonspecific lung disease", "serious heart disease or myocardial infarction", and "diabetes mellitus". The respondents' answers to this checklist were taken as the starting points for the analyses to be reported here. These answers were compared to two other sources of information on the respondents' health status: extensive diagnostic questionnaires and general practitioners' diagnoses. No attempt was made to validate respondents' self-reported back trouble.

All respondents to the oral interview, regardless of their answer to the checklist, had to answer a number of diagnostic questionnaires:

- For **chronic nonspecific lung disease**, the Dutch translation of the British MRC-questionnaire was used.[9,10] Criteria used to establish a diagnosis were any or all of the following: period of coughing lasting at least 3 months a year, period of productive cough lasting at least 3 weeks a year, attacks of shortness-of-breath and/or wheezing; and/or shortness-of-breath in rest or during exertion.
- For **heart disease** two questionnaires were used: the Dutch translation of the Rose questionnaire on angina pectoris[11,12] and a Dutch questionnaire on heart failure.[12] The number of items used to establish angina pectoris was 13. Criteria used to establish angina pectoris were heavy feeling in the chest, chest pain, or chest discomfort, or attack of pain in the jaw, throat, fingers or shoulders; these feelings occurred during moderate or heavy exertion and disappeared at rest or responded to medication. Criteria used to establish heart failure were at least two of three typical symptoms (swollen legs, nocturia, orthopnea) or shortness-of-breath in the absence of chronic nonspecific lung disease. Respondents were classified as having heart disease if they had either signs of angina pectoris or signs of heart failure, or both.
- For **diabetes mellitus** a Dutch questionnaire was used.[13] Criteria used to establish a diagnosis were reported treatment with insulin or oral antidiabetic drugs or both, and/or a sugar-free diet.

Each respondent was asked permission to approach his or her general practitioner for further information on the respondents' health status. Eighty-three percent of respondents agreed to this request. Because of some nonresponse among general practitioners, we finally obtained this information for 52% of respondents. Losses because of refusal or general

practitioner nonresponse did not vary by socioeconomic variables or by chronic disease status. Each general practitioner received a short questionnaire asking whether the respondent had one or more of the above-mentioned conditions. In case of a positive response, more detailed data on diagnosis and treatment were ascertained.

The analysis of the data involved the following steps. First, two-by-two tables were constructed giving the correspondence between self-reported diagnoses and diagnoses inferred from either the diagnostic questionnaires or the general practitioners' information. Because the study sample had an overrepresentation of the chronic diseases under study, the numbers in each cell were then reweighted to the original study population, with the reverses of the sampling fractions and response fractions as weights.

In the second step, summary indices for the correspondence between self-reported diagnoses and the two types of reference data were calculated. Because the focus of the analysis is on socioeconomic variation, this was done for each of four levels of educational attainment of the respondents. Confirmation fractions (proportion of self-reports confirmed by the reference data, equivalent to positive predictive value) and detection fractions (proportion of true diagnoses detected by the self-reports, equivalent to sensitivity) were calculated. In addition, the prevalence of each condition by educational level was calculated, according both to self-reports and to each type of reference data. All calculations were done on the basis of a logistic regression analysis, and the results of this regression analysis were used to calculate *P*-values (for the overall effect of education on the confirmation and detection fractions and on the prevalence rates) and 95% confidence intervals. All *P*-values and 95% confidence intervals were based on numbers before reweighting to the original population. The differences in confirmation and detection fractions and in prevalence rates by educational level were summarised as odds ratios (for primary school vs postsecondary education).

3.3 Results

Self-reports vs results of diagnostic questionnaires

Of 474 individuals reporting chronic nonspecific lung disease only 376 (79%) had a positive score on the diagnostic questionnaire (table 3.1). Conversely, of 595 individuals with a positive score on the diagnostic questionnaire for chronic nonspecific lung disease, only 376 (63%) report that they had this disease. Although these figures represent the confirmation and detection fractions in our study sample, they cannot be taken as estimates of the confirmation and detection fractions in the entire population, due to the overrepresentation of individuals with chronic disease in

our sample. After reweighting, the confirmation and detection fractions for chronic nonspecific lung disease are 74% and 43%, respectively.

For heart disease the confirmation and detection fractions after reweighting were 61% and 13%, respectively. The latter figure is due to the large number of cases of heart disease identified by the diagnostic questionnaire but not reported by the respondents themselves.

For diabetes mellitus the situation was much better: the two-by-two table shows very small number of false-negative and false-positive reports, and after reweighting the confirmation and detection fractions were 96% and 93% respectively.

Misreporting was not the same in all educational groups (table 3.2). For chronic nonspecific lung disease, confirmation fractions are lower in the higher educational groups. Although this does imply a larger extent of overreporting, the difference was not primarily a matter of different test behaviour, but rather reflected the lower prevalence of chronic nonspecific lung disease in the higher educational groups. At the same time, detection fractions show a tendency to be lower in the higher educational groups, implying a larger extent of underreporting. These two phenomena kept each other more or less in balance, so that the differences in prevalence based on self-reports (odds ratio for the lowest vs the highest educational group = 2.28) give a surprisingly accurate picture of the differ-

Table 3.1 Two-by-two comparisons of self-reports of three chronic diseases to the results of diagnostic questionnaires

	Self-reported, in study sample			Self-reported, reweighted to original population		
Diagnosed	Yes	No	Total	Yes	No	Total
			Chronic nonspecific lung disease			
Yes	376	219	595	672	910	1582
No	98	2097	2195	237	12348	12585
Total	474	2316	2790	909	13258	14167
			Heart disease			
Yes	167	482	649	261	1753	2014
No	109	1979	2088	171	11782	11953
Total	276	2461	2737	432	13535	13967
			Diabetes mellitus			
Yes	227	16	243	447	45	492
No	13	2556	2569	29	13780	13809
Total	240	2572	2812	476	13825	14301

Note: totals differ between tables because of missing values.

Table 3.2 **Summary indices by level of education, comparing self-reports of three chronic conditions with the results of diagnostic questionnaires (after reweighting to the original population)**

Level of education	Confirmation fraction [95% CI]	Detection fraction [95% CI]	Prevalence (self-report) [95% CI]	Prevalence (diagnosed) [95% CI]
		Chronic nonspecific lung disease		
Primary school	0.78 [0.71-0.84]	0.48 [0.41-0.56]	0.100 [0.086-0.117]	0.163 [0.142-0.187]
Secondary school, lower level	0.72 [0.64-0.78]	0.39 [0.33-0.46]	0.055 [0.047-0.064]	0.100 [0.087-0.114]
Secondary school, higher level	0.77 [0.64-0.87]	0.45 [0.35-0.55]	0.057 [0.045-0.071]	0.098 [0.080-0.118]
Postsecondary	0.60 [0.46-0.73]	0.36 [0.26-0.48]	0.047 [0.036-0.060]	0.077 [0.061-0.097]
Total	0.74 [0.69-0.78]	0.43 [0.39-0.47]	0.064 [0.058-0.070]	0.110 [0.101-0.119]
P(education)	<0.10	NS	<0.001	<0.001
OR (primary *vs* post-secondary)	2.39 [1.19-4.79]	1.64 [0.93-2.89]	2.28 [1.65-3.14]	2.32 [1.72-3.14]
		Heart disease		
Primary school	0.67 [0.57-0.76]	0.14 [0.10-0.18]	0.043 [0.034-0.053]	0.208 [0.183-0.236]
Secondary school, lower level	0.61 [0.50-0.70]	0.12 [0.10-0.16]	0.026 [0.021-0.032]	0.127 [0.112-0.144]
Secondary school, higher level	0.60 [0.47-0.72]	0.13 [0.09-0.19]	0.029 [0.022-0.038]	0.133 [0.110-0.160]
Postsecondary	0.46 [0.30-0.63]	0.12 [0.07-0.20]	0.030 [0.021-0.042]	0.112 [0.088-0.142]
Total	0.61 [0.55-0.67]	0.13 [0.11-0.15]	0.031 [0.028-0.035]	0.146 [0.135-0.157]
P(education)	NS	NS	<0.05	<0.001
OR (primary *vs* post-secondary)	2.36 [1.06-5.27]	1.13 [0.59-2.18]	1.44 [0.95-2.19]	2.09 [1.52-2.86]
		Diabetes mellitus		
Primary school	0.96 [0.90-0.98]	0.96 [0.90-0.98]	0.059 [0.047-0.073]	0.059 [0.047-0.073]
Secondary school, lower level	0.97 [0.92-0.99]	0.84 [0.72-0.92]	0.033 [0.027-0.040]	0.037 [0.031-0.046]
Secondary school, higher level	0.74 [0.47-0.90]	0.94 [0.80-0.99]	0.021 [0.015-0.029]	0.016 [0.012-0.023]
Postsecondary	1.00 [0.92-1.00]	0.96 [0.75-0.99]	0.013 [0.008-0.020]	0.013 [0.009-0.020]
Total	0.96 [0.93-0.97]	0.93 [0.89-0.96]	0.030 [0.026-0.034]	0.030 [0.026-0.034]
P(education)	<0.05	NS	<0.001	<0.001
OR (primary *vs* post-secondary)	...[a]	0.98 [0.11-8.62]	4.80 [2.94-7.85]	4.59 [2.83-7.44]

[a] Odds Ratio cannot be calculated because the confirmation odds for postsecondary education is infinite. When the observed value of 0 false-positive cases in the postsecondary education group is replaced by an arbitrary value of 1/2, the OR (primary *vs* postsecondary) becomes 0.37 [0.02, 6.87].

ences in prevalence based on the results of diagnostic questionnaires (odds ratio = 2.32).

For heart disease, there also was a tendency for the confirmation fraction to be lower in the higher educational groups, but detection fractions were the same regardless of educational level, so that the net effect was that self-reported data (odds ratio = 1.44) underestimated the differences in prevalence as measured by the diagnostic questionnaires (odds ratio = 2.09). In a second series of analyses for heart disease (results not shown), we checked whether this conclusion was affected by changing the criteria for determining heart disease with the diagnostic questionnaires. For example, when a diagnosis of angina pectoris was only made based on chest pain and related symptoms during light exertion (instead of on moderate or heavy exertion), the detection fractions increased and the diagnosed prevalences decreased, but the pattern of underestimation of socioeconomic inequalities in prevalence remained the same.

For diabetes mellitus, no clear patterns emerged, and there was no difference between prevalence estimates by educational group based on self-reports and those based on diagnostic questionnaire.

Self-reports vs general practitioner diagnoses

The data obtained through the respondents' general practitioners confirm that self-reports of chronic conditions often are inaccurate. Table 3.3

Table 3.3 Two-by-two comparisons of self-reports of three chronic conditions with general practitioners' diagnoses

	Self-reported, in study sample			Self-reported, reweighted to original population		
Diagnosed	Yes	No	Total	Yes	No	Total
			Chronic nonspecific lung disease			
Yes	173	51	224	339	196	535
No	70	1137	1207	130	6439	6569
Total	243	1188	1431	469	6635	7104
			Heart disease			
Yes	132	127	259	202	415	617
No	17	1177	1194	23	6504	6527
Total	149	1304	1453	225	6919	7144
			Diabetes mellitus			
Yes	119	17	136	231	69	300
No	10	1285	1295	25	6732	6757
Total	129	1302	1431	256	6801	7057

Note: totals differ between tables because of missing values.

shows that the extent of misreporting again was smallest for diabetes mellitus. The large number of false-negative heart disease self-reports again is striking.

Although the patterns of misreporting with reference to general practitioner diagnoses were not always the same as those seen with reference to the results of diagnostic questionnaires, they do confirm that misreporting differed according to educational level (table 3.4). Self-reported data underestimated the prevalence differences by educational group for all three chronic conditions.

3.4 Discussion

As stated in the introduction paragraph of this chapter, there have been a number of studies on the validity of reporting chronic conditions in health interview surveys. Many of these studies were done in the 1950s and 1960s,[14-23] but recently there has been some renewed attention to this subject area,[24-30] perhaps because of the institutionalisation of regular health interview surveys in many industrialised countries.[31]

Reviews of the accumulated evidence concluded that both underreporting and overreporting occur on a large scale, and that the net effect mostly tends toward underestimation of the prevalence of chronic conditions in the population.[5,6] There are large differences between conditions in the degree of under- and overreporting. For the three conditions included in the present study, the evidence from previous studies suggests that validity is highest for self-reports of diabetes mellitus, lowest for chronic respiratory disease, and in between for heart disease.[5,6]

The findings in our study with a few exceptions clearly fit this pattern. Although we did not find evidence for selective nonresponse, the cumulative nonresponse rates were substantial and it is difficult to exclude the possibility that our results were affected by biased participation. Nevertheless, the results clearly suggest that the extent of under- and overreporting of chronic conditions is extensive and that the net effect tends toward underestimating the prevalence of chronic nonspecific lung disease and heart disease in the population. The picture is much better for diabetes mellitus than for the other two conditions (tables 3.2 and 3.4). The only discrepancy with the results of previous studies is that the validity of self-reports of chronic nonspecific lung disease on the whole was higher than that of self-reports of heart disease in our study. This is perhaps because chronic nonspecific lung disease was described rather specifically in the questionnaire ("chronic bronchitis, asthma, emphysema (= 'overstretched' lung) or chronic nonspecific lung disease").

Table 3.4 **Summary indices by level of education, comparing self-reports of three chronic conditions with general practitioner's diagnoses (after re-weighting to the original population)**

Level of education	Confirmation fraction [95% CI]	Detection fraction [95% CI]	Prevalence (self-report) [95% CI]	Prevalence (diagnosed) [95% CI]
		Chronic nonspecific lung disease		
Primary school	0.79 [0.70-0.86]	0.75 [0.62-0.84]	0.128 [0.104-0.158]	0.136 [0.110-0.168]
Secondary school, lower level	0.58 [0.47-0.68]	0.46 [0.35-0.57]	0.053 [0.043-0.066]	0.067 [0.054-0.083]
Secondary school, higher level	0.80 [0.66-0.90]	0.61 [0.40-0.79]	0.045 [0.032-0.062]	0.059 [0.042-0.082]
Postsecondary	0.80 [0.63-0.91]	0.90 [0.74-0.97]	0.044 [0.030-0.065]	0.039 [0.026-0.059]
Total	0.73 [0.67-0.78]	0.65 [0.58-0.72]	0.064 [0.056-0.073]	0.075 [0.065-0.085]
P(education)	<0.01	<0.001	<0.001	<0.001
OR (primary *vs* post-secondary)	0.94 [0.35-2.53]	0.31 [0.08-1.19]	3.21 [2.00-5.15]	3.89 [2.36-6.43]
		Heart disease		
Primary school	0.86 [0.74-0.93]	0.30 [0.22-0.39]	0.049 [0.038-0.064]	0.141 [0.115-0.173]
Secondary school, lower level	0.89 [0.76-0.95]	0.23 [0.16-0.31]	0.021 [0.016-0.028]	0.082 [0.067-0.101]
Secondary school, higher level	0.94 [0.79-0.99]	0.55 [0.40-0.69]	0.035 [0.023-0.051]	0.059 [0.043-0.081]
Postsecondary	0.92 [0.74-0.98]	0.53 [0.35-0.70]	0.032 [0.020-0.050]	0.055 [0.038-0.079]
Total	0.90 [0.84-0.93]	0.33 [0.28-0.39]	0.032 [0.027-0.037]	0.085 [0.075-0.097]
P(education)	NS	<0.001	<0.001	<0.001
OR (primary *vs* post-secondary)	0.50 [0.10-2.60]	0.37 [0.16-0.87]	1.59 [0.90-2.78]	2.84 [1.79-4.50]
		Diabetes mellitus		
Primary school	0.95 [0.86-0.98]	0.70 [0.52-0.83]	0.053 [0.040-0.072]	0.073 [0.055-0.096]
Secondary school, lower level	0.87 [0.68-0.96]	0.77 [0.59-0.89]	0.043 [0.032-0.057]	0.048 [0.037-0.063]
Secondary school, higher level	0.79 [0.55-0.92]	0.88 [0.63-0.97]	0.019 [0.012-0.030]	0.017 [0.011-0.028]
Postsecondary	1.00 [0.33-1.00]	0.91 [0.56-0.99]	0.012 [0.006-0.023]	0.013 [0.007-0.024]
Total	0.91 [0.84-0.95]	0.79 [0.69-0.86]	0.033 [0.027-0.039]	0.037 [0.031-0.044]
P(education)	NS	NS	<0.001	<0.001
OR (primary *vs* post-secondary)	...[a]	0.23 [0.03-2.07]	4.58 [2.25-9.31]	5.77 [2.93-11.39]

[a] Odds Ratio cannot be calculated because the confirmation odds for post-secondary education is infinite. When the observed value of 0 false-positive cases in the postsecondary education group is replaced by an arbitrary value of 1/2, the OR (primary *vs* postsecondary) becomes 0.74 [0.03, 16.06].

Previous studies have not produced clear evidence on socioeconomic differences in under- and overreporting. The two reviews mentioned before concluded that socioeconomic differences are small,[5,6] but thereby concealed the sometimes conflicting findings of different studies. Our study suggests that when compared to general practitioners' diagnoses, self-reports of more highly educated persons usually were better than those of less educated persons (table 3.4). When self-reports were compared with the results of diagnostic questionnaires, there was a tendency for the reverse to be true (table 3.2). Perhaps disease in less educated persons more often goes undetected by general practitioners, and in that case we should place more confidence in the comparison of self-reports with the results of diagnostic questionnaires. On the other hand, the validity of diagnostic questionnaires may also differ between educational groups, and it is actually impossible to decide between the two data sources.

Neither of these is a perfect gold-standard measurement. Diagnostic questionnaires are not completely insensitive to individuals' perceptions (many questions refer to perceived symptoms), and general practitioners will not always have an accurate idea of their patients' diagnoses, especially if these diseases are actually treated by specialists (or not at all). Combining these two data sources may partially alleviate these problems, however, especially if the conclusions based on each of the two sources point in the same direction.

Both comparisons suggest that health interview survey data underestimate prevalence differences by educational level. This was very true when general practitioners' diagnoses were used as the reference data, but it was also true when results of diagnostic questionnaires were used, especially in the case of heart disease. This underestimation of inequalities in morbidity was also found in a previous study which we did in the same population, in which we linked data on self-reported cancer from the postal survey to data from a cancer registry operating in the same area.[30] Although we do not know with certainty whether the same conclusion applies to other chronic conditions, we consider it likely that this is the case, because the four conditions studied (chronic nonspecific lung disease, heart disease, diabetes mellitus and cancer) cover a wide spectrum of conditions. We also consider it likely that a similar pattern will be found in other countries. As a result of the Dutch system of universal health care insurance, there is less inequality of access to health care in the Netherlands than in many other countries. Consequently, underreporting of chronic conditions by less educated persons and underestimation of differences in prevalence by educational level may well be even greater in other countries. The possibility of underestimation should therefore be considered seriously in the interpretation of data on educational differences in self-reported chronic conditions.

Of course, it is not at all surprising that a simple device such as a conventional checklist of chronic conditions leads to serious misreporting by respondents. It has repeatedly been shown that even minor variations in the phrasing of questions lead to gross differences in overall prevalence estimates of chronic conditions.[32] It is likely that the cognitive processes involved in answering these questions (e.g. memory retrieval) can be supported better - for example, by extending and specifying the questions. It is to be welcomed that the US National Centre for Health Statistics is conducting a research programme on these cognitive aspects.[5,33] We recommend that this research programme take into account the educational differences in misreporting that we found in our study.

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Part II

Socioeconomic differences in the utilisation of health services in a Dutch population: the contribution of health status

Abstract

The main question addressed here is to what extent socioeconomic differences in the utilisation of health services in the Netherlands can be explained by health status. Our aim is to assess whether the health service has achieved equal access for equal needs, and which health status measures best control for need. Cross-sectional survey data from 2867 respondents with respect to utilisation of six different types of health service are used for analysis. Socioeconomic differences in utilisation were present for all services after we controlled for age, sex and marital status. By controlling for health status, differences changed markedly for all health services analyzed. Differences in general practitioner contacts diminished but did not disappear (adjusted odds ratio primary education/university 2.22). The pattern of excess contacts with specialist physicians reverses (adjusted odds ratio 0.74). This is also true for the physiotherapist. The pattern of hospital admissions is unclear. Use of over-the-counter medicines is little affected by control for health status. Adjusted differences in use of prescription medicines become small. Control for health status is best achieved with a set of health measures covering several dimensions of health. Whether low relative utilisation among those with low education reflects limited access, or whether higher use of other services is compensatory is hard to decide on the basis of this study. Monitoring access to health care is important for all sorts of systems, including those which are believed to be equitable.

4.1 Introduction

Every citizen has a right to access to high-quality health care. According to the UN International Covenant on Economic, Social and Cultural Rights participating governments should take steps necessary for "the creation of conditions which would assure to all medical service and medical attention in the event of sickness."[1]

Access to the health service for all groups in society has been a much-debated issue in the last two decades (and before) in many industrialised countries.[2-11] In the US the debate has generated a considerable body of knowledge through studies on access to health services, for example on socioeconomic differences in health services utilisation. These studies show that, under control for health status, the socially disadvantaged have lower physician utilisation rates,[12,13] lower utilisation rates of designated medical procedures,[14,15] while length-of-stay in hospitals is longer.[16]

Health care and finance in the US, with limited public insurance schemes, is organised very differently compared to most European countries or Canada, where National Health Services or a mixture of public and private insurance exist. Therefore, studies on access to the health care system in the US are of limited generalisability to countries with a different system. Relatively few recent studies have examined the issue of access in countries outside the US, though there are examples of fairly recent studies about access to the National Health Systems in Great Britain,[17,18] Italy,[9,19] and the health system of Canada.[20,21] Studies like these usually analyse a limited number of health services. Only one study, a multi-country comparison, covers the complete health system by analyzing total health expenditure.[4]

The Dutch Longitudinal Study on SocioEconomic Differences in the Utilisation of Health Services (LS-SEDUHS) aims at describing and explaining socioeconomic differences in the utilisation of a large range of health services in a predominantly chronically ill population in the South-East of the Netherlands. The study could fill some gaps in our knowledge about access to the health care system in a setting with a mixed insurance system. In the Netherlands, people earning less than approximately DFL 58,000 (in 1995) have a compulsory public insurance, those with an income above DFL 58,000 are privately insured. Virtually the entire population is covered.[22]

The question of interest when studying access is whether the health care system realises equal access for equal need. When one applies this principle to socioeconomic status, in equal access situations the lower strata (who are less healthy than people in the higher strata)[22,23] should show higher utilisation figures. Theoretically, the gap between socioeco-

nomic groups should disappear when need, i.e. health status, is taken into account.

When controlling for need, it is of course essential to cover all relevant aspects of health status. Unfortunately, we do not have a systematic insight into the contribution of several dimensions of health status (like perceived health, diseases and disabilities) to the explanation of socioeconomic differences in health service utilisation. Theoretically, we would assume that measures covering the above mentioned three dimensions, rather than just one or two, provide a more adequate representation of medical need. The LS-SEDUHS contains extensive information on health status and thus lends good opportunities to study the contribution of several health status measures.

The main questions adressed in this article are therefore:
- What is the contribution of designated health status measures in explaining socioeconomic differences in utilisation of health services? Which health status measures are relevant to control for health status when studying socioeconomic differences in health services utilisation?
- Is there equal utilisation for equal need between socioeconomic groups of a broad spectrum of health services (such as contact with a general practitioner, specialist physician, or physiotherapist, hospital admissions, and use of prescription or over-the-counter medicines)?

4.2 Data and methods

4.2.1 Study population

The LS-SEDUHS is part of the GLOBE study, a longitudinal study about inequalities in health in the Netherlands that started in 1991. Design and objective of this study have been described in detail elsewhere.[24] For the LS-SEDUHS, baseline data from the GLOBE postal survey were used to select the study population. The sample of the GLOBE study is based on a cohort of non-institutionalised Dutch nationals of 15-74 years old, oversampling the highest and lowest socioeconomic strata, as well as people aged 45 years and over. For the LS-SEDUHS it was desirable to overrepresent people with an illness to obtain sufficient events of health care utilisation on a wide range of services. Information on chronic diseases from the GLOBE-questionnaire was used to select all persons reporting chronic obstructive pulmonary disease (COPD) and asthma, cardiac problems, diabetes or severe low back pain. A random sample of the remainder of the population was drawn to obtain participants without chronic disease, or another than the above four. The four conditions were chosen for three reasons: they constitute a considerable part of the burden of chronic dis-

ease, socioeconomic differences in health status can be expected, and validated questionnaires for these conditions exist.

2867 respondents (72.3%) completed a separate mailed questionnaire and subsequent interview. There was no selective response by most sociodemographic characteristics, except for a smaller response rate among people aged 15-34. Only a slightly smaller response among those in the lowest education classes could be detected, and no important differences in response by health status occurred.[25] Some basic data on the composition of the study group are shown in table 4.1.

Table 4.1 Composition of study population by age, sex, education and disease status

	N	%
Age		
15 - 24	164	5.7
25 - 34	234	8.2
35 - 44	305	10.6
45 - 54	775	27.0
55 - 64	825	28.8
65 and over	564	19.7
Sex		
Male	1476	51.5
Female	1391	48.5
Education		
Primary	685	23.9
Lower vocational, general secondary	1101	38.4
Intermediate vocational, higher secondary	569	19.8
Higher vocational	338	11.8
University	104	3.6
Other, unknown	70	2.4
Disease status		
Asthma, COPD	603	21.0
Heart disease	867	30.2
Diabetes	231	8.1
Low back complaints	996	34.7
Total with at least one of the above four diseases[a]	1878	65.5
None of the above four	977	34.1
Missing data on all four diseases	12	0.7
Total study population	2867	100.0

[a] Comorbidity among the four groups was allowed, so this total (representing persons) is less than the total of the four disease groups (representing cases).

4.2.2 Data collection

The interview and questionnaire contained information concerning a wide array of services: general practitioner contacts and specialist physician contacts during the two months preceding the interview, contact with a physiotherapist and hospital admissions in the preceding year, and use of prescription and over-the-counter (OTC) medicines during the past 14 days. Health status measures included disabilities (checklist on constraints of Activities of Daily Living (ADL), short version of the disability indicator of the Organisation of European Co-operation and Development (OECD))[26] and self-rated health (perceived general health (PGH,[27] Nottingham Health Profile (NHP)).[28] Respondents also filled out a checklist of chronic conditions.

On the four overrepresented conditions, existing validated (Dutch) questionnaires for that condition were used. For asthma/COPD this was a Dutch translation of the British Medical Research Council (MRC) questionnaire.[29,30] The Rose questionnaire on angina pectoris as well as Dutch material on heart failure were used for heart conditions.[31,32] For diabetes, questions from a Dutch survey were used,[33] and a questionnaire for low back pain was constructed based on the Standardised Nordic questionnaire for this condition and a questionnaire used in a large Dutch health survey.[34,35]

Questions concerning health insurance and were also included. Sociodemographic variables were marital status (single, married, divorced, widowed), sex and age; socioeconomic status was determined by highest attained education (7 classes).

4.2.3 Methods

Of the four overrepresented conditions, disease severity was established based on ratings – if present – derived from the original questionnaire. The construction of the stages of severity of each of these conditions is explained in detail in the appendix. To show that the developed severity categories are meaningful, their relation with general practitioner (GP) contacts is shown in table 4.2. For nearly all categories there is a positive gradient with the utilisation of the general practitioner. An analysis with other health services performed likewise (results not shown).

The remainder of the chronic conditions were seperately coded as dichotomous variables (absent/present). All other health status measures were coded as polychotomous variables. Marital status was used in the original four categories, age was recoded into twelve 5-year classes. Persons presently following some sort of education were recoded according to their present education instead of allocating them to their highest attained education. The seven categories were collapsed into five.

Logistic regression with utilisation (yes/no) as dependent variable was done with SAS proc logistic version 6.07 under UNIX.[36] Firstly a basic model was fitted containing sociodemographic confounders. Confounders were selected on their known or suspected association with both socio-economic status and utilisation of health services and, after that, on statistical criteria.[37] Confounders were age, sex, and marital status (model 1). Degree of urbanisation and religion were considered as confounders, but appeared to play no significant role. After these sociodemographic con-

Table 4.2 Diagnostic questionnaires: meaning of categories and their relation with use of the general practitioner. Results of logistic regression analyses, controlling for age and sex

	No. of items	Categories	OR for GP contact [95% CI]
Asthma/COPD	13	0= no symptoms, no asthma/COPD	1.00
		1= only reported by respondent in checklist	0.74 [0.36-1.52]
		2= nonspecific symptoms	1.40 [1.01-1.95]
		3= asthma/COPD grade 1	1.30 [0.91-1.87]
		4= asthma/COPD grade 2	2.03 [1.43-2.89]
		5= asthma/COPD grade 3	2.47 [1.91-3.20]
		6= asthma/COPD grade unknown (items missing)	4.68 [0.97-22.50]
Heart disease	10	0= no symptoms, no heart disease	1.00
		1= only reported by respondent in checklist	2.68 [0.48-14.86]
		2= nonspecific symptoms	2.08 [1.64-2.64]
		3= reported heart condition, no symptoms	1.37 [1.01-1.86]
		4= angina pectoris	2.06 [1.61-2.64]
		5= heart failure	2.18 [1.53-3.11]
		6= angina pectoris and heart failure	3.28 [2.27-4.74]
Diabetes	6	0= no diabetes	1.00
		1= only reported by respondent in checklist	1.21 [0.57-2.57]
		2= diabetes without complications	1.74 [1.17-2.57]
		3= diabetes with one or more complications	2.71 [1.72-4.26]
Low back pain	6	0= no complaints	1.00
		1= only reported in checklist	1.47 [1.02-2.13]
		2= complaints of shoulders/high back	1.42 [0.61-3.27]
		3= low back pain, ≤ 3 months, no radiation	1.65 [1.23-2.21]
		4= low back pain, ≥ 3 months, no radiation	2.01 [1.55-2.61]
		5= low back pain, ≤ 3 months, with radiation	1.62 [1.17-2.25]
		6= low back pain, ≥ 3 months, with radiation	2.60 [1.97-3.43]
		7= low back pain,grade unknown (items missing)	2.44 [1.19-5.01]

founders, education is added to the model. The reduction in deviance (RD) of education in a regression model was used to test the overall effect of education in that particular model. The RD of education in logistic regression is analogous to the numerator of the partial F-test in ordinary least squares regression.

Health status measures were added to model 1 to control for need. 'Objective' health status measures (reported chronic diseases, handicaps and disabilities) were added first (model 2). Also 'subjective' health status measures (health or complaints as perceived by the respondent) were entered into the basic model (model 3). Finally, a model was fitted containing both 'objective' and 'subjective' health status measures (model 4). Education was added to these models. Socioeconomic differences in the utilisation of health services are expressed as odds ratios (OR) with the corresponding 95% confidence intervals for each of the educational classes, taking class 1 (university degree) as reference category (OR=1). If health status variables explain the socioeconomic differential in the utilisation of health services, the OR of a particular educational group will shift towards 1 compared to the model without these variables. The shifts were separately tested by a Wald-type collapsibility test statistic proposed by Maldonado and Greenland which tests the shift in the corresponding regression coefficient (beta). Maldonado and Greenland recommend a threshold P value of 0.20, in order not to miss any important effects.

The effect of each single health status measure or particular set of health status measures in controlling for health was compared with the effect of all measures together. For each situation the change in beta ('beta-shift') of the lowest educational group was taken as a percentage of the beta shift of a model with all health status measures. The highest educational group is used as reference. These analyses were done separately for all health services considered here.

4.3 Results

Table 4.3 shows the utilisation figures by socioeconomic status for the health services under study. The first column (model 1) shows figures adjusted for sociodemographic confounders only. All services show higher utilisation figures by those with lower education compared to those with an academic background, the only exception being OTC drugs which show a reverse pattern. A clear gradient from highest to lowest socioeconomic group is not always present. The only statistically significant odds ratios are those for GP contacts (lower 3 classes), prescription medicines (primary school) and OTC drugs (all groups). For GP contacts the reduction in deviance (RD) for education is 38.34 with a P value <0.05, implying that the overall contribution of education to differences in GP contacts is

Table 4.3 Utilisation of general practitioner, specialist physician and physiotherapist by socioeconomic status: results of multiple logistic regression analyses

	Odds Ratios [95% Confidence Interval]			
	model 1	model 2	model 3	model 4
Contact with general practitioner past 2 months				
University	1.00	1.00	1.00	1.00
Higher vocational	1.66 [0.98 - 2.79]	1.61 [0.93 - 2.80]	1.59 [0.93 - 2.73]	1.65 [0.94 - 2.87]
Intermediate vocational, higher secondary	2.46 [1.48 - 4.06]	2.25 [1.32 - 3.82]	2.05 [1.22 - 3.44]#	2.19 [1.28 - 3.75]
Lower vocational, general secondary	2.71 [1.65 - 4.44]	2.33 [1.38 - 3.92]@	2.05 [1.23 - 3.42]#	2.19 [1.29 - 3.71]
Primary school	3.30 [1.99 - 5.48]	2.54 [1.48 - 4.35]#	1.96 [1.16 - 3.33]#	2.22 [1.29 - 3.84]@
RD education	38.34*	18.25*	10.64*	12.55*
Contact with specialist physician past 2 months				
University	1.00	1.00	1.00	1.00
Higher vocational	1.26 [0.74 - 2.15]	1.02 [0.58 - 1.78]#	1.07 [0.62 - 1.86]#	0.95 [0.54 - 1.67]@
Intermediate vocational, higher secondary	1.50 [0.90 - 2.51]	1.16 [0.68 - 1.99]#	1.12 [0.66 - 1.90]#	1.05 [0.61 - 1.80]
Lower vocational, general secondary	1.26 [0.76 - 2.08]	0.84 [0.50 - 1.44]#	0.79 [0.47 - 1.33]#	0.71 [0.42 - 1.22]@
Primary school	1.56 [0.93 - 2.61]	0.91 [0.53 - 1.58]#	0.79 [0.46 - 1.35]#	0.74 [0.43 - 1.29]
RD education	7.21	6.22	10.95*	10.27*
Contact with physiotherapist past year				
University	1.00	1.00	1.00	1.00
Higher vocational	1.18 [0.67 - 2.06]	0.97 [0.53 - 1.77]@	1.05 [0.59 - 1.86]@	0.96 [0.53 - 1.76]
Intermediate vocational, higher secondary	1.33 [0.78 - 2.28]	1.05 [0.59 - 1.86]#	1.00 [0.57 - 1.73]#	1.00 [0.56 - 1.79]
Lower vocational, general secondary	1.33 [0.78 - 2.26]	0.93 [0.53 - 1.64]#	0.92 [0.53 - 1.59]#	0.88 [0.50 - 1.56]
Primary school	1.26 [0.73 - 2.16]	0.71 [0.39 - 1.28]#	0.68 [0.39 - 1.21]#	0.66 [0.36 - 1.21]
RD education	1.87	7.15	9.20	8.08

* Significant at the a=0.05 level with 4 df
# Wald-type collapsibility test on beta shift of model 1->2, 1->3, 3->4: $P<0.05$
@ Wald-type collapsibility test on beta shift of model 1->2, 1->3, 3->4: $P<0.20$

Model 1: health care utilisation= constant + age + sex + marital status [+ education]
Model 2: health care utilisation= constant + age + sex + marital status + chronic conditions (checklist + questionnaires) + ADL disabilities + OECD disability indicator [+ education]
Model 3: health care utilisation= constant + age + sex + marital status + perceived general health + Nottingham Health Profile (6 subscales) [+ education]
Model 4: health care utilisation= constant + age + sex + marital status + perceived general health + Nottingham Health Profile (6 subscales) + chronic conditions (checklist + questionnaires) + ADL disabilities + OECD disability indicator [+ education]

Table 4.3 (continued) **Hospital admissions, use of prescription medicines, and use of over-the-counter medicines by socioeconomic status: results of multiple logistic regression analyses**

	Odds Ratios [95% Confidence Interval]			
	model 1	model 2	model 3	model 4
Hospital admissions past year				
University	1.00	1.00	1.00	1.00
higher vocational	0.93 [0.45 - 1.93]	0.75 [0.35 - 1.59]#	0.82 [0.39 - 1.71]#	0.72 [0.34 - 1.55]@
Intermediate vocational, higher secondary	1.61 [0.81 - 3.18]	1.25 [0.62 - 2.54]#	1.25 [0.62 - 2.50]#	1.17 [0.58 - 2.38]
Lower vocational, general secondary	1.33 [0.68 - 2.60]	0.89 [0.44 - 1.80]#	0.89 [0.45 - 1.76]#	0.79 [0.39 - 1.59]@
Primary school	1.71 [0.86 - 3.37]	1.05 [0.52 - 2.16]#	0.99 [0.49 - 2.00]#	0.93 [0.45 - 1.92]
RD education	12.18*	7.47	6.05	7.78
Use of prescription drugs past 14 days				
University	1.00	1.00	1.00	1.00
Higher vocational	1.27 [0.77 - 2.08]	1.05 [0.61 - 1.81]@	1.08 [0.64 - 1.82]@	0.92 [0.53 - 1.59]@
Intermediate vocational, higher secondary	1.39 [0.86 - 2.24]	1.06 [0.63 - 1.78]#	1.01 [0.61 - 1.67]#	0.89 [0.52 - 1.51]@
Lower vocational, general secondary	1.50 [0.94 - 2.39]	1.00 [0.60 - 1.66]#	0.96 [0.59 - 1.58]#	0.79 [0.47 - 1.34]#
Primary school	1.94 [1.20 - 3.15]	1.10 [0.65 - 1.89]#	0.94 [0.56 - 1.58]#	0.82 [0.47 - 1.41]@
RD education	13.06*	0.66	0.77	1.47
Use of OTC drugs past 14 days				
University	1.00	1.00	1.00	1.00
Higher vocational	0.54 [0.33 - 0.90]	0.56 [0.33 - 0.94]	0.55 [0.33 - 0.91]	0.59 [0.35 - 1.01]
Intermediate vocational, higher secondary	0.42 [0.26 - 0.68]	0.41 [0.25 - 0.68]	0.37 [0.22 - 0.61]#	0.41 [0.25 - 0.69]@
Lower vocational, general secondary	0.30 [0.19 - 0.49]	0.28 [0.17 - 0.46]	0.26 [0.16 - 0.43]#	0.29 [0.17 - 0.48]@
Primary school	0.31 [0.19 - 0.51]	0.25 [0.14 - 0.42]#	0.23 [0.14 - 0.39]#	0.24 [0.14 - 0.42]
RD education	32.05*	40.16*	43.96*	39.66*

* Significant at the α=0.05 level with 4 df

Wald-type collapsibility test on beta shift of model 1->2, 1->3, 3->4: $P<0.05$

@ Wald-type collapsibility test on beta shift of model 1->2, 1->3, 3->4: $P<0.20$

Model 1: health care utilisation= constant + age + sex + marital status [+ education]

Model 2: health care utilisation= constant + age + sex + marital status + chronic conditions (checklist + questionnaires) + ADL disabilities + OECD disability indicator [+ education]

Model 3: health care utilisation= constant + age + sex + marital status + perceived general health + Nottingham Health Profile (6 subscales) [+ education]

Model 4: health care utilisation= constant + age + sex + marital status + perceived general health + Nottingham Health Profile (6 subscales) + chronic conditions (checklist + questionnaires) + ADL disabilities + OECD disability indicator [+ education]

statistically significant. Similarly, education contributes significantly to differences in hospital admissions, use of prescription drugs and use of OTC drugs.

Control for 'objective' health status measures (model 2) reduces differences for GP contacts, whereas the patterns for seeing a specialist physician or physiotherapist reverse. Hospital admissions now differ little by socioeconomic status. Also utilisation of prescription drugs differs little by socioeconomic status, whereas the pattern of lower use of OTC drugs in lower educational groups is enlarged. Control for 'subjective' health status measures essentially shows the same pattern in a more pronounced way (model 3). Control for both categories of health status measures (model 4) more clearly shows the pattern already present in the models 2 or 3. The relation between the odds ratios in the four educational groups for each regression model is illustrated graphically for two examples. Figure 4.1 shows GP contacts and figure 4.2 shows contact with the specialist physician; models 1 to 4 are displayed on the x-axis and the y-axis displays odds ratios.

Table 4.4 shows the effect each health status measure has on the beta shift of education of those with primary school, as a percentage of the total beta shift in that group if all health status measures were used. PGH in itself is responsible for the largest shift in beta's, except for contacts with the physiotherapist and OTC medicines. By applying just this health status measure, the beta shifts of education range between 58% and 122%, though most values are mid-range. When using both 'subjective' health status measures PGH and NHP beta shifts range from 83% to 131%. For 'objective' health status measures combined the beta shifts range from 65% to 95%. PGH, chronic diseases and ADL-handicaps were combined to investigate how a set of health status measures would perform, each covering one separate dimension of health status (subjective health, disease, disabilities). The beta shift for this combination ranges from 88% to 103%.

4.4 Discussion

In a cross-sectional analysis of Dutch survey data of 2867 persons, we have demonstrated socioeconomic differences in the utilisation of health services after we controlled for age, sex and marital status: all services – except the use of over-the-counter (OTC) drugs – are used more frequently by the less educated. After controlling for health status, these differences changed markedly for all health services analyzed. Some differences were reduced (GP contacts), other differences reversed (e.g. specialist physician). The odds ratios of the lowest educational class for GP contacts, for example, changed from 3.30 [95% CI: 1.99-5.48] to 2.22 [95% CI: 1.29-3.84].

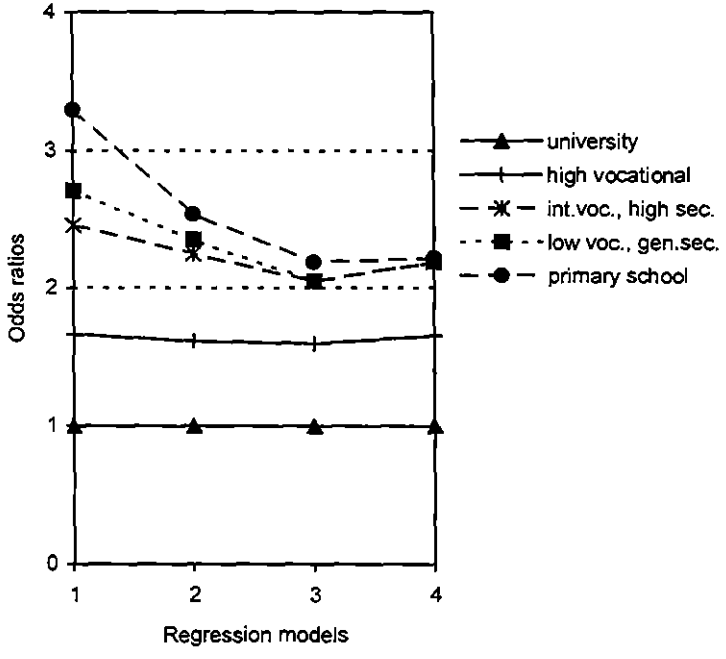

Figure 4.1 – GP contacts past 2 months by education, various regression models.
Numbers of regression models refer to table 4.3.

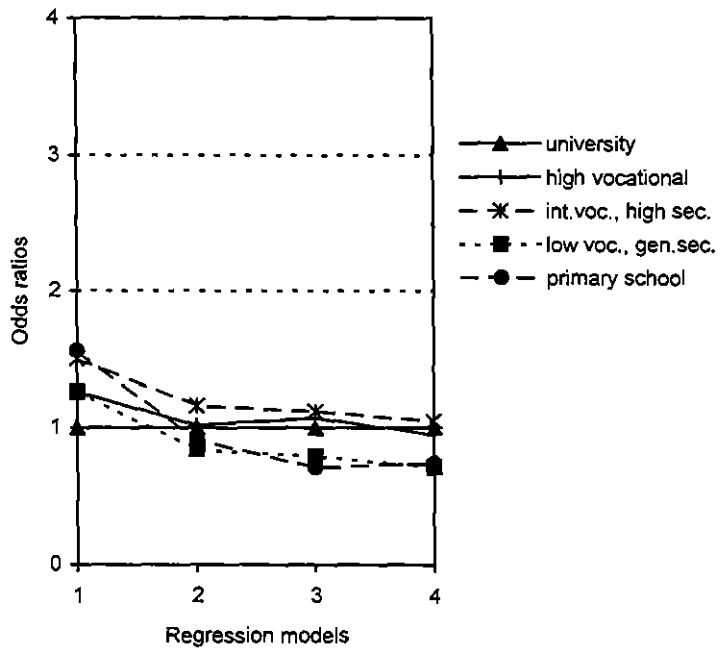

Figure 4.2 - Specialist contacts past 2 months by education, various regression models.
Numbers of regression models refer to table 4.3.

The odds ratios of the lowest educational class for contacts with a specialist physician changed from 1.56 [95% CI: 0.93-2.61] to 0.74 [95% CI: 0.43-1.29].

Five different health status measures were used, and their impact on the size of socioeconomic differences in health care utilisation was calculated. The impact of a single health measure depends on the type of health service considered, but is usually 40-70% of the impact of the five measures together. Perceived General Health (PGH) had the largest impact, and the 'subjective' health status measures PGH and Nottingham Health Profile (NHP) together had a larger impact than all 'objective' health status measures together (chronic conditions, disabilities and handicaps).

When interpreting the data some limitations of the study design have to be considered. The study is entirely based on survey data, i.e. on information provided by the respondent about chronic conditions and health care utili-

Table 4.4 Differences in utilisation of health services by education controlled for health status measures, expressed as percentage of the combined effect of all health status measures[a]

	GP	specialist physician	physio-therapist	hospital	prescription medicines	OTC medicines
Single instruments						
Perceived General Health (PGH)	122	83	58	74	84	95
Nottingham Health Profile (NHP)	83	54	85	66	42	113
Chronic conditions (checklist)	46	31	55	39	34	93
Chronic conditions (checklist+questionnaires)	46	49	63	51	51	92
Activities of Daily Living (ADL)	66	48	69	51	32	66
OECD disability indicator	55	35	57	48	29	47
Combined instruments						
PGH and NHP	131	92	95	90	83	120
Chronic conditions (checklist + questionnaires), ADL and OECD	66	72	90	80	65	95
PGH, chronic conditions (checklist+questionnaires) and ADL	103	97	93	88	97	95

[a] Results of logistic regression analysis, where the beta shift of the lowest educational group caused by adding a health status measure is expressed as a percentage of the beta shift if all health status measures listed in the table were added to the model.

sation. Results might be different when data from other databases, e.g. hospital records are used. Bias will only occur if groups with different socioeconomic status also report differentially about their utilisation of health services or health status. There is some evidence that lower socioeconomic groups systematically underreport certain conditions, such as cancer,[38] COPD/asthma and heart disease (chapter 3). This would imply an underestimation of the socioeconomic differences in health, and hence insufficient control for health status. However, for the majority of the respondents we were able to reach a diagnosis by specific questionnaires, rather than by a checklist of chronic conditions.

The occurrence of selection bias where ill people with a low socioeconomic status and not having access to the health care system are underrepresented in our study is a possibility. However, in these data there are no major differences in response by socioeconomic status and illness level.[25] The percentage of uninsured in the study population is smaller than in the Dutch population as a whole, but as both proportions are very small,[39] this will hardly cause any bias.

It should be reminded that the majority of persons has been selected for their reporting of one or more chronic conditions. Results therefore, cannot be generalised to a healthy population, although the observed patterns are similar to those from the Netherlands Health Interview Survey, which is representative for the Dutch population.[27]

The results indicate that the use of one health status measure to control for health status may be insufficient when socioeconomic differences in utilisation of health services are analyzed (table 4.4). The best single measure is PGH, which does rather well with most aspects of health service utilisation. Sometimes PGH accounts for more than 100% of the impact of all measures together. The reason for this high percentage is perhaps 'overcontrolling' for health, because the lower socioeconomic groups could be more inclined to judge the same health status as 'bad' as their counterparts with a high socioeconomic status, or are more inclined to complain about their health. This mechanism is corrected when other, more 'objectively' measured dimensions like handicaps are taken into account.

The results of the 'subjective' measures PGH plus NHP together do not differ much from those with the full model including 'objective' health status measures. This is probably due to the nature of the NHP, which is a real 'profile' with six subscales. The six subscales not only measure subjective complaints and well-being, but also mobility which will parallel the OECD and ADL-scales on disabilities. This idea is supported by figures of the model covering perceived health, diseases and disability together, measured by different instruments. Chronic diseases, ADL-handicaps and

PGH put together show figures very similar to a model with PGH and NHP (table 4.4).

A combination of health status measures covering the three important dimensions of health – perceived complaints, diseases, and handicaps – enables extensive control for health status in surveys aiming at measuring socioeconomic differences in health care utilisation.

The results show that socioeconomic differentials in the use of health services are present in this Dutch study population under control for health status. The findings do not necessarily imply that the health care system in the Netherlands is inequitable. In fact, previous research suggests that the health care system in the Netherlands is rather equitable compared to other European countries.[4]

The fewer specialist contacts in the low education groups while the reverse is true for contact with the general practitioner is perhaps partly to be explained by a substitution phenomenon in the Dutch system. Going to a specialist physician is financially more attractive for those with private insurance (and consequently a high socioeconomic status), because a substantial part of them have no coverage for the general practitioner. The publicly insured are completely covered for GP services. Although the general practitioner is the gate-keeper in the Dutch health care system, the private sector adheres less strictly to this rule than the public sector.

However, the difference between utilisation of general practitioner and specialist may also have other reasons. Attitude differences between social groups in seeking medical attention may be one of them. Independent of health status, people with a low socioeconomic status may be inclined to see a GP relatively often with minor complaints that do not warrant referral. The high figures on OTC medicines in the highly educated groups while socioeconomic differences in taking prescription drugs are small, could be another aspect of a difference in attitude: those with higher education might be more inclined to try to alleviate minor complaints without seeking professional help. Referral is not only determined by the severity of the complaints. Some (higher educated) patients who believe to be better off with a specialist could press the GP to refer, while the complaint can be perfectly dealt with by the GP.

Instead of these general explanations, differences in access to the specialist physician may have explanations on a more specific level. Socioeconomic differences have been described with regard to several cardiac procedures, not only in the United States but also in the United Kingdom.[17,18,40] Such differences could also occur in the Netherlands and should be object of further study.

Some of the previous alternative explanations are examples of substitution resulting in equivalent care, while other explanations (e.g. pressure to refer to a specialist by those with high education) in fact imply some form of unequal access. To enable reliable inferences about equal access, excellent control for differences in need is indispensable, because without sufficient control for health status observed differences may be attributed to other factors while in fact they are explained by differences in need. It seems wise to use a range of health status measures in surveys to achieve good control for health status, because in different sectors of the health care system different dimensions of health status are important.

Study of determinants of utilisation of both general and specific health services across social groups will give policy makers more understanding about how to maintain and improve equal access to health services for all groups in society. This is vital in this era of health care reform, for countries with state controlled health care systems as well as for countries where the health care system is market-driven.

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Socioeconomic differences in general practitioner and outpatient specialist care in the Netherlands: a matter of health insurance?

Abstract

Equal treatment for equal needs, irrespective of socioeconomic position, is a major issue in many countries. Although in the Netherlands differences in utilisation of health care between population groups are less pronounced than in most other countries, some differences by socioeconomic position do exist. Controlling for health status, individuals with a high socioeconomic status have a higher probability of outpatient contacts with a specialist, but a lower probability of general practitioner (GP) contacts, compared to those with a low socioeconomic status. In this cross-sectional study, we studied whether socioeconomic differences in GP and outpatient specialist care utilisation that exist after health status is taken into account could be explained by different aspects of health insurance. The study population, in which people with asthma and chronic obstructive pulmonary disease (COPD), diabetes mellitus, severe back trouble, and heart diseases are overrepresented, consists of 2867 respondents. Multivariate analyses show that the socioeconomic differences in outpatient specialist contacts cannot be explained by differences in health insurance, whereas differences in general practitioner contacts can partially be explained by the fact that individuals with higher socioeconomic status more often have a private (instead of public) insurance. This is not owing to differences in deductible or insurance coverage between public and private insurance, but is more likely to be caused by differences in regulatory aspects between these two insurance schemes (such as the stronger gate-keeper role of the general practitioner in the public insurance scheme).

5.1 Introduction

Equal health care treatment for equal health needs, irrespective of factors such as socioeconomic position, is a major issue in many countries.[1] In the context of health care reform, there is an important issue of which elements in the health system are responsible for differential utilisation and whether policy measures can affect these differences, if it is felt necessary to change the situation.

A recent international comparison of health care systems has shown that in the Dutch system differences in delivery of health care between population groups are less pronounced than in most other countries.[2] Still, there are notable differences in health care utilisation by socioeconomic status in the Netherlands. A study of the Netherlands Central Bureau for Statistics (CBS) shows that after control for health status, people in high socioeconomic groups have a higher probability of outpatient specialist contacts, physiotherapist contacts, hospital admissions, and non-prescription drugs use.[3] People in low socioeconomic groups, on the contrary, have a higher probability of general practitioner contacts and prescription drug consumption. In our study population, similar differences were found (table 5.1).[4]

The Dutch health care system is characterised by a combination of two types of health insurance: public and private, which differ with respect to financial and regulatory aspects. The public insurance offers a fixed insurance package which is compulsory for wage-earners and social security recipients with an annual income (in 1995) under Dfl 58,000 (= in 1995 approximately $36,000). The public insurance covers about 60% of the Dutch population, the remaining 40% of the population having private insurance. The percentage uninsured is extremely small in the Netherlands.[5] Most services are free of charge for the publicly insured. In contrast to the publicly insured, the privately insured have the option of accepting a deductible in return for premium reductions, and opting out for part of their health care. A deductible is a set amount which a person has to pay before any reimbursement occurs. Depending on deductible and coverage, privately insured persons may be completely reimbursed or may have substantial out-of-pocket costs. In some cases, the privately insured are not, or only partially, covered for general practitioner services which could act as a brake on utilisation of general practitioner care among people in high socioeconomic groups and subsequently stimulate outpatient specialist care.

Public and private health insurance offer different incentives to utilise general practitioner and outpatient specialist care. As type of insurance differs among socioeconomic groups due to its link with income level, the question arises whether the socioeconomic differences in GP and outpa-

tient specialist care utilisation could be explained by type of health insurance or coverage for GP services.

This question has important policy implications for two reasons. The policy in the Netherlands to strengthen the role of the GP is partly based on the assumption that the treatment of certain problems by a GP is more cost-effective than treatment of the same problem by a specialist; especially in the public sector, specialists can claim higher fees than a GP for treatment of the same problem.[6] Also in the absence of different payment systems between the specialist and GP, the GP may generate less costs. A randomised study in the National Health Service of Scotland shows that costs of the GP in follow-up after surgery are less high than those of the surgeon.[7] If specialist contacts substitute for GP contacts, the observed patterns mean that certain groups of patients prefer to use a relatively expensive service for problems for which an equivalent but less costly alternative is available; health care expenses are higher than need be.

A second reason may apply if specialist contacts do not, or only partially, substitute for GP contacts in which case some patients may not see a specialist when this is required. This implies differences in treatment resulting in inequality of care by socioeconomic status. Although it is not possible to make any inference about inequalities in treatment on the basis of the data reported here, such inequalities cannot be excluded either.

Differential utilisation by socioeconomic status may create a situation of unnecessary costs or unequal treatment. If the health insurance system contributes to differential utilisation, it may also be a policy tool to reduce costs or unequal treatment.

The following hypotheses are tested to establish the contribution of health insurance to socioeconomic differences in the utilisation of GP and specialist: firstly taking type of insurance (public and private) into account in analyses should reduce socioeconomic differences in both GP contact and outpatient specialist contacts; secondly, control for GP coverage should also result in a reduction of the socioeconomic difference in GP and specialist contacts.

5.2 Data and methods

5.2.1 Data

In the present cross-sectional study, we used the baseline data of a large-scale prospective cohort study: the Longitudinal Study on SocioEconomic Differences in the Utilisation of Health Services (LS-SEDUHS). In its practical implementation the LS-SEDUHS has been embedded in the GLOBE-study, which is the Dutch acronym for 'Health and Living Conditions of the Population of Eindhoven and surroundings'. The basis of the LS-

SEDUHS is the postal GLOBE-questionnaire of March 1991 of a random sample of approximately 27,000 persons from Eindhoven and a number of surrounding municipalities.[8] People older than 45 years of age, and the lowest and highest socioeconomic groups, are overrepresented and those who did not have Dutch nationality were excluded from the sample. The overall response rate was 70.1% (n=18,973).

For the baseline data collection of the LS-SEDUHS, an oral interview was held among a sample of 3968 persons drawn from respondents of the postal GLOBE-questionnaire. To increase the power of the study in describing and explaining socioeconomic differences in health care utilisation, people with the chronic diseases asthma and chronic obstructive pulmonary disease (COPD), diabetes mellitus, severe back complaints, and heart diseases, were overrepresented. Reasons for choosing these four chronic diseases were the availability of questionnaires measuring the presence and severity of the diseases, a high enough prevalence given the sample size to assess socioeconomic differences in health care utilisation, and the possibility of assessing various types of health care utilisation. The response rate was 72.3%, which results in a study population of 2867 respondents. Only a slightly lower response among those in the lowest education classes could be detected, and no important differences in response by health status occurred.[9]

Table 5.1 Contact with a general practitioner and with specialist physician by level of education (after control for age, gender, marital status, and health status)

			Odds ratios with 95% confidence interval	
Educational levels	*N*	%[a]	General Practitioner care[b]	Outpatient specialist care[b]
University	82	2.9	1.00	1.00
Higher vocational	324	11.6	1.60 [0.86-2.97]	0.71 [0.39-1.28]
Higher and intermediate general	179	6.4	1.75 [0.90-3.41]	0.73 [0.38-1.41]
Intermediate vocational	367	13.1	2.17 [1.18-4.00]	0.79 [0.44-1.42]
Lower general	426	15.2	2.12 [1.15-3.92]	0.60 [0.33-1.07]
Lower vocational	698	24.9	2.27 [1.25-4.13]	0.56 [0.32-0.99]
Primary school	722	25.8	2.16 [1.18-3.95]	0.57 [0.32-1.01]
Reduction in deviance for education			12.21 (df=6, *P*=0.06)	9.17 (df=6, *P*=0.21)

[a] Percentage of people with that educational level in the study population
[b] Contact with GP or specialist in the two months preceding the survey

In the present analyses, the role of health insurance in explaining socioeconomic inequality in health care utilisation is assessed controlling for health status, and age, gender, and marital status.

The highest educational level reached by the respondent was used as an indicator of socioeconomic position. Initially education was categorised into seven levels (table 5.1); for efficiency and surveyability purposes, however, it was collapsed into four levels. Health care utilisation was coded dichotomously by contrasting none and one or more contacts with the GP in the past two months, and none and one or more contacts with a specialist in the past two months. Variables relating to health insurance were: type of health insurance (public or private), the amount of deductible (5 categories), and insurance coverage for the specific types of health care: general practitioner (3 categories) and outpatient specialist care (2 categories).

Health status was measured by:
- perceived general health (5 categories);[10]
- the six subscales of the Nottingham Health Profile (NHP, 3 or 4 categories, depending on the subscale);[11]
- limitations in activities of daily life (ADL-scale, 10 items);[10]
- handicaps, as measured by the OECD long term disability indicator (8 items);[12]
- validated disease-specific questionnaires for asthma and COPD (7 categories,[13] heart diseases (7 categories),[14,15] severe back complaints (8 categories),[16,17] and diabetes mellitus (4 categories);[18]
- a checklist containing 20 other chronic diseases and disorders (present/not present).[10]

The extensive control for health status in our analysis is essential because we expect health status to be a strong confounder: it is likely to be associated with socioeconomic position, health care utilisation, and health insurance. The large amount of health status variables in the model did not cause collinearity assessed by the method of Belsley, Kuh, and Welsch,[19] or any other form of numeric instability.

5.2.2 Analyses

Analyses were carried out using Proc Logistic of SAS (version 6.07 under UNIX).[20] To assess the independent role of deductible and insurance coverage in explaining socioeconomic differences in health services, all analyses in this study were done both in the total population (N=2867) and in the subpopulation of privately insured (N=1076). As explained earlier, only the privately insured have a choice of deductible and coverage for a specific type of health service. The analyses in the whole population were

conducted to take an overall view of the effect of health insurance on socioeconomic differences.

In order to explain socioeconomic differences in health care utilisation, health insurance has to be related to both socioeconomic position and health care utilisation. As a first exploratory step in the analyses, the associations between health insurance and both socioeconomic position and health care utilisation were assessed. To assess the association between health insurance and socioeconomic position, percentages of people with public insurance, a certain amount of deductible, and coverage for a spe-

Table 5.2 Distribution of the four variables of health insurance in the study population

	Total population (*N*=2867)		Privately insured (*N*=1076)	
	Absolute numbers	Percentages	Absolute numbers	Percentages
Type of health insurance: public or private				
Publicly insured	1764	61.5	-	-
Privately insured	1076	37.5	1076	100
Missing values	27	0.9		
Amount of deductibles				
0 guilders	1972	68.8	208	19.3
< 250	211	7.4	211	19.6
>= 250 - < 500	186	6.5	186	17.3
>= 500 - < 1000	240	8.4	240	22.3
>= 1000	121	4.2	121	11.2
missing values	137	4.8	110	10.2
Insurance coverage for general practitioner care				
Full coverage	2546	88.8	781	72.6
Partial coverage	125	4.4	125	11.6
No coverage	82	2.9	82	7.6
Missing values	114	4.0	88	8.2
Insurance coverage for outpatient specialist care				
Full coverage	2620	91.4	855	79.5
Partial or no coverage	122	4.3	122	11.3
Missing values	125	4.4	99	9.2

cific type of health care were calculated per socioeconomic group. The association between health insurance and the utilisation of the two types of health services was analysed by multiple logistic regression. The dependent variable was use of a type of health service and the independent variable was one of the variables of health insurance. Gender, age, marital status, and health status were added as control variables. To test if adding health insurance improves the explanatory value of the model, the reduction in deviance (RD) of the model with health insurance, compared to the model without health insurance, was calculated.[21]

The second step in our analyses assessed the quantitative contribution of health insurance to the explanation of socioeconomic differences in utilisation of the two specific types of health services by multiple logistic regression. The dependent variable was use of a type of health service and the independent variable was education. After control for gender, age, marital status, and health status, one of the variables of health insurance was added to the model. If health insurance explains (part of) the socioeconomic inequalities in health care utilisation, the odds ratios of socioeconomic position will shift towards 1.00. The separate shifts were tested by a Wald-type collapsibility test statistic, proposed by Maldonado and Greenland.[22] The influence of health insurance on socioeconomic differences was tested overall by the change of reduction in deviance (DRD) of socioeconomic position caused by adding health insurance to the model. DRD is the difference between the RD for education in a model without health insurance and the RD for education in a model that includes health insurance.

5.3 Results

In table 5.2, the distribution of the four variables of health insurance in the study population is shown. Within our study population, 61.5% of the respondents are publicly insured and 37.5% are privately insured. These percentages resemble the percentages in the general Dutch population.[10] The distribution of deductible and insurance coverage in the total population shows that the majority of the respondents has no deductible and full coverage for general practitioner and outpatient specialist care. In the subpopulation of privately insured, who can choose a deductible and less than full insurance coverage, the amount of deductible is almost evenly distributed and the majority has a full insurance coverage for general practitioner care (72.6%) and outpatient specialist care (79.5%).

In table 5.3, the association between health insurance and education is shown. Within the total population, education is related to type of insurance, deductible, and insurance coverage. People with a high level of education are more often privately insured, have a higher amount of de-

Table 5.3 Differences in health insurance by level of education: percentages

	Educational levels							
	Total population				Privately insured			
	University	Higher vocational, higher and intermediate general	Intermediate vocational, lower general	Lower vocational, primary school	University	Higher vocational, higher and intermediate general	Intermediate vocational, lower general	Lower vocational, primary school
Type of health insurance (public versus private)								
Publicly insured	8.5	27.8	57.5	79.8	-	-	-	-
Amount of deductibles								
0 guilders	30.7	43.1	68.8	86.5	23.5	19.6	22.8	23.2
< 250	13.3	14.7	8.1	4.6	14.7	20.5	19.9	26.2
>= 250 - < 500	13.3	11.1	8.3	4.0	14.7	15.8	20.5	22.8
>= 500 - < 1000	26.7	22.9	9.6	2.7	29.4	32.4	23.8	15.2
>= 1000	16.0	8.2	5.3	2.2	17.7	11.6	13.0	12.7
Insurance coverage general practitioner care								
Full coverage	75.0	93.5	90.7	96.3	72.6	81.7	77.4	78.7
Partial coverage	10.0	4.3	5.7	3.1	11.0	8.6	13.8	17.6
No coverage	15.0	2.2	3.6	0.7	16.4	9.7	8.8	3.8
Insurance coverage for outpatient specialist care								
Full coverage	91.3	94.1	94.4	97.0	90.4	91.7	86.2	82.6
Partial/no coverage	8.8	5.9	5.6	3.0	9.6	8.3	13.8	17.4

ductible, and more often have partial or no insurance coverage for specific types of health care than those with a low educational level. Within the subpopulation of privately insured, however, the associations between education and deductible and insurance coverage for general practitioner care are less systematic than in the population as a whole, and the association between education and insurance coverage for outpatient specialist care has been reversed. In the subpopulation of privately insured, people with a lower level of education have more often partial or no coverage for outpatient specialist care.

In table 5.4, the associations between health insurance and the two types of health care utilisation after control for age, gender, marital status, and health status, are shown. The publicly insured have a significantly higher probability of contacting the general practitioner (OR= 1.34 [1.10-1.62]) and a (non-significantly) lower probability of contacting the specialist (OR= 0.85 [0.70-1.05]). Both the associations between deductible and general practitioner and outpatient specialist care are inconsistent. Insurance coverage for either general practitioner or outpatient specialist care is not consistently related to the corresponding type of health care utilisation. People with less than full coverage for the corresponding type of health service have a lower probability of general practitioner contact, but a higher probability of specialist contact. None of these associations with insurance coverage is statistically significant. In the subpopulation of privately insured the association between insurance coverage and health care utilisation is somewhat different: the association between insurance coverage for the general practitioner and general practitioner contact is inconsistent and no association is found between insurance coverage for outpatient specialist care and outpatient specialist contact.

In table 5.5, the odds ratios by education are shown for the two types of health services, before and after adding the health insurance variables to the model. In the total population, type of insurance and deductible explain a small part of the socioeconomic inequalities in general practitioner care as there are shifts in the separate odds ratios towards 1.00 (for example: the odds ratio of low education shifts from 2.23 to 1.92 ($P<0.10$; Wald-type collapsibility test statistic)). For both variables of health insurance, the overall test (DRD) is not significant. Insurance coverage for general practitioner care does not explain the socioeconomic inequalities in general practitioner care: the shifts in the separate odds ratios are small and the DRD is not significant.

In the subpopulation of privately insured, the socioeconomic inequalities in general practitioner care resemble the inequalities found in the total population after control for type of insurance. In both the total population and subpopulation of privately insured, the socioeconomic differences of outpatient specialist care are not explained by any of the variables of

Table 5.4 Differences in health care utilisation by health insurance (controlled for gender, age, marital status, and health status)

	Odds ratios with 95% confidence interval			
	General Practitioner contact in the last two months		Outpatient specialist contact in the last two months	
	Total population	Privately insured	Total population	Privately insured
Type of insurance (public versus private)				
Privately insured	1.00	-	1.00	-
Publicly insured	1.34 [1.10-1.62]	-	0.85 [0.70-1.05]	-
Reduction in deviance	8.69 (df=1, *P*<0.05)		2.27 (df=1, *P*=0.18)	
Deductible				
0 guilders	1.00	1.00	1.00	1.00
< 250	0.70 [0.49-0.99]	0.71 [0.42-1.21]	1.48 [1.04-2.10]	1.20 [0.71-2.06]
>= 250 - < 500	0.88 [0.61-1.26]	0.99 [0.59-1.66]	0.88 [0.60-1.29]	0.68 [0.40-1.19]
>= 500 - < 1000	0.71 [0.51-0.98]	0.79 [0.49-1.29]	1.09 [0.78-1.53]	0.81 [0.49-1.34]
>= 1000	0.64 [0.41-1.00]	0.68 [0.37-1.23]	0.81 [0.49-1.35]	0.61 [0.32-1.16]
reduction in deviance	10.60 (df=4, *P*=0.03)	3.38 (df=4, *P*=0.50)	6.52 (df=4, *P*=0.21)	6.49 (df=4, *P*=0.22)
Insurance coverage[a]				
Full coverage	1.00	1.00	1.00	1.00
Partial coverage	0.92 [0.60-1.40]	1.10 [0.64-1.89]	1.22 [0.76-1.97]	1.01 [0.58-1.74]
No coverage	0.67 [0.39-1.13]	0.79 [0.42-1.49]	-	-
Reduction in deviance	3.33 (df=2, *P*=0.26)	0.75 (df=2, *P*>0.50)	0.68 (df=1, *P*=0.46)	0.00 (df=1, *P*>0.50)

[a] For the service for which the results are displayed

Table 5.5 Differences in health care utilisation by level of education after adding health insurance to the model (controlled for gender, age, marital status and health status)

	Odds ratios with 95% confidence interval							
	Total population				Privately insured			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
General Practitioner contact in the past two months								
University	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00
Higher vocational, higher and intermediate general	1.67 [0.89-3.12]	1.60 [0.85-3.00][a]	1.61 [0.86-3.03]	1.62 [0.86-3.04]	1.47 [0.71-3.03]	-	1.50 [0.72-3.10]	1.45 [0.70-2.99]
Intermediate vocational, lower general	2.13 [1.15-3.94]	1.92 [1.03-3.59][b]	1.94 [1.04-3.62][b]	2.05 [1.10-3.81]	1.58 [0.75-3.31]	-	1.59 [0.75-3.37]	1.55 [0.73-3.25]
Lower vocational, primary school	2.23 [1.21-4.12]	1.92 [1.02-3.63][b]	1.95 [1.04-3.66][b]	2.12 [1.14-3.94]	1.95 [0.89-4.29]	-	1.98 [0.90-4.38]	1.89 [0.86-4.17]
DRD[c]	10.84[d] (df=3, *P*=0.01)	5.22 (df=3, *P*=0.21)	4.86 (df=3, *P*=0.24)	1.55 (df=3, *P*>0.50)	3.13[d] (df=3, *P*=0.42)		0.01 (df=3, *P*>0.50)	0.37 (df=3, *P*>0.50)
Outpatient specialist contact in the past two months								
University	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00
Higher vocational, higher and intermediate general	0.70 [0.39-1.27]	0.71 [0.39-1.28]	0.67 [0.37-1.21]	0.71 [0.39-1.27]	0.61 [0.31-1.22]	-	0.58 [0.29-1.16]	0.61 [0.31-1.22]
Intermediate vocational, lower general	0.68 [0.38-1.22]	0.70 [0.39-1.26]	0.65 [0.36-1.16]	0.68 [0.38-1.22]	0.64 [0.31-1.29]	-	0.60 [0.29-1.22]	0.64 [0.31-1.30]

Lower vocational, primary school	0.57 [0.32-1.02]	0.59 [0.32-1.08]	0.54 [0.30-0.97]	0.58 [0.32-1.02]	0.73 [0.34-1.55]	-	0.68 [0.32-1.46]	0.73 [0.34-1.55]
DRD[c]	5.66[d] (df=3, *P*=0.16)	1.62 (df=3, *P*>0.50)	-0.13 (df=3, *P*>0.50)	0.22 (df=3, *P*>0.50)	2.20[d] (df=3, *P*>0.50)		-0.40 (df=3, *P*>0.50)	0.00 (df=3, *P*>0.50)

Model 1: utilisation of health care= education + confounders[e] + health status
Model 2: utilisation of health care= education + confounders[e] + health status + type of health insurance (public *vs.* private)
Model 3: utilisation of health care= education + confounders[e] + health status + deductible
Model 4: utilisation of health care= education + confounders[e] + health status + insurance coverage

[a] *P*<0.05 according to the Wald-type collapsibility test
[b] *P*<0.10 according to the Wald-type collapsibility test
(the Wald-type collapsibility test tests the shift in the separate odds ratios of socioeconomic position caused by adding health insurance to the model)
[c] Difference in Reduction in Deviance
[d] Reduction in Deviance
[e] Gender, age, marital status

health insurance: the shifts in the separate odds ratios are small and the DRD are not significant.

5.4 Discussion

In this study, the question was raised whether the socioeconomic differences in GP and outpatient specialist care utilisation in the Netherlands could be explained by type of health insurance. To answer this question, we examined whether the socioeconomic differences in GP contact and outpatient specialist contacts were reduced when taking type of insurance (public vs private) into account. Secondly, we examined whether limited GP coverage under private insurance was responsible for the observed pattern. If it was, controlling for GP coverage should result into a reduction of the socioeconomic differences in GP and specialist contacts.

Based on the overall results of this study it can be concluded that health insurance cannot explain socioeconomic differences in outpatient specialist contacts. This failure of health insurance to explain the socioeconomic differences in outpatient specialist contacts derives from the fact that specialist care does not differ strongly by health insurance.

Secondly, it can be concluded that health insurance can only explain a small part of the socioeconomic differences in GP contacts. In the total population, differences in deductible explain part of the socioeconomic inequalities in general practitioner care. After stratification by type of insurance, adding deductible and insurance coverage to the model gives no shift in odds ratios and the DRD is not significant. This suggests that the effect of deductible on general practitioner utilisation in the total population in reality is an effect of type of insurance. Insurance coverage could not explain the socioeconomic differences in general practitioner care either. This can be understood from the fact that both insurance coverage for general practitioner care and amount of deductible do not vary systematically between the socioeconomic groups with private insurance.

The limitations of our study should be kept in mind. The results are based on self-reported data, which could bias the results if there were systematic differences in response to questions by socioeconomic position. There are no indications, however, of such a differential response. Another point is the oversampling of people with certain chronic diseases in our study population. The results are, therefore, not directly applicable to the general Dutch population. However, as the over-represented chronic diseases are common ones, the results are highly important to a significant group of chronically ill consumers of health services. The last limitation that should be mentioned is the cross-sectional nature of the data. Cross-sectional analyses give insight into the associations between factors, but to be able to distinguish cause and effect, longitudinal data are necessary.

The LS-SEDUHS is a longitudinal study, so such analyses can be undertaken in the future.

As differences in deductible and insurance coverage cannot explain the socioeconomic differences in general practitioner care, other aspects of type of health insurance (public or private) may be of interest. One of those aspects could be the different financial incentives experienced by physicians: the GP receives a flat annual capitation fee for publicly insured patients, while he can charge the privately insured for each medical service rendered ("fee for service"). GPs, therefore, could be more eager to treat privately insured patients. As the probability of a general practitioner contact for a privately insured patient is lower compared to its publicly insured counterpart (and not higher), financial incentives cannot explain the differences. Other aspects of type of insurance which could explain the higher probability of general practitioner contact are regulatory aspects. One regulatory aspect is the referral card system: to have access to a specialist, the publicly insured have to obtain a referral card from their GP. The referral card has a limited period of validity and after this period the need for specialist care has to be reassessed. The privately insured often need a referral card too, but for them the card has unlimited validity. Thus, differences in referral card system might explain the higher probability of general practitioner contacts for publicly insured.

As health insurance cannot explain the socioeconomic differences in outpatient specialist care and only a small part of the socioeconomic differences in general practitioner care, the question remains what other factors could be responsible for the differences. Besides health insurance socioeconomic groups might differ in other factors like distance to medical care services or opportunity cost of time. Socioeconomic groups might also differ in propensity to use medical care: attitudes and values relating to health status and medical care are likely to depend on socioeconomic status.[23] Finally, the almost inevitable differential interaction between doctor and patient in the consultation room could also play a role.

The hypothesis that health insurance could explain socioeconomic differences in GP and outpatient specialist contacts is based on the premise that specialist contacts among the privately insured are merely substitutes for GP contacts in the publicly insured. Because health insurance does not explain the observed pattern, the case for a substitution phenomenon becomes less convincing, although other factors (discussed previously) might also induce a possible substitution of GP contacts by specialist contacts. Whether or not socioeconomic differences in health care utilisation are based on substitution could not be evaluated extensively with the data in this study. However, one indication could be given which argues against the substitution phenomenon. After controlling for their smaller proportion of GP contacts, the proportion of higher socioeconomic groups with spe-

cialist contact tends to remain slightly higher compared to those with a lower socioeconomic status. This can be understood by the positive association between GP contacts and outpatient specialist contacts: people with a higher frequency of GP contacts also have a higher frequency of specialist contacts (data not shown).

As is shown in this study, the health insurance system can only very partially account for the socioeconomic differences in health care utilisation. Differential health care utilisation by socioeconomic status, however, is of great concern for health care policy for reasons of costs and equity. In the end, from a policy perspective the ultimate question is whether differences in health care utilisation are in fact 'inequities'. Socioeconomic differences will become socioeconomic inequities whenever differential health care utilisation results in differential health outcomes. Research on health outcomes is an important next step in the study of differential utilisation of health services by socioeconomic status.

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Low education, high GP consultation rates: the effect of psychosocial factors

Abstract

To estimate the contribution of psychosocial factors to the increased use of the general practitioner (GP) among those with a lower level of education, the use of GP services was elicited from survey data from 2867 respondents from the Dutch Longitudinal Study on SocioEconomic Differences in the Utilisation of Health Services (LS-SEDUHS). A simple Yes/No format was used. Psychosocial variables included long-term stressful conditions, social support, external locus of control, coping styles and tendency to consult (a measure of people's propensity to go to a doctor when they experience health problems). People with primary education only used the GP services more than people with higher vocational training or university degree (OR 1.87, $P<0.05$*) adjusted for health status and health insurance. Only tendency to consult partially explained this difference (OR: 1.74* $P>0.05$*). Most psychosocial factors do not seem very important in explaining high GP utilisation rates among those with a low socioeconomic status. Alternative explanations are discussed.*

6.1 Introduction

Socioeconomic differences in the use of health care systems has been widely reported.[1-4] Evidence from the Netherlands and the United Kingdom suggests that groups with a lower educational attainment or social class use general practitioner services more than those with a higher educational qualification or those in the higher social class categories, even if the less favourable health status of those with a low socioeconomic status is taken into consideration.[5-8] Furthermore, when potentially important information about health insurance is taken into account, substantial socioeconomic differences remain.[9] The question then arises as to what other factors apart from health status and health insurance might be contributing to the socioeconomic differences in the use of general practitioner services?

In order to study health services utilisation, Andersen formulated a widely used behavioural model describing the use of health services as a function of medical need, and enabling and predisposing characteristics of an individual.[10] The need component reflects the urge to seek medical care because of the individual's objective or subjective health status. The enabling component suggests that people in addition to their medical need, must have the means, e.g. health insurance, to use health care facilities. The predisposing component involves characteristics existing prior to the onset of disease which reflect a person's propensity to use health care services.

One group of predisposing characteristics are psychosocial factors. In order to understand the differences in the pattern of use of general practitioner services among different groups, it is useful therefore to determine the contribution of psychosocial factors. This understanding could be important when targeting interventions, both in order to help patients and perhaps also to find ways of reducing the workload for the general practitioner, especially in deprived areas.

In this paper, we will report the results of a cross-sectional analysis concerning the explanation of differences by level of education in consultation rates with the general practitioner in the Netherlands, controlling for health status and health insurance. We used data from a questionnaire which had elicited a response of approximately 72%. Explanatory variables used were long-term stressful conditions, social support, locus of control, coping styles, and attitudes towards health and health care. We tested the hypothesis that differences in the use of general practitioner services according to education remained after controlling for health status and health insurance and that the differences can be attributed to these psychosocial characteristics.

Our study was carried out in the Netherlands, but its results may have implications for other health systems that share certain characteristics with the Dutch health care system, such as the aim of universal access and the central role of the general practitioner in primary care.

6.2 Data and methods

6.2.1 Study population

We used cross-sectional data from the Longitudinal Study on SocioEconomic Differences in the Utilisation of Health Services (LS-SEDUHS). The LS-SEDUHS is part of the GLOBE study, a longitudinal study on inequalities in health in the Netherlands that began in Spring 1991 with a postal survey. The design and objective of this study have been described elsewhere.[11] The sample of the GLOBE study was based on a cohort of non-institutionalised Dutch nationals aged 15-74 years. The highest and lowest socioeconomic strata were oversampled, as well as people aged 45 years and over. For the LS-SEDUHS, people with an illness were overrepresented to obtain sufficient examples of health care utilisation. Information on chronic diseases from the Spring 1991 questionnaire was used to select persons for the LS-SEDUHS. Eligible were all persons reporting COPD or asthma, cardiac problems, diabetes or severe low back trouble. In addition, a random sample of the remainder of the Spring 1991 respondents was added to include persons without chronic diseases, or health conditions other than those mentioned above. 2867 persons (72.3% of the LS-SEDUHS sample) completed an interview and a self-administered questionnaire. There was no severe selective response according to most sociodemographic characteristics, except for a smaller response from persons aged 15-34. Only a slightly smaller response from those in the lowest educational classes could be detected and no important differences in response according to health status occurred.[7]

6.2.2 Data

Consultation with a general practitioner was measured as consultation (yes or no) on behalf of the respondents themselves in the two months preceding the interview. A variety of illness-dimensions was measured to establish severity of the overrepresented conditions such as a self-perceived health (perceived general health[6] and the Nottingham Health Profile),[12] a checklist of chronic diseases,[6] ADL disabilities,[6] long-term disabilities,[13] and disease-specific questionnaires.[14-17] Variables on type of health insurance (public or private), coverage for general practitioner's services and amount of deductible were included. Table 6.1 contains additional information on the psychosocial factors which were measured by validated

Table 6.1 Psychosocial factors measured in the LS-SEDUHS

Psychosocial factor	No. of items in questionnaire	Answer categories	Range score	No. of categories in regression analysis
Long-term stressful conditions				
3 subscales:				
With respect to disease of others	5	No/yes	0- 5	4
With respect to relationships with others	8	No, some, quite, severe	0-24	6
With respect to situation	5	No, some, quite, severe	0-15	5
Social support				
Get assistance from someone: emotional support	4	No, possibly, certainly	0-20	5
Share feelings with someone: instrumental support	5	Never, sometimes, often	0-25	6
Marital status	1	Married, unmarried, divorced, widowed	n.a.	4
Locus of control				
Statements reflecting sense of control over one's situation	11	Absolutely agree, agree, do not agree/do not disagree, disagree, absolutely disagree	11-55	5
Coping styles				
(Reported) ways to react to problems, 7 subscales:		Seldom or never, sometimes, often, very often or always		
Seeking social support	6		6-24	5
Depressive reaction	7		7-28	5
Comforting cognitions (optimism)	4		4-16	5
Actively dealing with problem (confrontation)	8		8-32	5
Palliative reactions	6		6-24	5
Expressing emotions	3		3-12	5
Avoiding the problem	7		7-28	5
Attitudes towards health and health care				
Tendency to consult: reaction to health problems	14	Do nothing, wait and see, take aspirin or another medicine, visit doctor next day, immediately phone doctor	14-70	5

Dutch questionnaires. Long-term stressful conditions were measured as three different types of problems.[18] Regarding social support, respondents were asked if any of 3 persons they felt close to would help with certain activities (instrumental support), and whether the respondent shared certain feelings with these persons (emotional support).[19] Marital status was also taken as a proxy measure for social support. The locus of control questionnaire measured someone's belief in control over his or her own life.[20] The questionnaire on coping, i.e. the way people deal with difficulties, distinguished between 7 coping styles.[21] Attitude towards health and health care was measured by asking the respondent's reaction in response to certain symptoms (tendency to consult).[22] Finally, the questionnaire contained a number of questions on sociodemographic variables. Education was used as an indicator of socioeconomic status. The original 7 classes of education were recoded into 4 categories. In the explanatory analyses, psychosocial variables were entered as dummy variables according to the number of categories listed in the last column of table 6.1.

6.2.3 Methods

It was hypothesised that the psychosocial factors considered might explain the relationship between educational status and consultation with the general practitioner. Associations between psychosocial characteristics and educational level were demonstrated by ordinary least squares regression, with the score of the psychosocial factor as the dependent variable and education as the independent variable, controlling for age (6 classes) and sex. The overall contribution of education was determined by an F-test of the difference in sum of squares between a model with education and a model without it. Associations between psychosocial factors and general practitioner consultation were determined by logistic regression. Psychosocial variables were each added to a model containing age, sex, and health status. The overall contribution of the psychosocial factor was determined by a chi-square test of the change in reduction in deviance of the logistic model when the factor was included.

Logistic regression was also used to estimate the contribution of each psychosocial factor to the explanation of differences in the use of the general practitioner services according to level of education. General practitioner consultation (yes or no) was the dependent variable, age and sex were confounders. Health status was controlled for by the illness dimensions already mentioned. A basic model containing confounding variables, such as sociodemographic variables, health status measures and health insurance variables, was fitted first. Then each of the psychosocial variables were added to this basic model. The contribution of all psychosocial factors was estimated by adding them simultaneously to the basic model.

A factor explains the educational differential in general practitioner service use, if the odds ratio (OR) of a lower educational group approaches unity, which is the OR of the reference category, when the factor is added to the model. The shift of the OR was tested separately for statistical significance.[23] All statistical analyses were carried out using SPSS-X, version 4.00 under UNIX. Significance was at the 0.05 level unless otherwise stated.

6.3 Results

Results of the associations between education and the explanatory factors are displayed in table 6.2. Because so many associations and overall con-

Table 6.2 Overall associations of psychosocial factors with education, controlling for sociodemographic variables[a]

Factor	No. of categories	Overall contribution to model[b]
Long-term stressful conditions		
With respect to disease of others	4	ns
With respect to relationships with others	6	ns
With respect to situation	5	*
Social support		
Instrumental support	5	ns
Emotional support	6	**
Marital status	4	ns
Locus of control		
External locus of control	5	***
Coping styles		
Seeking social support	5	***
Depressive reaction	5	**
Comforting cognitions (optimism)	5	***
Actively dealing with problem (confrontation)	5	***
Palliative reactions	5	ns
Expressing emotions	5	***
Avoiding the problem	5	***
Attitude towards health and health care		
Tendency to consult	5	***

[a] Model: psychosocial factor = constant + education + age + sex
[b] *F*-test for difference in sum of squares between model with and without education:
ns $P>0.05$
* $P<0.05$
** $P<0.01$
*** $P<0.001$

Table 6.3 Association of psychosocial variables with education: regression coefficients of ordinary least squares regression[a]

	Long-term stressful conditions			*Social support*			*Locus of control*
	With respect to disease of others	With respect to relation-ships with others	With respect to situation	Instrumental	Emotional	Marital status[c]	External locus of control
University	0	0	0	0	0	0	0
Higher vocational, higher general	-0.014 ns	0.027 ns	0.208 ns	1.347 ns	1.167 ns	0.038 ns	1.581 *
Intermediate vocational, low general	0.030 ns	0.048 ns	0.255 ns	1.310 ns	0.827 ns	0.038 ns	4.642 ***
Lower vocational, primary education	0.092 ns	0.080 ns	0.351 *	1.431 ns	-0.320 ns	0.033 ns	7.658 ***

	Coping styles							*Attitude towards health and health care*
	Seeking social support	Depressive reaction	Comforting cognitions (optimism)	Actively dealing with problem (confrontation)	Palliative reactions	Expressing emotions	Avoiding the problem	Tendency to consult[b]
University	0	0	0	0	0	0	0	0
Higher vocational, higher general	-0.517 ns	-0.201 ns	0.587 **	-0.367 ns	0.387 ns	-0.079 ns	-0.273 ns	0.012 ns
Intermediate vocational, low general	-0.688 ns	-0.280 ns	0.880 **	-1.417 **	0.662 ns	-0.044 ns	0.016 ns	-1.699 ns
Lower vocational, primary education	-1.112 **	0.113 ns	0.833 *	-3.037 ***	0.645 ns	-0.399 *	0.940 **	-2.891 **

ns $P>0.05$
* $P<0.05$
** $P<0.01$
*** $P<0.001$

[a] Model: psychosocial variable = constant + education + age (6 categories) + sex
[b] A low coefficient means a higher tendency to consult a doctor
[c] Marital status was dichotomised in unmarried/divorced/widowed (0) and married (1)

tributions of education in table 6.2 were statistically significant, all coefficients of education are displayed in table 6.3. Long-term stress was only statistically significantly more prevalent among the lower educated with respect to situational problems.

Both types of social support did not significantly differ according to educational level, although the overall contribution of education was statistically significant when emotional support was the dependent variable. People with an education below university level more frequently had an external locus of control. Seeking social support, confrontation and showing emotion were less common coping styles in groups below university level, while they had higher scores on comforting cognitions

Table 6.4 Overall associations between psychosocial factors and general practitioner consultation, controlling for sociodemographic and health variables[a]

Factor	No. of categories	Overall contribution to model[b]
Long-term stressful conditions		
With respect to disease of others	4	ns
With respect to relationships with others	6	ns
With respect to situation	5	ns
Social support		
Instrumental support	5	ns
Emotional support	6	ns
Marital status	4	ns
Locus of control		
External locus of control	5	ns
Coping styles		
Seeking social support	5	ns
Depressive reaction	5	ns
Comforting cognitions (optimism)	5	ns
Actively dealing with problem (confrontation)	5	ns
Palliative reactions	5	***
Expressing emotions	5	ns
Avoiding the problem	5	*
Attitude towards health and health care		
Tendency to consult	5	***

[a] Model: utilisation = constant + psychosocial factor + age + sex + health status
[b] Chi-square test for reduction in deviance between model with and without psychosocial factor:
ns $P>0.05$
* $P<0.05$
*** $P<0.001$

(optimism) as a way of coping. Depressive reactions did not show a clear gradient according to educational level. Nevertheless, education significantly contributed to the model. Lower educational level was associated with a higher tendency to consult a doctor.

Table 6.4 demonstrates the relationship between the psychosocial factors and consultation with the general practitioner. ORs are given for those factors that showed a statistically significant association (table 6.5). Only tendency to consult showed a gradient that increases with the score. The coping styles palliative reactions and expressing emotions contributed to general practitioner consultation. Tendency to consult also contributed significantly to the model.

Table 6.6 shows the contribution of each psychosocial factor to the explanation of differences according to educational level in consultations with the general practitioner. Significant differences continued to exist after controlling for long-term stressful conditions, social support and coping

Table 6.5 Associations between psychosocial factors and general practitioner consultation, controlling for sociodemographic and health variables: odds ratios and 95% confidence intervals of factors with significant overall association[a]

Factor	OR [95% CI]
Coping styles	
Palliative reactions	
1 (lowest)	1.00
2	1.06 [0.78-1.43]
3	0.98 [0.73-1.30]
4	1.50 [1.11-2.03]
5 (highest)	1.56 [1.13-2.15]
Avoiding the problem	
1 (lowest)	1.00
2	1.58 [1.16-2.14]
3	1.07 [0.80-1.45]
4	1.16 [0.85-1.57]
5 (highest)	1.19 [0.87-1.65]
Attitude towards health and health care	
Tendency to consult	
1 (lowest)	1.00
2	1.11 [0.66-1.86]
3	1.35 [0.81-2.25]
4	1.74 [1.04-2.91]
5 (highest)	2.58 [1.28-5.18]

[a] Model: utilisation = constant + age + sex + health status

Table 6.6 The contribution of long-term stressful conditions, social support, locus of control, coping styles and attitudes towards health and health care in the explanation of socioeconomic differences in consultations with the general practitioner, controlling for sociodemographic and health variables, and aspects of health insurance

		Base-line model, controlling for health status and health insurance[a]	models including[b]					
			Long-term stressful conditions	Social support	Locus of control	Coping styles	Attitudes towards health and health care	All psychosocial factors
	N	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]
General Practitioner *N*=2466								
University	69	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Higher vocational, higher general	440	1.55 [0.83-2.93]	1.57 [0.83-2.98]	1.57 [0.83-2.96]	1.55 [0.82-2.92]	1.69 [0.89-3.23][§]	1.55 [0.82-2.92]	1.70 [0.89-3.27]
Intermediate vocational, low general	715	1.87 [1.00-3.52]	1.90 [1.01-3.58]	1.90 [1.01-3.57]	1.86 [0.99-3.50]	2.08 [1.09-3.97][§]	1.81 [0.97-3.41][¶]	2.03 [1.05-3.91]
Lower vocational, primary education	1242	1.87 [0.99-3.54]	1.90 [1.00-3.62]	1.87 [0.98-3.55]	1.84 [0.97-3.51]	2.14 [1.11-4.13][¶]	1.73 [0.91-3.29]**	1.96 [1.00-3.84]

[a] Model: utilisation=constant + education + age + sex + health status + health insurance [+education];
[b] Model: utilisation=constant + education + age + sex + health status + health insurance + explanatory factor [+education]

OR shift between base-line model and model with psychosocial factor:
[§] $P<0.20$
[¶] $P<0.10$
* $P<0.05$
** $P<0.01$

since confidence intervals for the lower two educational groups still included one. When locus of control was added, confidence intervals for the lowest two educational groups included one; the shift in OR was not statistically significant. When attitude towards health and health care (tendency to consult) is added, differences according to education were reduced (adjusted OR for those with lower vocational or primary education: 1.73 [0.91-3.29]) and the shift in OR was significant ($P<0.01$). Inclusion of all psychosocial factors simultaneously, did not significantly reduce the ORs in the lowest two educational classes. On the contrary, the adjusted OR of those with lower vocational or primary education changed from 1.87 [0.99-3.54] to 1.96 [1.00-3.84].

6.4 Discussion

In this study we tested whether psychosocial factors contributed to explaining the higher general practitioner consultation rates among those in the lower socioeconomic strata, controlling for health status and health insurance. Analyses were carried out on cross-sectional Dutch survey data of 2867 mainly chronically ill persons. Tendency to consult was the only psychosocial factor that explained the socioeconomic differential partially. Therefore our hypothesis has to be rejected since the combined psychosocial variables explored did not account for the higher use of general practitioner services among those who have not attained a university level of education.

Some limitations in the study design should be considered. The population of the present study was drawn from another study. Both may have been subject to nonresponse bias which may therefore have affected the results.

Since most psychosocial factors did not explain socioeconomic differences in the use of general practitioner services, underestimation of the contribution of the psychosocial factors may be the most likely form of such bias. This would occur if the association of education with psychosocial factors, or the association between general practitioner consultations and psychosocial factors were much stronger among nonrespondents than among respondents. Such a nonresponse pattern requires rather complex assumptions about the characteristics of the nonrespondents. This cannot be evaluated directly, but nonrespondents in the LS-SEDUHS do not differ much from respondents according to a variety of sociodemographic and health characteristics,[7] suggesting that nonrespondents resemble respondents according to other characteristics also.

The majority of subjects were selected because they suffered from one or more chronic conditions. Results therefore cannot be readily generalised to

the Dutch population. However, the reason for general practitioner utilisation in this study is not (only) linked to the overrepresented conditions and socioeconomic differences are similar to those found in the Netherlands Health Interview Survey which is nationally representative.[6]

Another limitation of the study was the cross-sectional nature of the analysis. Whether a high tendency to consult explains some of the educational differences in general practitioner consultations or whether general practitioner consultation 'causes' a different attitude towards consulting remains unknown without longitudinal analysis. However, for an impression of the importance of psychosocial factors in differential use of the general practitioner services according to education, a cross-sectional design is appropriate.

The yes/no format to measure the use of general practitioner services may be considered too simple but nevertheless provides a useful starting point for an explorative study. Analysis of consultation frequency would be an important next step.

The marginal explanatory contribution of most psychosocial variables is explained by a weak association between these variables and general practitioner consultation and not by their weak association with educational level. According to Mechanic, weak associations between health care utilisation and psychosocial characteristics may be due to controlling for health status with measures of perceived health. The effects of these measures on health care utilisation may be contaminated with the effects of psychosocial determinants.[24] However, a repetition of our analyses, excluding perceived general health and the Nottingham Health Profile, yielded results very similar to the ones reported here (results not shown), therefore not lending support to the idea of contamination. Weak associations between health care utilisation and psychosocial characteristics may also be due to the measurement of these variables. Not all relevant psychosocial stressors may have been measured. Coping and locus of control may well be context-dependent[25] and because the items of the scales refer to general situations, they may not necessarily be related to behaviour associated with use of general practitioner services. Some support for this hypothesis is the significant contribution of the only context-specific variable in this study i.e., tendency to consult a doctor.

The small influence of some psychosocial variables on general practitioner use does not mean that psychosocial factors are irrelevant in general practice. It may mean that these factors mainly influence health care utilisation through health problems. This is supported by literature reporting that reasons for appointments exclusively for psychosocial problems are a relatively small part of consultations in general practice.[26]

Also, more complex mechanisms concerning psychosocial factors, analogous to the stress buffer hypothesis may explain the socioeconomic gradient in consultation with the general practitioner. According to this hypothesis, a positive association between social support and well-being may only be present in the case of stressful events.[27] Analogously, psychosocial factors may only influence health services use in the presence of health problems. Such hypotheses should be tested in further studies.

The explanation for the utilisation differences according to education that remain after all psychosocial factors have been taken into account may be due to entirely different factors. All health status measures used in this study controlled for health status relating to longstanding health problems. While this may be adequate, it should be pointed out that a substantial proportion of the complaints presented in general practice concern acute and/or relatively minor health problems. These types of health conditions are not incorporated in the measures used in the present study. Minor ailments may be more prevalent among people with a low socioeconomic status.[8]

Interaction between doctor and patient may also play a role. Expectations of the general practitioner may differ according to socioeconomic status. Furthermore, communication between patient and doctor may differ across social strata. An encounter with the doctor may be perceived as less satisfying by patients with a low socioeconomic status than for patients in higher socioeconomic strata. This might result in more consultations per problem or, alternatively, a higher chance to consult the doctor.

The high workload of general practitioners involving socioeconomically disadvantaged patients is unlikely to be predominantly explained by an unequal distribution of unfavourable psychosocial circumstances among those who are educationally disadvantaged. Therefore interventions which specifically target psychosocial factors such as those included in this study cannot be expected to significantly decrease the high rates of general practitioner use among those persons with a low socioeconomic status.

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Part III

The course of health status among chronically ill persons: differentials according to level of education

Abstract

This paper describes socioeconomic differences in the time course of several health indicators, encompassing perceived health and disabilities, among a population sample of persons reporting one or more chronic conditions. Data, covering the period 1991-1993, were obtained from a Dutch follow-up study. Educational differences in the course of health status were estimated by ordinary least squares regression. The course of almost all health status measures was statistically significantly less favourable ($P<0.05$) for those with a low educational level compared to those with higher vocational training or a university degree, adjusting for age, sex and marital status. After additional adjustment for health status in 1991, significant differences remained for perceived general health, long-term disabilities and two subscales of the Nottingham Health Profile. These findings imply that socioeconomic differences in prevalence of health problems are not only attributable to differences in incidence of diseases by socioeconomic status, but also to a differential course of existing health problems. Implications for health care delivery are discussed.

7.1 Introduction

Chronic diseases develop differently between groups of people. One of the characteristics which are associated with a differential course of chronic disease is socioeconomic status. Survival studies on cancer,[1] ischaemic heart disease,[2] and asthma[3] demonstrate a lower survival among people with a low socioeconomic status than among people high in the social hierarchy. These survival studies suggest that health status develops more unfavourably among sick people when their socioeconomic status is lower. Indeed, in addition to incidence, the differential course of chronic disease by socioeconomic status may also contribute to the explanation of socioeconomic differences in the prevalence of health problems.

With the exception of mortality and survival, the course of chronic disease in different socioeconomic groups has received remarkably little attention. If "more people live with chronic conditions than die from them",[4] differential development of the burden of disease across social groups is relevant for medical care: the types of health problems involved and the socioeconomic groups where health declines fastest or recovery is slowest should be known to adequately plan health care delivery and manage patient care.

In this article we report differences according to level of education in the course of several aspects of health status over the period 1991-1993 among a Dutch population sample of persons who reported one or more chronic conditions. We shall describe differences according to educational level in the course of health status, operationalised as the mean change per educational group. As an unfavourable course of health status is more likely with a history of health problems (comorbidity, for instance), and as such a history will be unevenly distributed among socioeconomic groups, health status at the beginning of the study may be an important predictor of its very course. We will therefore also take this factor into account when studying socioeconomic differentials in the course of health status.

7.2 Data and methods

7.2.1 Study population

Source of the data is the Longitudinal Study on SocioEconomic Differences in the Utilisation of Health Services (LS-SEDUHS). The LS-SEDUHS is part of the GLOBE study, a longitudinal study that started in 1991 in the southeast of the Netherlands, aimed at explaining socioeconomic inequalities in health. The design and objective of the GLOBE study have been described in detail elsewhere.[5] The cohort of the GLOBE study is based on a sample of non-institutionalised Dutch nationals aged 15-74 years. The highest and lowest socioeconomic strata were oversampled, as well as people aged 45 years and

over. Data collection started in the Spring of 1991 with a mailed questionnaire about health, health behaviour and various living conditions.

Because one of the aims of the LS-SEDUHS was to study health services utilisation, it was desirable to overrepresent people with an illness in the study sample. Information on chronic diseases from the Spring 1991 GLOBE data collection was used to select all persons reporting one or more of the following chronic conditions: asthma or chronic obstructive pulmonary disease (COPD), severe heart disease or myocardial infarction, diabetes, severe

Table 7.1 Population characteristics in 1993 (according to 1991 data)*

	N	(%)
Age		
15-24	70	(3.6)
25-34	116	(6.0)
35-44	202	(10.5)
45-54	535	(27.9)
55-64	602	(31.3)
65+	396	(20.6)
Sex		
Male	981	(51.1)
Female	940	(48.9)
Marital status		
Married	1450	(76.3)
Unmarried	196	(10.3)
Divorced	133	(7.0)
Widowed	122	(6.4)
Education		
University, higher vocational	292	(15.5)
Higher secondary, intermediate vocational	382	(20.3)
Lower secondary, lower vocational	763	(40.5)
Primary	445	(23.6)
Chronic condition*		
Asthma/COPD	586	(30.5)
Heart disease	921	(47.9)
Diabetes	195	(10.2)
Low back trouble	921	(47.9)
Either of the above four	1659	(86.4)
Other conditions only (none of the above four)	262	(13.6)
Total	1921	(100.0)

* Because of missing values not all figures sum up to totals in the last row
** Because of comorbidity, the sum of cases of the four overrepresented conditions exceeds the total number of respondents

low back trouble. These diseases were chosen because they constitute a considerable part of the burden of disease, socioeconomic differences in health status can be expected, and validated questionnaires for these conditions exist. A random sample of people with other chronic conditions than the four already mentioned was also drawn.

Participants completed an interview and a self-administered questionnaire at baseline (1991) and were followed up yearly with a mailed questionnaire. Total response was 72.3% (n=2867). Response at follow-up in 1993 was 79% of the response in 1991. All respondents to the interview, regardless of their answers to the checklist, had to answer diagnostic questionnaires on asthma or COPD, heart disease, diabetes and severe low back trouble. Eligible for the analyses reported here were all respondents who reported any symptoms listed in the diagnostic questionnaires in 1991 or who reported other chronic condition(s) in the checklist, with completed questionnaires in 1991 and 1993 (n=1921). Table 7.1 shows the composition of the study group in 1993 by age, sex, marital status, education and chronic condition.

7.2.2 Data

To study the course of health status a wide variety of health dimensions was measured. Table 7.2 contains more information about these measures. Self-perceived health was operationalised through a single question about the respondent's health in general (perceived general health)[6] and the Nottingham Health Profile.[7] More 'objective' aspects of health status were covered by a

Table 7.2 Health status measures used as outcome measures in the study

Health status measure	Range	Meaning
Perceived general health	1-5	1=very good 2=good 3=moderate 4=sometimes good, sometimes bad 5=bad
ADL disabilities	0-10	Number of activities of daily living done with 'some difficulty' or more
OECD long-term disability indicator	0-8	Number of long-term disabilities done with 'great difficulty' or more
NHP-M (mobility)	0-8	Number of complaints answered with 'yes'
NHP-P (pain)	0-8	Number of complaints answered with 'yes'
NHP-E (energy)	0-3	Number of complaints answered with 'yes'
NHP-S (sleep)	0-5	Number of complaints answered with 'yes'
NHP-O (social isolation)	0-5	Number of complaints answered with 'yes'
NHP-T (emotional reactions)	0-9	Number of complaints answered with 'yes'

questionnaire about disabilities in Activities of Daily Life (ADL)[6] and the OECD indicator of long-term disabilities.[8] Health status measures were also used as independent variables (see section 'analysis: statistical models'). Also data about the year of onset of the four overrepresented conditions were collected.

The diagnostic questionnaires and a checklist of 24 chronic conditions[6] were used in applying the inclusion criteria. The diagnostic questionnaires were also used to establish the severity of the disease in case the respondent reported symptoms of one of the overrepresented chronic conditions.[9-12] Criteria for diagnosis and severity of these conditions are listed in the appendix.

Finally, the questionnaire contained a number of questions on sociodemographic variables. Education will be used as the indicator for socioeconomic status.

7.2.3 Analysis: general considerations

In statistical analyses of the change in health status over time, 'bottom' and 'ceiling' effects have to be accounted for.[13] Those who have a top score on a particular measure cannot get better, whereas those who have the lowest score cannot get worse. Because people were selected on their having a chronic condition, this phenomenon, commonly known as regression to the mean, is likely to play a role particularly for the extreme scores of the health status measures. Moreover, top and lowest scorers will be unevenly distributed by education, so the original value of the health measure of interest must also be considered as a confounder in this case, and has to be included in any analysis studying the course of health status by education.

The obvious way to model change in health status over time is to take the difference of a health measure score in 1991 (h_1) and 1993 (h_2) as the dependent variable. Thus, considering h_1 is also a confounder, the model would be:

$$h_2-h_1=c_1+\beta_1 h_1+\ldots+\beta_z x_z \qquad (1)$$

Because there are some statistical objections to the use of difference scores[13] and since h_1 appears on both sides of the equal sign, the equation is mathematically, as well as statistically equivalent to:

$$h_2=c_1+(\beta_1+1)h_1+\ldots+\beta_z x_z \qquad (2)$$

which can be rewritten as:

$$h_2=c_1+\beta_2 h_1+\ldots+\beta_z x_z \qquad (3)$$

The last model will be the model used in regression analyses.

7.2.4 Analysis: statistical models

Three models were fitted. Apart from b_1, the basic model also included the sociodemographic confounders age, sex and marital status. Two other models were fitted hierarchically after the first model. To estimate the contribution of disease severity, year of onset of the disease and comorbidity to a differential course by education, a second model included the severity of asthma or COPD, heart disease, diabetes and low back trouble as constructed with the diagnostic questionnaires, the year of onset of these diseases, and presence or absence of all other chronic conditions about which information was available. To estimate the contribution of other aspects of health status, a third model contained all remaining health status measures which were included in the questionnaire. Education was added to all three models as a last step.

Multiple regression analysis was done on the subset of eligible respondents with complete data on all variables. Ordinary least squares regression was used to estimate differences by education, controlling for several confounding factors. Outcome variables were each of the (continuous) scores on the general health status measures listed in table 7.2. All independent variables – except the 1991 score of the variable used as outcome measure – were entered as categorical variables. The original 7 classes of education (primary school, lower vocational training, lower secondary education, intermediate vocational training, higher secondary school, higher vocational training and university) were recoded into 4 categories. Age was entered in 6 10-year classes, marital status was divided in the classes married, unmarried, divorced and widowed. Asthma or COPD and heart disease were coded in 6 categories, diabetes in 3 categories and low back trouble in 7 categories. All other chronic conditions were entered as separate dichotomous variables (present/not present). Perceived general health was coded in 5 categories and the Nottingham Health Profile subscale E (energy) was coded in 3 categories; all other health status measures were coded in 4 categories, approximately with the same number of respondents in each category. Differences by level of education are calculated as regressioncoefficients of the educational group compared to the reference category with the highest educational attainment (university/higher vocational training, coefficient=0). The overall effect of education was tested with an F-test for the difference between a regression model with and without education.

Not all assumptions for ordinary least squares regression were met; distributions of most health status measures were not normal, but transformation of the outcome variables did not improve the fit of the model to the data markedly. However, when large datasets are used ordinary least squares regression is considered fairly robust and has been used before with, for instance, disability scores with a limited number of values.[14,15] Logistic regression has

Table 7.3 Mean scores health measures 1991-1993, total group and by educational level[a]

Educational level	1991[b]	1993[b]	Overall difference 1991-1993[cd]	Difference 1991-1993 stratified by 1991 score[d]		
Perceived General Health				*Score 1991 1-2*	*Score 1991 3*	*Score 1991 4-5*
	N=1765			*N*=978	*N*=458	*N*=329
University, higher vocational	2.24	2.20	0.04	-0.12	0.36	0.71
Higher secondary, intermediate vocational	2.40	2.42	-0.02	-0.24	0.11	0.93
Lower secondary, lower vocational	2.60	2.62	-0.01	-0.24	0.05	0.54
Primary education	2.93	2.92	0.01	-0.35	0.01	0.45
Total	2.58	2.58	0.00	-0.23	0.09	0.57
NHP (all subscales)				*Score 1991 0*	*Score 1991 1-10*	*Score 1991 11-38*
	N=1834			*N*= 639	*N*= 970	*N*= 225
University, higher vocational	1.98	1.99	-0.02	-0.55	0.32	4.50
Higher secondary, intermediate vocational	3.11	3.39	-0.27	-0.65	-0.44	2.92
Lower secondary, lower vocational	4.29	4.35	-0.06	-0.87	-0.18	2.49
Primary education	5.72	5.61	0.11	-0.90	-0.75	3.34
Total	4.02	4.08	-0.06	-0.76	-0.29	2.96
ADL-disabilities				*Score 1991 0*	*Score 1991 1-4*	*Score 1991 5-10*
	N=1860			*N*=1151	*N*= 546	*N*= 163
University, higher vocational	0.54	0.64	-0.09	-0.21	0.04	2.11
Higher secondary, intermediate vocational	0.90	1.15	-0.25	-0.43	-0.04	0.73
Lower secondary, lower vocational	1.16	1.41	-0.25	-0.42	-0.23	0.95
Primary education	1.75	2.03	-0.29	-0.56	-0.38	0.83
Total	1.15	1.38	-0.23	-0.41	-0.21	0.93
OECD long-term disability indicator				*Score 1991 0*	*Score 1991 1-2*	*Score 1991 3-8*
	N=1876			*N*=1342	*N*= 434	*N*= 100
University, higher vocational	0.21	0.12	0.09	-0.05	0.69	2.00
Higher secondary, intermediate vocational	0.31	0.27	0.04	-0.10	0.55	0.50
Lower secondary, lower vocational	0.47	0.40	0.07	-0.14	0.46	1.24
Primary education	0.81	0.70	0.11	-0.24	0.47	0.90
Total	0.48	0.40	0.08	-0.13	0.50	1.03

[a] Respondents with valid answers on education and health status measure in 1991 and 1993
[b] Higher scores mean less good health
[c] Inconsistencies with a subtraction of the previous two columns may exist because of rounding
[d] 1993 scores are subtracted from 1991 scores, thus lower values mean a less favourable course

the advantage of requiring few assumptions, but the disadvantage that it needs dichotomous outcome variables. This results in information loss because only one transition in health status can be modelled. As we wanted to model the mean change in health status by education, least squares regression was the option that most closely approached our goals.

7.3 Results

Table 7.3 shows the mean difference of each health status measure between 1991 and 1993, for the total study population and stratified by health-score in 1991. The items of the NHP were summarised in one score. Health status hardly seems to change between 1991 and 1993 when crude figures for the whole group are considered. Although the individual difference in perceived general health-score varies between +4 (maximum improvement between 1991 and 1993) and -4 (maximum deterioration between 1991 and 1993), the mean difference is virtually 0 for all educational levels, and one might conclude there is no difference in course of perceived general health by level of education. When the figures are stratified according to perceived general health in 1991, which implies that one accounts for regression to the mean, educational differences become more marked. Perceived general health develops more unfavourably in those with the lowest educational level compared to those who have the highest educational level; this means more deterioration in those with low education who were in good health in 1991, and less improvement in those with low education who were in bad health in 1991. Despite some inconsistencies, this is the general pattern for most stratified outcome measures.

Table 7.4 shows the results of ordinary least squares regression, modelling the course of health status from 1991-1993, controlling for the confounders age, sex and score of health status in 1991 (model 1), severity, year of onset and comorbidity (model 2) and other aspects of health status (model 3).

A value of 0.27 of perceived general health in those with primary education means that this group has a mean score in 1993 that is 0.27 points higher on a scale from 1 (best)-5 (worst) than the highest group, taking into account differences in age, sex, marital status and 1991 score on perceived general health. Coefficients of all other scales can be interpreted as the mean change in number of complaints, or disabilities. For example, the figure of the OECD long-term disability indicator in table 7.4, model 1 may be interpreted as follows: those with primary school report 0.19 more disabilities (out of 8) after two years than those in the reference category. Or, alternatively, one might say that a group of 100 persons with primary education has developed 19 more long-term disabilities from 1991-1993 than the same group with higher vocational training or university, taking into account differences in

Table 7.4 Differences in the course of health status between 1991 and 1993, by educational level

Educational level	Relative difference		
	model 1[a]	model 2[a]	model 3[a]
Perceived General Health	*N*=1480		
University, higher vocational (= ref.)	0	0	0
Higher secondary, intermediate vocational	0.17 [0.05-0.28]	0.19 [0.07-0.30]	0.14 [0.03-0.26]
Lower secondary, lower vocational	0.19 [0.08-0.29]	0.20 [0.09-0.30]	0.16 [0.05-0.26]
Primary education	0.27 [0.15-0.39]	0.28 [0.15-0.40]	0.21 [0.09-0.33]
Overall test education[b]	6.52**	7.03**	4.37**
NHP-M (mobility)	*N*=1531		
University, higher vocational (= ref.)	0	0	0
Higher secondary, intermediate vocational	0.09 [-0.09-0.28]	0.13 [-0.05-0.31]	0.10 [-0.07-0.27]
Lower secondary, lower vocational	0.08 [-0.09-0.24]	0.06 [-0.10-0.23]	0.03 [-0.13-0.19]
Primary education	0.10 [-0.08-0.27]	0.12 [-0.07-0.30]	0.02 [-0.16-0.20]
Overall test education[b]	0.48	0.89	0.51
NHP-P (pain)	*N*=1530		
University, higher vocational (= ref.)	0	0	0
Higher secondary, intermediate vocational	0.17 [-0.07-0.41]	0.23 [-0.01-0.47]	0.19 [-0.05-0.43]
Lower secondary, lower vocational	0.10 [-0.13-0.32]	0.10 [-0.12-0.32]	0.08 [-0.14-0.30]
Primary education	0.10 [-0.15-0.35]	0.12 [-0.12-0.37]	0.06 [-0.19-0.31]
Overall test education[b]	0.63	1.23	0.92
NHP-E (energy)	*N*=1528		
University, higher vocational (= ref.)	0	0	0
Higher secondary, intermediate vocational	0.07 [-0.03-0.18]	0.08 [-0.02-0.19]	0.05 [-0.05-0.15]
Lower secondary, lower vocational	0.09 [0.00-0.19]	0.07 [-0.02-0.17]	0.03 [-0.06-0.12]
Primary education	0.15 [0.04-0.27]	0.11 [0.01-0.22]	0.05 [-0.06-0.15]
Overall test education[b]	2.49	1.52	0.40
NHP-S (sleep)	*N*=1529		
University, higher vocational (= ref.)	0	0	0
Higher secondary, intermediate vocational	0.11 [-0.03-0.26]	0.11 [-0.03-0.25]	0.09 [-0.05-0.23]
Lower secondary, lower vocational	0.18 [0.04-0.31]	0.14 [0.01-0.27]	0.10 [-0.03-0.23]
Primary education	0.18 [0.03-0.33]	0.16 [0.01-0.31]	0.11 [-0.03-0.26]
Overall test education[b]	2.59	1.86	0.94

Table 7.4 (continued)

Educational level	Relative difference		
	model 1[a]	model 2[a]	model 3[a]
NHP-O (social isolation)	*N*=1527		
University, higher vocational (= ref.)	0	0	0
Higher secondary, intermediate vocational	0.06 [-0.03-0.15]	0.05 [-0.03-0.14]	0.05 [-0.04-0.14]
Lower secondary, lower vocational	0.10 [0.01-0.18]	0.07 [-0.01-0.16]	0.06 [-0.02-0.15]
Primary education	0.16 [0.07-0.25]	0.14 [0.04-0.23]	0.10 [0.00-0.19]
Overall test education[b]	3.92**	2.81*	1.43
NHP-T (emotional reaction)	*N*=1540		
University, higher vocational (= ref.)	0	0	0
Higher secondary, intermediate vocational	0.15 [-0.04-0.34]	0.12 [-0.07-0.31]	0.08 [-0.11-0.26]
Lower secondary, lower vocational	0.26 [0.09-0.43]	0.23 [0.06-0.40]	0.18 [0.01-0.35]
Primary education	0.34 [0.15-0.53]	0.29 [0.10-0.49]	0.18 [-0.02-0.37]
Overall test education[b]	4.44**	3.45*	1.65
OECD long-term disability indicator	*N*=1535		
University, higher vocational (= ref.)	0	0	0
Higher secondary, intermediate vocational	0.10 [0.00-0.20]	0.10 [0.00-0.21]	0.06 [-0.04-0.16]
Lower secondary, lower vocational	0.12 [0.02-0.21]	0.11 [0.02-0.21]	0.06 [-0.03-0.15]
Primary education	0.19 [0.08-0.29]	0.19 [0.09-0.30]	0.16 [0.06-0.26]
Overall test education[b]	4.16**	4.26**	3.28*
ADL-disabilities	*N*=1533		
University, higher vocational (= ref.)	0	0	0
Higher secondary, intermediate vocational	0.19 [-0.06-0.45]	0.24 [-0.01-0.49]	0.19 [-0.05-0.43]
Lower secondary, lower vocational	0.22 [-0.02-0.46]	0.16 [-0.07-0.39]	0.10 [-0.12-0.32]
Primary education	0.30 [0.03-0.56]	0.27 [0.01-0.54]	0.22 [-0.04-0.47]
Overall test education[b]	1.72	1.74	1.28

[a] Model 1: health status measure 1993 = constant + health status measure 1991 + education + age + sex + marital status
Model 2: health status measure 1993 = model 1 + severity of asthma/COPD, heart disease, diabetes, low back trouble + year of onset of asthma/COPD, heart disease, diabetes, low back trouble + other chronic diseases
Model 3: health status measure 1993 = model 2 + all other health status measures

[b] Overall test education: significance of *F*-test of adding education to the regressionmodel, * $P<0.05$ ** $P<0.01$

age, sex, marital status and score on the OECD longterm disability indicator in 1991.

Most health status measures show a differential course by education; for all health status measures except NHP-subscales M (mobility) and P (pain), the course of health status in the lowest educational group is significantly more unfavourable than in the highest category.

This pattern does not fundamentally change when severity and year of onset of asthma or COPD, heart disease, diabetes and severe low back trouble are added together with other chronic conditions (table 7.4, model 2).

When all other general health status measures are entered (table 7.4, model 3), differences diminish. The coefficient of perceived general health, the OECD disability indicator and the NHP dimension social isolation is statistically significant in those with primary school. The coefficient of emotional reaction (NHP-T) is statistically significant in those with lower secondary school or lower vocational training. Perceived general health and the OECD disability indicator have statistically significant overall contributions of education.

7.4 Discussion

In a chronically ill population we have demonstrated a more unfavourable course of several aspects of general health status over a two-year period in those with a lower educational attainment compared to a reference category of respondents with university level or higher vocational training, while controlling for age, sex and marital status. Of four overrepresented chronic conditions – asthma or COPD, heart disease, diabetes and severe low back trouble – data about severity and year of onset were available. Neither differences in comorbidity at the beginning of the study in 1991, nor the duration of the four overrepresented conditions, nor the severity of these conditions in 1991 account for the differential course of health status by education. Although other aspects of health status explain part of the remaining differences, statistically significant differences remain for perceived general health, the OECD disability indicator and the NHP subscales O (emotional reaction) and T (social isolation); for the latter, the difference was only significant in the group with the second lowest educational level.

Some limitations concerning the study design and analyses that were carried out have to be considered. Loss to follow-up may have biased results. Of these, mortality and nonresponse are the most important; attrition due to failure to locate the respondent is only 0.7% in this study. Mortality was higher in those with a low education. Nonresponse was greater in the groups with low education and in groups reporting health problems.[16]

Among nonrespondents in 1993, differences in health status according to education in 1991 were larger than among respondents in 1993 as table 7.5 shows. Because health status in 1991 is a good predictor for the changes in health status between 1991 and 1993, it is likely that socioeconomic differences in the course of health status were underestimated in our study. As we still find statistically significant socioeconomic differences, differential response by health status and education leaves the key message – an unfavourable course of health status in chronically ill people is related to low education – unchanged.

The data are entirely based on survey data about health i.e. on information provided by the respondent. Differential course of health status by educational level might be due to the subjective nature of the data. However, this would imply that the propensity to report health problems develops differently over a two-year period among respondents with a low and a high level of education. It is hard to think of a plausible mechanism behind such a differential development in self-report of health problems. Moreover, the only measure not based on self-reports, mortality, also differs according to level of education in this study.[16]

Results may be biased because assumptions for ordinary least squares regression are not entirely met. To check the results obtained from ordinary least squares regression, we performed logistic regression with outcome measures dichotomised as deterioration *versus* no deterioration/no improvement. This yielded results equivalent to those of ordinary least squares regression (results not shown). Controlling for the confounders age, sex and

Table 7.5 Differences according to level of education in perceived general health in 1991 among nonrespondents in 1993 and among those who responded in 1991 and 1993[a]

	Respondents in 1991 and 1993		Nonrespondents in 1993			
Educational level	*N*	Perceived general health in 1991	*N*	Perceived general health in 1991	*P* value *t*-test	*P* value *F*-test[b]
University, higher vocational	288	2.26	55	2.24	0.86	
Higher secondary, intermediate vocational	372	2.40	85	2.63	<0.05	
Lower secondary, lower vocational	748	2.62	172	2.87	<0.01	
Primary education	430	2.93	173	3.29	<0.01	
Total	1838	2.59	485	2.91	<0.01	<0.01

[a] Respondents with valid answers on education and perceived general health in 1991
[b] For overall difference between respondents in 1991/1993 and nonrespondents in 1993

score of health status in 1991, differences by education were largest, and controlling for severity, year of onset and comorbidity reduced differences moderately. Taking into account other aspects of health status reduced educational differences markedly, but these differences remained significant for perceived general health, the social isolation subscale of the NHP (NHP-O) and the OECD disability indicator. Only the statistically significant difference of the group with lower vocational or lower secondary school in the course of the NHP-T subscale found with ordinary least squares regression, could not be reproduced with logistic regression.

In general, differences in comorbidity (in terms of chronic diseases), time of onset of the disease or severity of the disease do not contribute very much to the differential course of health status according to education as they probably measure a different concept of health status than the other health status measures.

Results controlling for all aspects of health status at baseline may have several interpretations. A less favourable course of health status among those with a low educational level may be due to the less favourable starting point in terms of health than the highly educated. Health status may develop unfavourably because two disease processes exert a cumulative influence on the performance of one organ or organsystem, causing accelerated deterioration mirrored by some health status measure. Other explanations may also apply. The course of a certain aspect of health status may be causally predicted by another health status measure, because certain disabilities (measured by one indicator) are preceded by certain complaints (measured by another indicator). For instance, ADL disabilities due to exercise intolerance in obstructive lung disease may be preceded by periods of prolonged cough measured at baseline. In the latter case correction for base-line health status may result in overcorrection, as one corrects for the same disease process. Including measures of health status in 1991 may also result in overcorrection because differences in health at the beginning of the study were themselves partly the result of a socioeconomic difference in the course of health status during the period before 1991. Therefore, controlling for health status in 1991 also means controlling for the difference in the course of health status by education before 1991, and hence differences in the period 1991-1993 may be substantially underestimated. One may not need to control for base-line health in all situations; in a descriptive sense, differences in the course of health status according to education are also adequately reflected in model 1 in table 7.4, which includes only sociodemographic confounders.

Despite the possibility of overcorrection, health status in 1991 cannot always account for the differences in course of health status. This implies that those with primary education experience a more unfavourable course of their health status than those with university or higher vocational training

even if differences in many aspects of health status at the beginning of the study period are accounted for. This is true for perceived general health as well as for long-term disabilities. Other factors apart from health status in 1991 potentially explain the differential course of health status by education. These factors may be related to health care, or to behavioural (life-style) factors, structural or environmental factors or psychosocial circumstances.[5] Most of these factors will influence health status only in the long term. If they are to be determinants of socioeconomic differences in course of health status, their influence must be large enough to make contributions in a two-year period plausible, although determinants need not necessarily act during that period; they may have exerted their influence already in the past.

Although access to the health service in general is equitable in the Netherlands, services like outpatient specialist care are used less by those with a low education than by people with a high education when health status is controlled for, also in this predominantly chronically ill population.[17] Differential utilisation of health services in chronically ill people may contribute to the explanation of socioeconomic differences in the course of health problems. Studies of well-defined populations suggest that health care can contribute to (an improvement of) socioeconomic health differences.[18-20] An approach with generic health status measures and generic measures of health service use is not likely to demonstrate an effect of health care on outcomes. Some of the generic health status measures used in this paper may be susceptible to health care influences while others may represent a domain of health on which health care has little impact. For instance, health care is unlikely to have a large impact on the course of the NHP dimensions social isolation and emotional reaction, and in this case the potential to explain socioeconomic differences is small.

Behavioural factors reported to influence mortality or survival in the overrepresented chronic diseases are likely to be important as explanatory factors in analyses of their course. Smoking, which has been demonstrated to differ by socioeconomic status,[6] may speed up pathophysiological changes occurring in chronic diseases,[3] leading to more disabilities in groups with a low socioeconomic status. Exercise has been reported to have a beneficial effect on the course of obstructive pulmonary disease and diabetes mellitus,[21] so lack of exercise in patients with a low socioeconomic status potentially reduces possibilities for optimal recovery. Examples of structural or environmental factors that may influence the course of health status are occupational circumstances and housing conditions, both of which also differ by socioeconomic status.[22,23] Both conditions may have a direct adverse effect on the course of health problems. A psychosocial factor that is potentially explanatory is psychosocial stress, of which higher levels are present among the socially disadvantaged,[24] which increases mortality[25] and which

also may predispose to a higher incidence of complications of disease and hence influence the course of health status.

Our findings have important implications for policies to reduce health inequalities. These inequalities not only arise because of a higher incidence of certain diseases in societies' lower strata but also because health status develops unfavourably among the chronically ill in such strata. This implies that policies aiming to reduce inequalities in health should not only be carried out in terms of preventive actions targeted to lower socioeconomic groups in the general population, but should also specifically reach out to chronically ill groups with a low socioeconomic status. Further research is required into the determinants of socioeconomic differences in course of health status.

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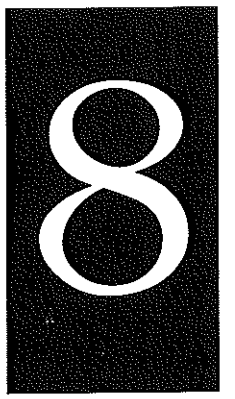
The care and course of diabetes: differences according to level of education



Abstract

The objective of this study was to describe socioeconomic differences in the utilisation of health services among diabetics and to link these differences with socioeconomic differences in the course of diabetes. A two-year follow-up study (1991-1993) was done with data from a population-based survey in the Netherlands (city of Eindhoven and surroundings). Those reporting diabetes who also reported treatment with a diet, oral antidiabetics, or insulin and who completed questionnaires in the years 1991 and 1993 (n=173) were included in the analysis. Main outcome measures were (1) the odds ratios according to level of education of utilisation of eleven types of service or medical checks in 1991, relevant for diabetes and (2) odds ratios according to level of education of the difference between 1991 and 1993 in the prevalence of symptoms of diabetic complications. Controlling for severity of diabetes, contact rates with the general practitioner were significantly (P<0.05) higher among those with primary education, compared to those with an educational level of intermediate vocational training or higher. Rates of checks by a specialist, influenza vaccination, and many other checks were statistically significantly lower among those with a low educational level, although the group with the lowest educational level did not always show the lowest rates. Of symptoms indicating diabetes complications the prevalence of pain in the legs and visual impairments developed more unfavourably among those with primary education. The prevalence of all symptoms together developed more unfavourably among those with primary education. A direct contribution of uptake of checks and services to the differential course of diabetes by education could not be demonstrated. Diabetics with a low level of education have lower utilisation rates of checks and services relevant for diabetes care, and a worse outcome in terms of complications.

8.1 Introduction

Diabetes is no exception to the rule that socioeconomic status and health are inversely related. The incidence of non-insulin dependent diabetes mellitus (NIDDM) is higher in groups with a low socioeconomic status,[1,2] and total diabetes prevalence (of which 80-90% may be considered NIDDM)[3] is higher in those groups.[4-9] Reports with regard to the direction of the association between socioeconomic status and the incidence of insulin dependent diabetes mellitus (IDDM) conflict: a higher incidence in groups with a high social class has been reported,[10-12] some report no association between socioeconomic status and IDDM incidence,[2,13] while others demonstrated a higher incidence among the less well-off.[14,15] There is recent evidence of shorter survival in IDDM patients with a low socioeconomic status.[16]

Patients with either type of diabetes and a low socioeconomic status are at higher risk for complications, which is the focus of this paper. The risk for coronary artery disease is higher in NIDDM patients.[17,18] Higher prevalences of proliferative retinopathy and macroalbuminuria have been demonstrated in IDDM populations.[19,20] This may, at least partly, be attributable to poorer glycaemic control for both types of diabetes in lower social strata,[20-22] which may in turn be a result of socioeconomic differences in the uptake of diabetes checks.[20] Research from the US indicates that diabetics with fewer years of education have a smaller chance to have had regular ophthalmic examinations,[23,24] which will help prevent retinopathy and vision loss.[25] Two recent studies suggest that use of health care facilities and quality of care may play a role in preventing premature mortality in socially disadvantaged diabetics[16,26] without investigating direct links between the two due to lack of data on health service use.

We explored whether service use or diabetes checks would occur less in lower educated diabetics in comparison to their fellow patients with a higher socioeconomic status. In addition, we tested the hypothesis that the course of diabetes was more unfavourable among those with a low level of education, by examining the differences in prevalence of symptoms of complications between 1991 and 1993 in a cohort study. Finally, we tried to supplement existing knowledge in establishing the contribution of differential service use to differences in the course of diabetes by level of education while using a population-based design.

8.2 Material and methods

8.2.1 Study population

Source of the data is the Longitudinal Study on SocioEconomic Differences in the Utilisation of Health Services (LS-SEDUHS). The LS-SEDUHS is part of

the GLOBE study, a longitudinal study that started in 1991 in the southeast of the Netherlands, aiming to explain socioeconomic inequalities in health. The design and objective of the GLOBE study have been described in detail elsewhere.[27] The cohort of the GLOBE study is based on a sample of non-institutionalised Dutch nationals aged 15-74 years. The highest and lowest socioeconomic strata were oversampled, as well as people aged 45 years and over. Data collection started in the Spring of 1991 with a mailed questionnaire about health, health behaviour and various living conditions.

Because one of the aims of the LS-SEDUHS was to study health services utilisation, it was desirable to overrepresent people with an illness in the study sample. Information on chronic diseases from the Spring 1991 GLOBE data collection was used to select, amongst others, all persons reporting diabetes. Participants completed an interview and a self-administered questionnaire at baseline (Autumn 1991) and were followed up yearly with a mailed questionnaire. Total response in 1991 was 72.3%, response during follow-up was 79% or higher. All respondents to the oral interview, regardless of their answer to the checklist, had to answer a questionnaire on diabetes. Because we will report analyses of the contribution of health service utilisation to the course of diabetes using 1991 and 1993 data, the study population comprises respondents with diabetes who completed questionnaires in these two years (n=173). Due to attrition for various reasons, follow-up in 1993 in this group was 75% of the 1991 sample. Attrition was due to mortality (4.4%), previous-

Table 8.1 Sociodemographic and diabetes characteristics of the study population (1991 data)

	N[a]	%
Sex		
Men	81	46.8
Women	92	53.2
Age		
<55 years	39	22.5
55-64 years	74	42.8
≥65 years	60	34.7
Level of education		
Intermediate vocational training and higher	43	24.9
Lower secondary school, lower vocational training	69	39.9
Primary school	51	29.5
Type of diabetes		
IDDM	31	17.9
NIDDM	142	82.1
Total	173	100.0

[a] Not all values add up to the total due to missing values

ly stated refusal to participate in follow-up (4.4%), non-response (14.7%), failure to locate the respondent (1.0%) and other reasons (0.4%). Table 8.1 shows the composition of the study group by some basic characteristics based on 1991 data.

8.2.2 Data

Service utilisation and medical procedures were chosen with respect to their relevance for diabetes control. The standard protocol 'Diabetes Mellitus type II' of the Dutch College of general practitioners was taken as a starting point to select relevant aspects of diabetes care.[28] It is meant for controls by the general practitioner of NIDDM patients receiving oral therapy. Checks by a specialist in internal medicine are indicated if the patient is on insulin therapy. The standard protocol contains the following elements: bloodglucose and weight checks at least every three months, and at least yearly checks of blood pressure, serum creatinine, serum cholesterol, urine protein, and check of the eye fundus by an ophthalmologist. Furthermore, yearly weight check and inspection of feet are also recommended. An influenza vaccination for diabetics is 'urgently recommended' by the Ministry of Health (Ministry of Health, Advice concerning vaccination against influenza, 1991). Questions were taken from a questionnaire designed to monitor care for diabetes patients.[29] Checks do not always exclusively apply to checks by a medical professional, but include self-checks in the case of blood, urine, weight and foot checks. Checks of bloodglucose, serum creatinine, serum cholesterol could not be specified and were described as 'blood check' in the questionnaire; also urine check for protein was not specified and described as 'urine check'. A dichotomous variable was put together containing all recommendations (from the Dutch standard protocol and the Ministry of Health) and coded '1' if all criteria were fulfilled and coded '0' if not all the above criteria were fulfilled.

Severity of diabetes was operationalised as the presence or absence of symptoms of several diabetic complications. Eye complications were operationalised as severe visual impairment. This was indicated by a positive answer on at least one out of two items from the OECD indicator on long-term disabilities[30]: 'great difficulty' or 'not able' to read small letters in a paper or to recognise faces from a 4m distance (with glasses if necessary). Sensibility loss as a symptom of polyneuropathy was indicated by at least one positive answer to two questions relating to sensibility in the extremities: being able to close a buttoned garment or the feeling to walk on cotton wool were considered positive answers. Pain in the legs may reflect both polyneuropathy and peripheral vascular problems. Sores healing with difficulty further indicate peripheral vascular problems. A Dutch translation of the Rose-questionnaire on angina pectoris was used to ascertain angina pectoris.[31, 32] Although the Rose-questionnaire distinguishes two grades of angina pectoris,

only absence or presence of angina was considered to be relevant when analyzing complications of diabetes.

Socioeconomic status was operationalised as the highest level of education attained by the respondent; for students, the level of education presently followed was taken. The original 7 types of education were collapsed into 3 classes: intermediate vocational training/higher secondary school/higher vocational training/university, lower secondary school/lower vocational training, and primary school.

8.2.3 Analysis

Cases with missing values in any of the variables were excluded in all analyses.

For analyses of the difference by education in utilisation of these services or procedures, age and sex as well as the severity of disease were considered to be confounders. Age was entered in three classes: <55 years, 55-64 years and ≥65 years. Furthermore, type of diabetes was controlled for. IDDM and NIDDM were distinguished by considering everyone who reported the onset of the disease before 40 years of age as IDDM, and everyone with an onset after or on their 40th year as NIDDM.[3] Independent of type, the duration of diabetes has been demonstrated to influence mortality[33] and is therefore a possible indicator for the severity of the disease. As this variable also differed by socioeconomic status in our data, duration was considered to be a confounder. Duration was categorised as <5 years, 5-10 years and ≥10 years.

Diabetic complications present in 1991 were also controlled for. The symptoms visual impairment, sensibility loss, pain in the legs, sores and angina pectoris were summed up in one variable to control for disease severity, which was entered as categorical variable. Because no-one had 5 symptoms and only 2 respondents had 4 complications, this category was merged with those having 3 complications. Also body mass index and reported hypertension were considered to indicate severity of disease while being unevenly distributed by education. Body mass index was categorised in <25 kg/m^2, 25-27 kg/m^2 and ≥27 kg/m^2, self-reported hypertension was a dichotomous variable.

Differences according to level of education in the use of health services (in 1991) were analyzed by logistic regression controlling for confounders. Dependent variable was every single service use or check (yes/no). Analyses of differences in the course of diabetes by level of education were also done with logistic regression, and modelled with the complication in 1993 as outcome, given its 1991 value (as independent variable). This is equivalent to an analysis of the difference between the two points in time.[34,35] Analyses were carried out controlling for age, duration and type of diabetes following the same categorisations as in the analysis of health service use. Education

was added to all models as a last step. Overall contributions of education were tested as the reduction in deviance of the model with education compared to the model without education.

To estimate the contribution of health services utilisation to the difference in the course of diabetes complications according to level of education, health service variables relevant to the outcome were added to a regression model with age, sex, base-line value (1991) of the outcome variable, and other diabetes complications (1991). Again, education was entered in the last step. Analyses were executed with SPSS 6.1.3. for Windows. Statistical significance is at the P=0.05 level.

8.3 Results

The use of services according to level of education are listed in table 8.2, checks are listed in table 8.3. Checks of blood and blood pressure are not included in this table, because nearly everyone reported these checks, and a meaningful contrast did not exist. Controls by the general practitioner were reported by a larger proportion of lower educated people compared to the reference category (statistically significant for those with lower secondary school or lower vocational training), as was contact with a dietician, with the highest rates in the middle category (n.s., table 8.2). Controls by a specialist in internal medicine was reported by a smaller proportion of lower educated people with diabetes. Also use of other services was reported less by those in the lower two classes of education, but a gradient was not always there. Frequently, the middle category reported the lowest figures, with CIs entirely below unity in contact with an internist, a diabetes nurse and in the case of influenza vaccination.

Urine checks were performed more in lower educated diabetics (n.s., table 8.3). All other checks, except foot checks, were done in a smaller proportion of lower educated patients but only weight checks were statistically significant in the overall test. There was no clear difference by level of education in adherence to all checks.

The course of diabetes is generally less favourable in the lower educated groups, with those with primary education reporting the highest prevalences (table 8.4). Statistically significant differences are found for visual impairments and for pain in the legs. The wide 95% confidence intervals in visual impairments are due to the small number of patients reporting these impairments. The difference in the course of all complications according to level of education is also statistically significant, both for the likelihood to have one or more complications after a two-year follow-up, as for the probability to have two or more complications after that period.

Since a study of socioeconomic differences in the incidence of diabetes complications in a two-year period was not a feasible option considering the sample size of those without complications, we did an analysis of the prevalence of diabetes complications. However, an analysis of the incidence of complications according to level of education controlling for confounding variables yielded higher incidence figures among those with lower educational levels for all complications except angina pectoris; these higher inci-

Table 8.2 Use of relevant services in 1991 by level of education among respondents reporting diabetes. Logistic regression controlling for age, sex, number of complications, body mass index, hypertension and type and duration of diabetes

Level of Education	OR [95% CI]	% Prevalence of use (1991)
Diabetes controls by general practitioner		42.8
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	2.89 [1.07-7.85]	
Primary school	2.54 [0.85-7.58]	
Overall test education[a]	4.74 *P*=0.09	
Diabetes controls by specialist (internal medicine)		60.1
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	0.24 [0.08-0.68]	
Primary school	0.40 [0.13-1.26]	
Overall test education[a]	7.79 *P*<0.05	
Contact with diabetes nurse		12.1
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	0.24 [0.06-0.94]	
Primary school	0.21 [0.04-1.02]	
Overall test education[a]	5.55 *P*=0.06	
Contact with dietician		34.1
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	1.92 [0.72-5.11]	
Primary school	1.27 [0.43-3.71]	
Overall test education[a]	2.01 *P*=0.37	
Contact with pedicure		28.1
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	0.42 [0.13-1.39]	
Primary school	0.41 [0.12-1.38]	
Overall test education[a]	2.56 *P*=0.28	
Influenza vaccination		32.9
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	0.27 [0.10-0.73]	
Primary school	0.54 [0.19-1.55]	
Overall test education[a]	7.51 *P*<0.05	

[a] Chi-square test, 2 df

dence figures were statistically significant in those with primary school for eye complications (results not shown).

An analysis of socioeconomic differences in the course of visual impairments with eye checks as explanatory variable did not diminish the differences between educational groups. Likewise, all recommended checks and influenza vaccination together could not even partially explain the difference according to educational level in the course of all complications (results not shown).

Table 8.3 Checks in 1991 by level of education among respondents reporting diabetes. Logistic regression controlling for age, sex, number of complications, body mass index, hypertension and type and duration of diabetes

Level of Education	OR [95% CI]	% Prevalence of check (1991)
Urine checks		63.0
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	1.14 [0.43- 3.00]	
Primary school	3.14 [0.97-10.17]	
Overall test education[a]	5.18 *P*=0.08	
Weight checks		92.5
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	0.08 [0.01-0.92]	
Primary school	0.21 [0.02-2.74]	
Overall test education[a]	6.00 *P*<0.05	
Foot checks		36.4
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	1.13 [0.45-2.83]	
Primary school	0.94 [0.34-2.59]	
Overall test education[a]	0.20 *P*=0.91	
Eye check		81.5
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	0.76 [0.21-2.81]	
Primary school	0.31 [0.08-1.22]	
Overall test education[a]	3.55 *P*=0.17	
Eye checks by specialist (ophthalmology)		72.8
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	0.96 [0.34-2.72]	
Primary school	0.50 [0.16-1.57]	
Overall test education[a]	2.01 *P*=0.37	
All recommended diabetes checks and influenza vaccination		8.1
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	0.64 [0.08-4.85]	
Primary school	1.05 [0.17-6.67]	
Overall test education[a]	0.35 *P*=0.84	

[a] Chi-square test, 2 df

Table 8.4 Differences in the course of diabetes by level of education, 1991-1993. Logistic regression controlling for initial value, age, sex, type and duration of diabetes

Level of Education	OR [95% CI]	% Complication prevalence (1991)
Visual impairments		10.4
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	4.05 [0.72-22.85]	
Primary school	5.92 [1.05-33.32]	
Overall test education[a]	5.11 *P*=0.08	
Symptoms of sensibility loss		19.7
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	0.47 [0.10-2.22]	
Primary school	1.62 [0.38-6.94]	
Overall test education[a]	3.29 *P*=0.19	
Pain in the legs		37.0
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	1.60 [0.54- 4.79]	
Primary school	3.60 [1.11-11.70]	
Overall test education[a]	5.26 *P*=0.07	
Sores on legs or feet healing with difficulty		12.1
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	0.89 [0.20-3.96]	
Primary school	0.93 [0.20-4.41]	
Overall test education[a]	0.02 *P*=0.99	
Angina pectoris		37.0
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	0.92 [0.21- 4.02]	
Primary school	3.95 [0.77-20.36]	
Overall test education[a]	5.22 *P*=0.07	
All complications, 1 or more		57.7
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	1.85 [0.59- 5.75]	
Primary school	4.92 [1.29-18.78]	
Overall test education[a]	6.06 *P*<0.05	
All complications, 2 or more		31.8
Intermediate vocational and higher (=ref.)	1.00	
Lower secondary school, lower vocational	0.90 [0.25- 3.95]	
Primary school	5.00 [1.35-18.54]	
Overall test education[a]	12.05 *P*<0.01	

[a] Chi-square test, 2 df

8.4 Discussion

In a group of 173 respondents to a health survey who reported diabetes, we demonstrated socioeconomic differences in the uptake of medical care relevant for the disease, controlling for the severity of the disease and other relevant confounders. At the same time we showed a considerable and sometimes statistically significant difference in the course of diabetes by level of education over a two-year period, measured as the difference in prevalence of complications between 1991 and 1993. A causal link between lower service use and a less favourable course of diabetes in groups with a low level of education could not be demonstrated. Still, this study is quite unique in presenting individual data about differences in the use of a wide array of health services as well as differences in the course of the disease according to level of education among diabetics in a population-based sample.

A few limitations of this study should be borne in mind. The number of individuals eligible for analysis was small, which caused few statistically significant findings and sometimes wide confidence intervals. However, even in this small group statistically significant differences between groups with different educational levels could be demonstrated.

These analyses were done with data from a population-based survey, which rely on the respondent's self-reports. In general, prevalences in our study population are roughly in accordance with reports in the literature, indicating that reported data do not severely distort important basic data. For instance, NIDDM is considered to account for 80-90% of the diabetes in the general population[3] which matches our figure very well. Figures on the prevalence of complications are difficult to compare with other studies, but prevalences of angina pectoris, pain in the legs and sores seem to match with prevalences of ischaemic heart disease, peripheral vascular complaints and ulcus cruris among diabetics in two Dutch studies.[36,37] The prevalence of 12% visual impairments in our population is higher than the 6% prevalence of blindness among diabetics in Dutch general practice,[36] but lower than reported retinopathy of 26% among diabetics in a population-based study.[24]

We were able to check diagnosis and type of diabetes with the respondent's general practitioner for about half the sample. The confirmation of the diagnosis was 92% for the group with the lowest level of education and 90% for the group with the highest educational level. The agreement about the type of diabetes between respondent and general practitioner was fair, with Cohen's Kappas of 0.41 for those with primary school, 0.64 for those with lower secondary school or lower vocational training, and 0.49 for those who accomplished intermediate vocational training or higher.

Self-reported data may have caused biased results in that lower educated people tend to underreport chronic disease and possibly also symptoms, al-

though the agreement between respondents and general practitioners of the diagnosis was quite good in all socioeconomic groups (chapter 3).[38] Nevertheless, differential misreporting of diabetes by socioeconomic status could have created bias.

Analyses of health service use and the course of diabetes in individuals whose general practitioner provided data about diabetes and type of diabetes did not have enough power to yield statistically significant results, but showed similar tendencies as the analyses reported earlier in this paper; the most striking difference with the results reported in this paper was that compliance to all recommended care now seemed to be more prevalent among those with primary school (results not shown), which may be due to a selection effect where lower educated diabetics not adhering to diabetes checks are more likely to refuse additional data collection through the general practitioner. Self-reports of diabetes, therefore, do not seem to severely bias our results.

However, misreporting by socioeconomic status may be extended to the use of medical care, for which we had no complementary data source. Since those with a low level of education underreport chronic disease (chapter 3),[38] underreporting of health service use may also happen. The lower proportion of those with a low level of education reporting checks might thus be estimated too low. A study among a population with a considerable proportion of diabetics, however, found no differences according to educational level in self-reports of medication use relevant for diabetes, with high sensitivity and specificity using physician data as gold standard.[39] Other diabetes research not based on self-reports or cross-validated with other sources confirms the inverse relationship between socioeconomic status and ophthalmologic checks[23] and regular clinic (specialist) visits,[20] so our results on health service use are not likely to be caused by misreporting.

Because we did not do a clinic-based survey and relied exclusively on the information given by respondents, we could only record symptoms suggesting diabetes complications without being able to confirm the diagnosis of the complications. Similarly, asking health checks more specifically was not feasible: 'check of urine' was asked instead of 'albumin excretion', 'eye check' instead of 'dilated eye examination' etcetera. This approach also precluded getting any other information about physical parameters like systolic and diastolic blood pressure, cholesterol, triglycerides and HbA1c, which could have provided valuable extra data about base-line health status. Also additional information about antihypertensive treatment could have had added value.

Nevertheless, a population-based survey also has important advantages. It has been pointed out that clinic-based surveys are subject to considerable referral bias. Clinic studies overestimate the number of patients treated with insulin, and the prevalence of complications.[40] The lower uptake of diabetes

checks by diabetics with a low socioeconomic status present in population-based surveys may be different in a clinic-based population. Selection processes might also result in different outcomes of the course of diabetes by socioeconomic status in terms of complications.

Most contact rates for diabetes with a health professional were lower among people with a lower level of education than the reference category. Striking exception is control by the general practitioner (table 8.2). Controls by the specialist occur less among the lower educated. This is in accordance with data on socioeconomic differences in the use of health care facilities in the Netherlands. Controlling for health status, utilisation rates of the general practitioner are higher among the lower educated, whereas the inverse pattern is observed with respect to specialist care.[41] These utilisation patterns may be explained by features of the Dutch health care system. The general practitioner has a gate-keeping role and is directly accessible, whereas other services need referral by the general practitioner. This threshold apparently differs by socioeconomic status. Compliance with all recommended care (recommendations of the Dutch standard protocol and the Ministry of Health) does not differ by socioeconomic status, but it occurs in only 8% of the cases.

Because many checks relevant for diabetes were less prevalent among lower educated groups, and medical care -particularly glycaemic control- may be very important in the outcome of diabetes,[16,26,42,43] this finding suggests a causal link with the less favourable course of diabetes among the lower educated which our analysis failed to demonstrate. In this analysis, the use of some checks or services was associated with a higher probability of an unfavourable course of diabetes (results not shown), which suggests confounding by indication. Confounding by indication, in this case, is the mixing of the effect of health problems as a determinant for service use and as a predictor of unfavourable outcomes while the study objective is to assess potentially favourable outcomes associated with service use. Theoretically, control for base-line health status should remove its confounding effect but apparently base-line health status was not sufficiently controlled for.

As service utilisation and diabetes checks did not sufficiently explain the socioeconomic gradient in the course of diabetes, other factors may explain the difference. Behavioural factors such as smoking and hypertension differ in diabetics by socioeconomic status[17] and influence the course of both IDDM and NIDDM in terms of macrovascular complications.[44] Also physical exercise and obesity have this effect.[20] Healthy lifestyles are more prevalent in better educated diabetics, although evidence for an effect on diabetes complications is conflicting. In IDDM patients healthy lifestyles are not reflected in heart disease prevalence in men,[20] while in a mixed population of diabetics there was an association between smoking rates by socioeconomic status and the incidence of ischaemic heart disease or peripheral

vascular disease.[18] Little physical exercise, smoking, and overweight were all more prevalent among the lower educated groups in our data, and may explain their less favourable course of diabetes. Apart from behavioural factors, metabolic parameters such as serum cholesterol and glycaemic control are also obvious candidates as explanatory factors.

The results of this explorative study imply that diabetes checks in lower educated people should be carefully monitored and stimulated, and not only at the bottom of the socioeconomic spectrum. As lower educated people have relatively high contact rates with their general practitioner, the general practitioner is important in delivering intensive and high-quality care, at least to patients with NIDDM in the Netherlands. Health education materials developed for diabetics with a low socioeconomic status may help improve the situation. In this respect the low contact rates with the diabetes nurse, who is specialised in health education for diabetes patients, are disappointing for all groups, but especially so in those with a low educational level.

The less favourable course of diabetes in lower educated diabetics suggests causality between socioeconomic inequalities in diabetes care and the outcome in terms of complications, which was not supported by the results of the present study. Future studies should study the contribution of health care to socioeconomic inequalities in the course of diabetes in the context of other explanatory factors. Shortcomings of previous studies should be met: the study should have sufficient numbers of both types of diabetes in all socioeconomic groups, be population (or general practice) based, have a long follow-up, a well-defined base-line population in terms of health status, and should measure clinical parameters. Findings from such research are of paramount importance to clinicians, policy makers and diabetes patients to promote equal opportunities for people with diabetes to live life unhindered by diabetic complications.

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The heart of the matter: differences in the course of heart disease according to level of education

Abstract

Few investigations have studied the socioeconomic patterning of the course of heart disease morbidity. We studied this course for men and women, and tried to explain differences according to level of education in terms of comorbidity, health service utilisation, behavioural risk factors for ischaemic heart disease and psychosocial stress. Multivariate analysis was done of scores on angina pectoris and heart failure questionnaires in a two-year population-based follow-up study (1991-1993), in the town of Eindhoven and surroundings (the Netherlands). The course of angina pectoris was statistically significantly less favourable ($P<0.05$) in lower educated groups compared to the group with university/higher vocational training, for both sexes. In men with primary school only, 54% of the difference could be explained by behavioural risk factors, whereas for women also other factors played a role. The course of heart failure after adjustment for age and marital status was less favourable in the lower educational groups in men ($P<0.05$) and women. Behavioural risk factors diminished the socioeconomic difference in men, but not in women. The course of heart disease is more unfavourable among those with a low level of education, both in men and women. In men, the higher prevalence of behavioural risk factors for heart disease is an important explanation.

9.1 Introduction

Prognosis of ischaemic heart disease in terms of survival is more unfavourable in groups with a low socioeconomic status than among those high in the social hierarchy. Chances of survival after myocardial infarction are smaller in those with a low income,[1-3] and those with a low education,[4] occupation[5] or living in a deprived area.[6]

While heart disease survival by socioeconomic status has been studied regularly, rarely any attention has been paid to socioeconomic differences in the course of heart disease over time by indicators of cardiac morbidity. In times of improving therapy for several heart conditions resulting in increased survival[7-9] it seems a logical step to proceed from analysis of socioeconomic differences in survival to analysis of the differential course of heart disease morbidity by socioeconomic status. If a socioeconomic difference in the course of heart disease is found, the next question is whether any intermediary factors (health service use, behavioural- or psychosocial factors) are likely to influence it. As people will now live part of their lives with a heart condition and its complications, the question about the contribution of these factors to the observed morbidity differences becomes increasingly important. Because the socioeconomic distribution of risk factors for heart disease has shown gender differences,[10-14] the explanation of socioeconomic differences in the course of heart disease may be different for men and women.

This article deals with these issues by an analysis of differences according to level of education in the course of angina pectoris and heart failure over the period 1991-1993 among men and women with symptomatic heart disease in a Dutch population survey. Explanatory factors considered are the presence of other heart conditions or chronic diseases, as well as health service utilisation, behavioural factors and psychosocial factors.

9.2. Methods

9.2.1 Study population

Source of the data is the Longitudinal Study on SocioEconomic Differences in the Utilisation of Health Services (LS-SEDUHS). The LS-SEDUHS is part of the GLOBE study, a longitudinal study that started in 1991 in the South East of the Netherlands, and aims at explaining socioeconomic inequalities in health. The design and objective of the GLOBE study have been described in detail elsewhere.[15] The cohort of the GLOBE study is based on a sample of non-institutionalised Dutch nationals aged 15-74 years. The highest and lowest socioeconomic strata were oversampled, as well as people aged 45 years and over, in order to gain sufficient statistical power to do analyses by socioeconomic status. Data collection started in the

Spring of 1991 with a postal questionnaire about health, health behaviour and various living conditions.

Because one of the aims of the LS-SEDUHS was to study health services utilisation, it was desirable to overrepresent people with an illness in the study sample. Information on chronic diseases from the Spring 1991 GLOBE data collection was used to select, amongst others, all persons reporting 'severe heart disease or myocardial infarction'. Participants completed an interview and a self-administered questionnaire at baseline (Autumn 1991) and were followed up yearly with a postal questionnaire. Total response in 1991 was 72.3% (n=2867), of whom 79.2% were respondents to the follow-up round in 1993 (n=2272). All respondents to the interview, regardless of their answer to the checklist, had to answer a Dutch translation[16] of the Rose questionnaire on angina pectoris[17] and a Dutch questionnaire on heart failure.[16] Eligible for the analyses reported here were all respondents who had symptomatic heart disease in 1991 (symptoms of angina pectoris according to the Rose-questionnaire (n=289), symptoms indicating heart failure (n=136) or both (n=120)), with completed questionnaires in 1991 and 1993 (n=545). Due to attrition for various reasons, follow-up in 1993 (n=545) in this group was 75% of the 1991 sample (n=726). Attrition was due to nonresponse (14.7%), mortality (4.4%), previously stated refusal to participate in follow-up (4.4%), failure to locate the respondent (1.0%) and other reasons (0.2%). The composi-

Table 9.1 Sociodemographic characteristics of men and women with angina pectoris or heart failure (1991 data)[a]

	Men (%)	Women (%)
Education		
University/higher vocational training	47 (17.4)	21 (7.6)
Higher secondary school/intermediate vocational training	67 (24.8)	27 (9.8)
Lower secondary school/lower vocational training	95 (35.2)	120 (43.6)
Primary school	58 (21.5)	100 (36.4)
Missing data, unclassified education	3 (1.1)	7 (2.5)
Age		
14-44	39 (14.4)	31 (11.3)
45-64	155 (57.4)	178 (64.7)
65+	76 (28.1)	66 (24.8)
Marital status		
Married	203 (75.2)	181 (65.8)
Never married	23 (8.5)	23 (8.4)
Divorced	27 (10.0)	32 (13.1)
Widowed	13 (4.8)	36 (13.2)
Missing data	4 (1.5)	3 (1.1)
Total	270 (100)	275 (100)

[a] Because of rounding, percentages do not necessarily add up to 100

tion of the study group according to sociodemographic variables is given in table 9.1.

9.2.2 Data

Highest attained level of education is taken as the indicator for socioeconomic status. Sociodemographic confounders were age and marital status. Because the course of heart disease is likely to depend on the cardiac condition at the beginning of the study in 1991, which is also likely to differ by socioeconomic status, aspects of cardiac condition other than the outcome measure in 1991, and year of onset of symptoms were considered to be confounders of the explanatory analyses.

Explanatory factors considered were comorbidity, health service utilisation, behavioural risk factors and psychosocial stress. Assumptions about their association with education were checked in the data, for men and women separately. Comorbidity was considered to be relevant if it was likely to directly or indirectly compromise cardiac function and if there was a socioeconomic gradient in men or women, controlling for age. Asthma, Chronic Obstructive Pulmonary Disease (COPD) and diabetes fulfilled both criteria; hypertension was considered as a confounder but did not clearly differ according to level of education. A contribution of health service utilisation to an unfavourable course in low socioeconomic groups can be expected if these services are used less by lower socioeconomic groups under the assumption that service utilisation is beneficial and relevant for the condition under study. Services that met this criterion were contact with a cardiologist, angiography, antihypertensive medication and influenza vaccination. Behavioural factors found to be related to socioeconomic differences in heart disease survival, incidence or mortality are also likely to explain some of the differences in the course of the disease. These factors include smoking[10] and overweight,[13,18] moderate alcohol consumption,[19-21] and regular physical exercise.[13,22,23] Psychosocial stress has been mentioned in several investigations as a risk factor for cardiovascular disease,[13,24] while being inversely related to socioeconomic status.[13]

All data were measured with validated Dutch questionnaires. Only the questions about influenza vaccination and the use of cardiological procedures were developed by the authors. The distibution of the various explanatory factors among men and women is displayed in table 9.2. A description of the criteria used to establish angina pectoris and heart failure is given in the appendix.

The overrepresented conditions asthma/COPD and diabetes were derived from diagnostic questionnaires.[25,26] Questions on contact with a cardiologist were based on those in the Netherlands Health Interview Survey.[27] Data on smoking, alcohol consumption and body mass index were based on the same survey. Psychosocial stress was operationalised

as the number of long-term stressful conditions. The questionnaire that was used covered three dimensions: stress related to disease of others, stress occurring in relationships with others, and stress because of situational factors.[28] More details about the measurements can be found in Chapter 2.

9.2.3 Analysis

In statistical analyses of the change in severity of disease over time, 'bottom' and 'ceiling' effects at base-line had to be accounted for. Those

Table 9.2 Disease characteristics of men and women with angina pectoris or heart failure (1991 data)[a]

	Men (%)	Women (%)
Heart disease: angina pectoris		
No angina pectoris	48 (17.8)	78 (28.4)
Angina pectoris grade 1	182 (67.4)	148 (53.8)
Angina pectoris grade 2	36 (13.3)	43 (15.6)
Missing data	4 (1.5)	6 (2.2)
Heart disease: heart failure		
No heart failure	155 (57.4)	126 (45.8)
Heart failure with light dyspnea	20 (7.4)	65 (23.6)
Heart failure with moderate dyspnea	61 (22.6)	45 (16.4)
Heart failure with severe dyspnea	34 (12.6)	31 (11.3)
Missing data	-	8 (2.9)
Heart disease: duration		
Duration of symptoms ≥ 10 years[b]	89 (35.9)	93 (37.2)
Comorbidity		
Diabetes	21 (7.8)	36 (13.1)
Asthma/COPD	104 (39.7)	104 (38.7)
Health services use		
Contact with cardiologist past year	128 (47.4)	64 (23.3)
Angiography past year	106 (39.3)	44 (16.0)
Antihypertensive medication past 14 days	43 (15.9)	69 (25.1)
Influenza vaccination past year	81 (30.0)	74 (26.9)
Behavioural risk factors		
Current smoker (cigarettes)	83 (30.7)	70 (25.5)
Moderate alcohol consumption	166 (61.5)	126 (46.2)
No exercise	24 (8.9)	28 (10.2)
Body mass index ≥27 kg/m^2	66 (24.4)	96 (34.9)
Psychosocial stress		
Stress because of disease others: >1 circumstance	37 (13.7)	56 (20.4)
Stress in relationships with others: >1 circumstance	99 (36.7)	110 (40.0)
Stress because of social situation: >1 circumstance	65 (24.1)	81 (29.5)
Total	270 (100)	275 (100)

[a] Because of rounding, percentages do not necessarily add up to 100.
[b] Respondent was asked to indicate first occurrence of symptoms, without explicit reference to diagnosis

who had a top score on a particular measure could not get better, whereas those who had the lowest score could not get worse. Because people were selected on either angina pectoris or heart failure complaints regression to the mean is likely to occur. The analysis reported here is an analysis of 1993 values of angina pectoris or dyspnea scores as dependent variable, given the 1991 value as independent variable. This is in fact an analysis of change, accounting for base-line health status.[29,30]

Ordinary least squares regression was used in multivariate analyses. Outcome variables were the 1993 scores on the Rose questionnaire for angina pectoris or the 1993 scores on the dyspnea scale for heart failure. Scores in 1991 of the same variable were entered as independent, continuous variable in order to stick as closely as possible to the concept of analysis of difference scores.

Because multiple regression analysis on the subset of eligible respondents with complete data on all variables in the model would have resulted in loss of cases, observations with missing values were included in the analysis with a separate code for the missing variable(s).

Regression models were fitted separately for men and women. Apart from disease severity in 1991, the basic model also included the sociodemographic confounders age (six 10-year classes) and marital status (model 1). The contribution of cardiac morbidity other than the outcome measure to differential course of heart disease according to level of education was estimated by a second model. This model included the severity of heart failure (when angina pectoris was the dependent variable) or the severity of angina pectoris (when heart failure was the dependent variable) together with the year of onset of the reported complaints (model 2). Differences according to level of education are given as regressioncoefficients of a particular educational group compared to the reference category with the highest educational attainment (university/high vocational training, coefficient=0) for the two basic models. The overall contribution of education to the model was tested with an F-test. Statistical significance is at the 0.05 level. In order to estimate the explanatory contribution of other factors correctly, especially health services use, further analyses have been done taking cardiac condition into account. Health service variables, behavioural and psychosocial factors were added in separate blocks, as well as together in one model. Education was added to all models as a last step. Variables explain differences in a particular educational group if the coefficient of the model with the added variables changes towards 0, the value of the reference group. These changes are expressed as percentage changes from model 2. Analysis was carried out with SPSS for Windows version 6.1 (SPSS Inc., 1994).

9.3 Results

Table 9.3 shows the unadjusted mean changes between 1991 and 1993 in average angina pectoris score according to level of education, for men and women. The average level of angina improves between 1991 and 1993. The mean improvement of the angina score (range: 0-2) for men is 0.32, and varies according to level of education. The group with primary school shows a small improvement of 0.14, those with university or higher vocational training have the largest improvement, 0.55. A similar pattern is found in heart failure.

Differences according to level of education in the explanatory variables were checked in the data controlling for age (results not shown). Overweight, lack of physical exercise and smoking are more prevalent in lower

Table 9.3 Crude mean grade angina pectoris[a], and heart failure[b] total group and according to level of education, men and women[c]

	1991	1993	difference 1991-1993
Angina pectoris, men	*N*=242		
University, higher vocational	0.80	0.25	0.55
Higher secondary, intermediate vocational	0.88	0.65	0.23
Lower secondary, lower vocational	1.07	0.70	0.37
Primary school	0.91	0.77	0.14
Total	0.94	0.62	0.32
Angina pectoris, women	*N*=234		
University, higher vocational	0.81	0.10	0.71
Higher secondary, intermediate vocational	0.72	0.56	0.16
Lower secondary, lower vocational	0.87	0.46	0.41
Primary school	0.90	0.58	0.32
Total	0.86	0.48	0.38
Heart failure, men	*N*=262		
University, higher vocational	0.54	0.24	0.30
Higher secondary, intermediate vocational	0.91	0.52	0.39
Lower secondary, lower vocational	0.91	1.00	-0.09
Primary school	1.14	1.04	0.10
Total	0.90	0.75	0.15
Heart failure, women	*N*=235		
University, higher vocational	0.67	0.55	0.12
Higher secondary, intermediate vocational	0.84	0.67	0.17
Lower secondary, lower vocational	0.83	0.65	0.18
Primary school	1.12	1.14	-0.02
Total	0.92	0.82	0.10

[a] Grades of angina pectoris range from 0 (no angina) - 2 (severe angina)
[b] Grades of heart failure range from 0 (no heart failure) - 3 (severe heart failure)
[c] Only respondents with valid data on education and angina pectoris or heart failure in 1991 and 1993

educational strata, whereas moderate alcohol consumption is less prevalent compared to those with the highest educational attainment. Levels of psychosocial stress are generally higher when level of education is lower.

Asthma/COPD and diabetes are more prevalent in lower educated men, with less clear patterns according to educational level in women. Consultation of the cardiologist is less prevalent among those with a low level of education. Angiographies, influenza vaccinations, and consumption of antihypertensive drugs occur in more lower educated men, but less in lower educated women.

The course of angina pectoris and heart failure according to level of education for men and women is displayed in the top rows of tables 9.4 and 9.5, adjusted for original score, age and marital status.

There are statistically significant differences according to level of education in the course of angina pectoris in men and women. In men with primary education the coefficient is 0.36, implying that the mean angina score in 1993 is 0.36 points higher on a scale from 0 (no angina)- 2 (moderate to severe angina) than the reference group with university or higher vocational training, adjusted for differences in age, marital status and 1991 angina score. Or, alternatively, one might say that in a group of 100 men with primary education the adjusted total score of angina for this group is 36 points higher after two years than in the group with the highest educational attainment. Coefficients of heart failure may be interpreted likewise.

Tables 9.4 and 9.5 also show the contribution of comorbidity, health service use, behavioural factors and psychosocial stress and all variables together to the change in the disease score from 1991-1993, controlling for age, marital status, 1991 score, other indicators of cardiac morbidity, and year of onset of heart complaints. Changes away from 0, enlarging differences rather than explaining them, are left blank. Control for cardiac morbidity and year of onset diminishes differences according to level of education in the course of angina pectoris, more in men than in women (model 2). Coefficients in men are not statistically significant anymore in the lower two educational groups. When entering blocks of explanatory variables, comorbidity does not change the pattern markedly. Health service use explains some of the differences in women. Behavioural risk factors are an explanation of differences in the course of angina in men. Behavioural factors also explain differences in women, but coefficients change less dramatically than they do in men. Psychosocial stress only modestly explains the differences in the course of angina in men, but in women the explanatory contribution of this type of stress is much clearer.

There is virtually no contribution of comorbidity to socioeconomic differences in the course of heart failure in both sexes. Behavioural factors explain part of the differences according to level of education in men,

Table 9.4 The course of angina pectoris according to level of education: contribution of explanatory factors

Level of Education	Relative difference in the course of angina pectoris severity [95% confidence interval]	
	Men	Women
Angina pectoris		
Adjusted for age, marital status and original value (model 1)		
University, higher vocational (=ref.)	0	0
Higher secondary school, intermediate vocational	0.34 [0.08 - 0.59]	0.51 [0.15 - 0.88]
Lower secondary school, lower vocational	0.24 [-0.00 - 0.49]	0.39 [0.07 - 0.70]
Primary school	0.36 [0.08 - 0.64]	0.40 [0.08 - 0.73]
Overall contribution of education[b]	2.21 *P*=0.07	2.23 *P*=0.07
Model 1 + duration of angina pectoris and severity of heart failure (model 2)		
University, higher vocational (=ref.)	0	0
Higher secondary school, intermediate vocational	0.30 [0.05 - 0.54]	0.46 [0.10 - 0.81]
Lower secondary school, lower vocational	0.19 [-0.05 - 0.43]	0.32 [0.02 - 0.63]
Primary school	0.24 [-0.04 - 0.52]	0.37 [0.05 - 0.68]
Overall contribution of education[b]	1.46 *P*=0.22	2.38 *P*=0.05
	Percentage of difference with reference group in model 2 explained by explanatory variable	
Asthma/COPD and diabetes		
University, higher vocational (=ref.)	-	-
Higher secondary school, intermediate vocational	...[c]*	2.2%*
Lower secondary school, lower vocational	0.0%	...[c]*
Primary school	0.0%	0.0%*
Health service use		
University, higher vocational (=ref.)	-	-
Higher secondary school, intermediate vocational	...[c]*	8.7%*
Lower secondary school, lower vocational	...[c]	15.6%
Primary school	...[c]	16.2%*
Behavioural risk factors		
University, higher vocational (=ref.)	-	-
Higher secondary school, intermediate vocational	0.0%*	6.5%*
Lower secondary school, lower vocational	15.8%	12.5%
Primary school	54.2%	8.1%*
Psychosocial risk factors		
University, higher vocational (=ref.)	-	-
Higher secondary school, intermediate vocational	13.3%*	15.2%*
Lower secondary school, lower vocational	10.5%	21.9%
Primary school	4.2%	17.9%
All variables together		
University, higher vocational (=ref.)	-	-
Higher secondary school, intermediate vocational	...[c]*	43.5%
Lower secondary school, lower vocational	5.3%	56.2%
Primary school	16.7%	40.5%

[a] Grades of angina pectoris range from 0 (no angina) - 2 (moderate to severe angina); thus higher values of the coefficients represent a more severe course of angina

[b] *F*-test of the difference between a model with education and a model without it

[c] No explanatory change: coefficients change away from 0 rather than towards 0

* Difference with reference groups significant ($P<0.05$)

whereas in women psychosocial factors contribute to the explanation of differences in the course of heart failure.

9.4 Discussion

In an analysis of 545 men and women reporting symptoms of angina pectoris or heart failure we found a statistically significantly less favourable course of both conditions over a two-year period among the lower educated in both sexes, compared to their counterparts with university or higher occupational training. An important part of the socioeconomic differences in the course of both outcome measures in lower educated men is explained by behavioural factors. In contrast to men, these factors only modestly contribute to the differential course of angina pectoris in women, in whom psychosocial stress and health services use also play a modest role.

Some limitations of the study design and analyses reported here have to be considered. The study relies entirely on survey data, i.e. all data are provided by the respondent. This may have resulted in misclassification in selecting the study group: not all respondents with symptomatic heart disease according to the criteria of the questionnaires may be patients suffering from heart disease. However, we used questionnaires which can be assumed to reflect the underlying condition in a reasonably reliable manner and which are commonly applied in other population-based epidemiologic studies.

Nevertheless, the presentation of heart disease differs between men and women.[31,32] There is more misclassification of angina among women,[33] also according to the Rose-questionnaire.[34] The distinction in our study between men and women may not only reflect the socioeconomic differences in the course of angina. Differential misclassification of angina by gender may also produce two groups with different underlying forms of coronary artery disease that produces different results. No matter what these underlying differences are, the results reflect socioeconomic differences in the experience of symptoms over time, in men as well as in women.

The socioeconomic differences in the course of heart disease may be artefacts arising from the use of reported data. Mortality is a measure that is free of this potential drawback. It differs according to level of education in this study. Controlling for age, sex, and marital status, those with a lower level of education have higher death rates than respondents with university or higher vocational training have.[35]

Table 9.6 The course of heart failure (1991-1995) according to level of education: contribution of explanatory factors

Level of Education	Relative difference in the course of dyspnea severity [95% confidence interval]	
	Men	Women
Heart failure		
Adjusted for age, marital status and original value		
University, higher vocational (=ref.)	0	0
Higher secondary school, intermediate vocational	0.17 [-0.22 - 0.55]	0.13 [-0.45 - 0.72]
Lower secondary school, lower vocational	0.60 [0.24 - 0.97]	0.21 [-0.28 - 0.71]
Primary school	0.53 [0.13 - 0.93]	0.45 [-0.06 - 0.96]
Overall contribution of education[b]	3.98 P=0.00	1.55 P=0.19
Model 1 + duration of heart failure and severity of angina pectoris (model 2)		
University, higher vocational (=ref.)	0	0
Higher secondary school, intermediate vocational	0.13 [-0.22 - 0.47]	0.20 [-0.34 - 0.74]
Lower secondary school, lower vocational	0.41 [0.08 - 0.74]	0.16 [-0.30 - 0.62]
Primary school	0.42 [0.06 - 0.79]	0.27 [-0.20 - 0.74]
Overall contribution of education[b]	2.23 P=0.07	0.63 P=0.64
	Percentage of difference with reference group in model 2 explained by explanatory variable	
Asthma/COPD and diabetes		
University, higher vocational (=ref.)	-	-
Higher secondary school, intermediate vocational	7.7%	...[c]
Lower secondary school, lower vocational	4.9%*	...[c]
Primary school	4.8%*	...[c]
Health service use		
University, higher vocational (=ref.)	-	-
Higher secondary school, intermediate vocational	...[c]	15.0%
Lower secondary school, lower vocational	...[c*]	0.0%
Primary school	2.4%*	...[c]
Behavioural risk factors		
University, higher vocational (=ref.)	-	-
Higher secondary school, intermediate vocational	7.7%	...[c]
Lower secondary school, lower vocational	...[c*]	...[c]
Primary school	31.0%	...[c]
Psychosocial risk factors		
University, higher vocational (=ref.)	-	-
Higher secondary school, intermediate vocational	...[c]	...[c]
Lower secondary school, lower vocational	...[c*]	37.5%
Primary school	...[c*]	37.0%
All variables together		
University, higher vocational (=ref.)	-	-
Higher secondary school, intermediate vocational	...[c]	...[c]
Lower secondary school, lower vocational	...[c*]	43.8%
Primary school	11.9%	3.7%

[a] Grades of dyspnea range from 0 (no dyspnea) - 3 (severe dyspnea); thus higher values of the coefficients represent a more severe course of heart failure

[b] F-test of the difference between a model with education and a model without it

[c] No explanatory change: coefficients change away from 0 rather than towards it

* Difference with reference group significant (P<0.05)

Assumptions of ordinary least squares regression could not always be met, especially in analysis of heart failure. We checked our results by doing a logistic regression with the outcome variables dichotomised in present/not present. The contributions of the explanatory variables were similar as in least squares regression. Only the contribution of health service use in women with angina pectoris could not be reproduced.

The use of education as an indicator for socioeconomic status may be more appropriate for men than for women, since older women are generally housewives whose socioeconomic status may be better represented by their husband's occupation or income. However, the explanation of socioeconomic differences in the course of heart disease by individual factors like behavioural risk factors and health service utilisation is perhaps more appropriate with an individual indicator of socioeconomic status. Moreover, education may be a good reflection of a person's assets to realise health through these explanatory factors.

Generalisability to people with a heart condition may be questioned, e.g. the high prevalence of asthma/COPD in Table 9.2 may give the impression that the study group is a selective one. This high comorbidity of asthma/COPD can be explained by higher prevalences in elderly populations like this one (mean age approximately 55 years) and the use of an asthma/COPD questionnaire that overestimates prevalences compared to the usual self-reports. The accumulated effects of age and method would give expected prevalences of 11-13%. In addition, there is evidence for clustering of asthma/COPD and heart disease. Two studies from the Netherlands report observed/expected ratios of lung disease or asthma in patients with heart disease ranging from 2.12 to 5.5[36,37] and a Swedish study reports a total prevalence of asthma and chronic bronchitis of 28% among patients reporting angina.[38] Accumulation of the effects of age, method, and clustering largely explains the morbidity pattern and we are quite confident that this population permits generalisation to all groups with symptomatic (reported) heart disease.

A somewhat counterintuitive finding in this study is the general improvement of both angina and heart failure in the study group. Regression to the mean is likely to play a role here. Regression to the mean occurs when criteria for enrolment in a study group are repeatedly measured over time. Because selection for these analyses have taken place on persons reporting symptoms of angina pectoris or heart failure, this mechanism may partially explain the general improvement, but it cannot account for the differences in improvement by level of education.

Selection bias through attrition, which is differential by disease severity, may contribute to the general improvement in the study population. Attrition in our study population is not higher in those with angina pectoris than

those without it, but it is higher in those with symptoms of heart failure (results not shown). Both nonresponse and mortality may be responsible for this. Thus, persons remaining in the study are the healthier part of the original population.

Another reason for the general improvement may be the subjective nature of the data. Because the classifications of angina and heart failure are based on subjective assessment of the degree of functional compromise, a reduction in physical exercise as a result of deterioration might make a person seem improved as it produces fewer symptoms.[39] To influence our findings of a differential – less favourable – course among those with a lower educational attainment such a mechanism should occur differentially by socioeconomic status, which seems rather far-fetched.

Finally, the observed general improvement might not be an artefact, but might partly be the result of use of medical care among patients with heart disease. In the case of angina, improvement might partly additionally be explained by pain disappearance following intercurrent myocardial infarction.

Health service use does not contribute to an explanation for socioeconomic differences in the course of angina pectoris in men. Because most services or procedures included in this analysis, except contact with a cardiologist, are used more among lower educated men than among their higher educated counterparts, an enlargement of the difference between lowest and highest educated men is to be expected when health service use is incorporated in multivariate analysis, assuming health service use is beneficial. Lower educated women use most services and procedures less than higher educated women do. Because of this distribution according to level of education, service use partially contributes to the explanation of socioeconomic differences in the course of angina pectoris in women. A lower use of certain cardiac procedures among women with a low socioeconomic status has been reported by others.[40]

Behavioural risk factors for ischaemic heart disease provide an explanation of socioeconomic differences in the course of angina pectoris and heart failure in men, but less so in women. This sex difference is owing to different patterns of the socioeconomic distribution of these risk factors among men and women. Many authors find an interaction between sex and socioeconomic indicators in the distribution of risk factors for ischaemic heart disease in the general population,[10-14] but findings are not always consistent. Socioeconomic gradients are often steeper among women than among men, although the reverse has been reported on physical exercise and obesity.[13,14] In our population we find quite clear differences in the prevalence of behavioural risk factors among men, whereas patterns according to educational level in women are usually less steep or absent. This is likely to be due to our population of men and

women who have symptomatic heart disease, while the other studies have been carried out in a general population.

The contribution of each of the behavioural factors to socioeconomic differences in the course of heart disease may be of interest because it may give ideas for interventions. As far as angina pectoris is concerned, smoking appears to be more important than the other behavioural factors. In heart failure no clear distinction can be made between any of these factors.

Other factors not measured in our study may explain some of the differences that persist after all explanatory factors have been taken into account. For instance, the socioeconomic patterning of biological cardiovascular risk factors, like hypercholesteremia and low HDL-cholesterol, is not fully explained by behavioural risk factors.[10] Hence these factors may make an additional contribution to the explanation of socioeconomic differences in the course of heart disease, especially angina pectoris.

The major message from these results is that socioeconomic differences in heart disease are not only attributable to a higher incidence of disease in the lower social strata, but are also manifest through a less favourable course of disease in patients in these strata. An explanation for these differences can be found in health behaviour: smoking, alcohol consumption, (over)weight and physical exercise. In lower educated women with angina pectoris psychosocial stress and perhaps a lower use of health services may play a modest role. There is accumulating evidence that not only healthy individuals but also patients with heart disease benefit from promoting healthy life-styles to reduce coronary events.[7,41-44] Hence, clinicians are potential partners in reducing health inequalities in heart disease; different strategies for men and women may be needed.

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Part IV

General discussion 10

10.1 Summary of the results

10.1.1 The description and explanation of socioeconomic differences in the use of health services

In this thesis, socioeconomic differences in the utilisation of health services in the Netherlands have been described and an attempt has been made to explain these differences using the behavioural model of Andersen,[1,2] which distinguishes several factors influencing the use of health services. These factors are medical need, enabling factors, and predisposing factors. All three types of factors have been studied to explain socioeconomic differences in the use of health services.

We have confirmed earlier findings, and demonstrated clear differences in the use of health services by socioeconomic status. Compared to people with a high level of education, use of almost all health services is higher among those with a low educational level. This applies to consultation rates with the general practitioner, the specialist, the physiotherapist, hospital admissions and use of prescription medicines. Over-the-counter medication is being used by a smaller proportion of the lower educated respondents. Also service use on a disease-specific level appeared to differ according to socioeconomic status (see paragraph 10.1.2).

Differences according to level of education in the use of health services are explained, to a large extent, by the differences in health status (medical need) that exist between different socioeconomic groups. Taking the unfavourable health status of people with a low level of education into consideration, their relatively high use diminishes. However, in general practice the use of services is still higher in patients with a low socioeconomic status. For services requiring referral, such as the specialist and physiotherapist, the adjusted figures frequently show lower service use among those with a low educational level. The pattern of hospital admissions according to level of education does not show a clear pattern after adjustment for health status. The use of prescription medicines is modestly lower for the lower educated and the consumption pattern of over-the-counter medicines remains essentially the same.

Not all differences in the use of health care can be explained by differences in health status. The contribution of enabling and predisposing factors was also studied. The analysis of the contribution of enabling factors was confined to general practitioner and specialist consultations. Health insurance is widely believed to explain these differences because it encourages the privately insured (who are above an income level of approximately DFL. 60,000.-, and so generally higher educated) to seek help of the specialist since some private policies do not reimburse the general practitioner's costs. This would perfectly explain why those with a low level of education have relatively high general practitioner consultation rates but relatively low spe-

cialist consultation rates. Although type of health insurance explains part of the relatively high rates of general practitioner consultation among the lower educated, it cannot explain the lower use of the specialist in the lower socioeconomic groups. Deductibles and coverage, which distinguish private insurance from public insurance, do not contribute to an explanation of socioeconomic differences in health service use among privately insured individuals, implying that other differences between both insurance types may play a role.

Factors which predispose to using health care facilities may explain why some people use health services more frequently than others. As predisposing factors we studied the contribution of a number of psychosocial factors which are likely to differ by socioeconomic status and influence general practitioner use. These factors are: long term stressful conditions, social support, locus of control, coping styles, and tendency to consult (reflecting the propensity to consult a doctor). Apart from tendency to consult, none of the factors explain the heavier use of the general practitioner among those with a lower education compared to the respondents with a university background.

10.1.2 The description and explanation of socioeconomic differences in the course of health status

This study has revealed that the course of health status is substantially less favourable among those with a low level of education, compared to those with a high educational attainment. After taking into account differences in age, sex and marital status, important and statistically significant socioeconomic differences in the course of many generic health status measures exist, covering perceived health as well as handicaps and disabilities. Even when base-line health status is taken into consideration, important differences remain which are statistically significant for long-term disabilities and for perceived general health.

These findings imply that socioeconomic health differences not only originate from a higher incidence of disease or health problems in lower socioeconomic strata, but also exist because the course of present health problems is worse in these strata.

Socioeconomic differences are also present in the course of specific chronic conditions, for example in diabetes or heart disease.

In diabetes regular medical care is important for its long-term course[3] which makes it a good candidate to study socioeconomic differences in the course of the disease and relate these differences to differences in the use of health services relevant for diabetes. Over a two-year period, a larger proportion of diabetics with primary school reports complications of this disease than diabetics with intermediate vocational training or higher. This relates to visual impairments, pain in the legs, complaints of angina pectoris and

complaints indicating polyneuropathy. After two years the prevalence of all these complications together is also statistically significantly higher among those with primary school, adjusted for base-line health status and sociodemographic confounders.

At the same time, differences according to level of education exist in the attendance of certain services. Controlling for age, sex, type of diabetes, the number of complications and duration of the disease, a relatively small proportion of lower educated diabetics reported controls by a specialist, consultation with a diabetes nurse or weight checks; although not statistically significant, also a smaller proportion of diabetics with primary school reported eye controls. However, the lowest control rates were not always in the group with the lowest level of education, and a direct link with a higher prevalence of complications after two years could not clearly be demonstrated.

In heart disease, the course of angina pectoris after two years is statistically significantly less favourable among lower educated men and women compared to those with higher vocational training or university. Likewise, the course of heart failure is less favourable for lower educated men.

Differences in the course of heart disease according to level of education diminished after adjusting for base-line cardiac condition. The explanation of the remaining differences varies between men and women. Behavioural factors (smoking, alcohol consumption, exercise) explains part of the remaining differences in the course of angina pectoris in men and women, whereas in women differences in the use of health services and psychosocial stress also modestly contribute to an explanation. Behavioural factors in men and psychosocial stress in women partly explain differences according to level of education in heart failure.

10.2 Validity of the results

10.2.1 Internal validity

Introduction

Internal validity implies validity of inference for the study subjects themselves.[4] Some important factors influencing the internal validity of a study will be considered: selection bias, information bias and confounding. Selection bias pertains to the selection of study subjects from a sample, information bias to obtaining the information from these subjects. Confounding is the mixing of the effect under study with other factors. Distortion of the study results occurs when bias or confounding factors are linked with the central variables in this study, i.e. health service use, health status or socioeconomic status.

Nonresponse (1) and cross-sectional analysis (2) will be discussed as two possible ways in which selection bias may operate in this study. Differential misclassification (3) and cross-sectional analysis (4) are two mechanisms through which information bias may express itself. Issues of confounding (5) will be discussed after that.

(1) Selection bias due to nonresponse

Selection bias owing to nonresponse is an important issue when carrying out health surveys in the general population. Although a response of 72.3% of the base-line measurement in the LS-SEDUHS is quite satisfactory, the effect of nonresponse should be evaluated since it may influence inference of study results.

Bias may become an issue after a few measurements even when differences in nonresponse after a first measurement seem unimportant. A follow-up study makes high demands on the respondent's motivation, which may gradually wane after a couple of years.

A discussion about these issues starts with an analysis of the effects of nonresponse in 1991, followed by an analysis of the effects of nonresponse during follow-up.

In analyses of *socioeconomic differences in the use of health services,* bias occurs if differences in use by level of education differ between respondents and nonrespondents. There is no way to tell whether this occurs, since data about health service use are not available in the GLOBE postal survey. However, the distribution among respondents and nonrespondents according to educational level of the most important determinant of health service use, i.e. health status, can be evaluated. Health data from the GLOBE postal survey are available for those who were to be respondents and nonrespondents later when data for the LS-SEDUHS were collected. Table 10.1 shows that educational differences for perceived general health among respondents are somewhat overestimated. For chronic conditions, there is hardly any bias because of nonresponse. If response bias occurs, it is likely to elicit overestimated health differences (and possibly differences in health service use) according to level of education. Hence, the contribution of health status may be overestimated when adjusting for health variables.

The contribution of an explanatory factor might be over- or underestimated when the association between the explanatory factor and education or the association between explanatory factor and health service use differs between respondents and nonrespondents. Except health status, bias in other explanatory factors cannot be evaluated since there are no data about these characteristics of nonrespondents. Because respondents are 70% of the total sample, associations between the variables of interest should differ quite substantially between respondents and nonrespondents to create major bias.

To assess the effect of nonresponse in the analysis of *socioeconomic differences in the course of health status* the analysis concentrates on the central variables socioeconomic status (represented by education) and health status (represented by perceived general health). To explore possible differential response according to these characteristics, we determined their association with nonresponse in a multiple logistic regression on the population of LS-SEDUHS respondents in 1991. Response in 1993 was the dependent variable and health status and education (both in 1991) were independent variables, with age and sex as control variables.

Nonresponse was statistically significantly higher in the lowest two educational categories and among those who perceived their health as "less than good" (table 10.2). Table 10.2 also shows that these response patterns occurred independently from each other, i.e. the low response rates of persons with primary school could not be entirely accounted for by their unfavourable perceived general health, which also caused low response rates. Nonresponse creates bias if differences in the course of health status by level of education are not the same among respondents and nonrespondents. The course of health status could not be evaluated among nonrespondents in

Table 10.1 Health differences by level of education according to data from the GLOBE survey in Spring 1991, controlling for age and sex for the whole LS-SEDUHS sample, LS-SEDUHS respondents and LS-SEDUHS nonrespondents (logistic regression analysis)

	Whole LS-SEDUHS sample	LS-SEDUHS respondents	LS-SEDUHS nonrespondents
	Odds Ratio [95% CI]	Odds Ratio [95% CI]	Odds Ratio [95% CI]
Perceived general health less than 'good' in Spring 1991 survey			
University, higher vocational training	1.00	1.00	1.00
Intermediate vocational, higher secondary school	1.87 [1.25-2.03]	1.72 [1.29-2.29]	1.29 [0.80-2.09]
Lower vocational, lower secondary school	2.65 [1.83-2.86]	2.66 [2.05-3.45]	1.55 [1.00-2.39]
Primary education	4.15 [3.27-5.28]	4.88 [3.68-6.48]	2.65 [1.68-4.20]
One or more chronic conditions in Spring 1991 survey			
University, higher vocational training	1.00	1.00	1.00
Intermediate vocational, higher secondary school	1.30 [1.02-1.66]	1.43 [1.07-1.92]	1.01 [0.63-1.60]
Lower vocational, lower secondary school	1.41 [1.13-1.77]	1.46 [1.11-1.91]	1.31 [0.85-2.02]
Primary education	1.88 [1.44-2.44]	1.90 [1.39-2.61]	1.88 [1.15-3.08]

1993; since health differences at a certain point in time are partly the result of differences in the course of health status, the assumption in the following analysis was that differences in health status are a proxy for (future) differences in the course of health status.

Thus, a larger or smaller difference in health status in 1991 according to level of education among respondents in 1993, compared to nonrespondents in 1993, may indicate the existence of bias. When health status is the dependent variable this implies that response is an effect modifier of the relation between education and health status or, in analytical terms, that an interaction is present between education and response. This interaction appeared to be statistically not significant (table 10.3). Still, biased results of longitudinal analyses could not be totally excluded. Bias, if it is influential, will be toward an underestimation of differences in the course of health status by educational level, since those with the lowest level of education and a bad health status have the highest probability to drop out of the study (table 10.3). As health differences according to education are underestimated rather than overestimated, meaningful inference of the study results is still possible.

Explanatory analyses will be biased if associations between the course of health status and explanatory factors, or socioeconomic status and explanatory factors, differ between respondents and nonrespondents. The association between education and some health status measures in 1991 was weaker among nonrespondents than among respondents. This may be explained by selective response, caused by higher nonresponse among those with the worst health status (predominantly in lower social strata) or because of higher mortality among those who are very ill, who are likely to be in the lowest socioeconomic strata. This implies that the contribution of these baseline health status measures might have been overestimated since their association with education was 'too strong' in the study population. We have no

Table 10.2 Nonresponse 1993 LS-SEDUHS population: association of nonresponse with perceived general health (PGH, 1991) and education, controlling for age and sex (logistic regression analysis)

	Odds Ratio [95% CI]
Education, controlling for PGH (1991), age and sex	
University, higher vocational training	1.00
Intermediate vocational, higher secondary school	1.14 [0.76-1.73]
Lower vocational, lower secondary school	1.56 [1.08-2.25]
Primary education	2.22 [1.50-3.29]
PGH (1991), controlling for education, age and sex	
Very good or good	1.00
Less than good	1.25 [1.11-1.40]

data on the distribution by socioeconomic status of other explanatory variables among respondents and nonrespondents. In this respect a sensible evaluation of response bias cannot be carried out.

(2) Selection bias due to cross-sectional analysis

Our explanatory analyses of socioeconomic differences in the use of health services were cross-sectional. We examined differences in the use of the general practitioner or specialist by level of education, and investigated whether these differences could be explained by health status, health insurance, and psychosocial factors like long-term stressful conditions, social support, locus of control, coping, and attitudes towards health care.

In saying so, it is suggested that these factors have a causal relationship with health service use by being a determinant of the outcome, and not a consequence. This type of inference from cross-sectional analysis may be susceptible to selection bias. The identification and, hence, selection of persons with health service use is inseparable from the measurement of explanatory factors, so it is not clear whether the factor causes use or whether use resulted in the presence of that factor. For instance, while it is likely that tendency to consult a doctor determines general practitioner consultations, it is also conceivable that consulting a doctor influences the tendency to consult.

Table 10.3 The interaction between response and level of education in the analysis of perceived general health (PGH, 1991), controlling for age and sex (logistic regression analysis)

	Odds Ratio [95% CI]
Education, controlling for PGH (1991), age and sex	
University, higher vocational training	1.00
Intermediate vocational, higher secondary school	1.36 [0.98-1.89]
Lower vocational, lower secondary school	2.07 [1.55-2.78]
Primary education	3.57 [2.60-4.90]
Response status, controlling for education, age and sex	
Respondent	1.00
Nonrespondent	1.49 [1.14-1.96]
Interaction education-response	
University, higher vocational training and nonrespondent	1.00
Intermediate vocational, higher secondary school and nonrespondent	1.54 [0.60-3.96]
Lower vocational, lower secondary school and nonrespondent	1.30 [0.56-2.99]
Primary education and nonresponse	1.73 [0.73-4.11]
Overall contribution interaction[a] education-response (3 df)	2.04 P=0.56

[a] Reduction in deviance when the interaction term is added to the regression model

In general it is safe enough to assume a causal relationship between health service use and the explanatory factors we used in cross-sectional analyses, as we wanted to explore the contributions of several factors which in the Andersen model were determinants of health service use.

(3) Information bias due to differential misclassification

Information bias may occur in analysis of *socioeconomic differences in the use of health services* if respondents report their health service use differentially by socioeconomic status. Although there is conflicting evidence[5,6] under-reporting of health service use may occur in lower socioeconomic strata.[7] If use is underreported by those with a low socioeconomic status, the higher consultation rates with the general practitioner will be underestimated, i.e. biased towards 1. The lower rates of consultation with a specialist or physiotherapist will be too low, i.e. biased away from 1.

In this study, the prevalence of the chronic conditions, in particular asthma or COPD, heart disease and diabetes mellitus is underestimated among those with a low level of education due to underreporting in those groups (chapter 3). Also other health status measures may be subject to this type of misclassification. Insufficient adjustment for medical need may result, implying a bias of the socioeconomic difference in use of general practitioner services away from 1 and a bias of those differences in the use of specialist services or physiotherapy towards 1. Since both underreporting of health status and underreporting of health service use may occur simultaneously and their effects are opposite, it is quite impossible to determine the net effect.

Consequences of differential misclassification for analyses of *socioeconomic differences in the course of health problems* are equally hard to determine in the absence of other health data from the same individuals. In the present analyses the socioeconomic differences in the outcome (health status) variable may be underestimated, while the same may simultaneously occur in adjustment for the socioeconomic difference in health status at baseline.

Another form of differential misclassification occurs when the propensity to report health problems increases among those with a lower educational level. This requires rather far-fetched assumptions. If it were the case, socioeconomic differences in the course of health problems found in the data would be overestimated. This type of flaw is not present in mortality data. Mortality is higher among the lower educated. A logistic regression analysis controlling for age, sex and marital status shows mortality differences by level of education, although they are not statistically significant (table 10.4). This analysis supports the core result of the longitudinal analyses. Socioeconomic differences in the course of morbidity are unlikely to be only artefacts arising from self-reports.

(4) Information bias due to cross-sectional analysis

Information bias may arise within the cross-sectional design of some analyses. This type of bias may occur because information about health service use and potential explanatory factors is all supplied by the respondent at the same point in time, with health service use taking place prior to the time of data collection. Thus, *reporting* (and not the actual level) of some explanatory factor may be influenced by the participant's use of health services, creating associations with health service use different from the actual ones. For instance, psychosocial stress may be unrelated to general practitioner visits, but the reporting of psychosocial stress may be different among those who recently visited their doctor (maybe because the doctor suggested that stress might be a component of the complaints they presented). If psychosocial stress also differs by socioeconomic status, it may thus found to be an explanatory factor of the socioeconomic differences in general practitioner consultations only because the information supplied by respondents who consulted their general practitioner was different from those who did not.

(5) Confounding

In the analysis of *socioeconomic differences in the use of health services* equal access for equal need is the starting point. Therefore, the influence of need as one of the strongest confounders should be removed by controlling for health status. Persons with a low level of education underreport chronic conditions, which has been analysed in depth for asthma or COPD, heart disease and diabetes mellitus in chapter 3. This differential misclassification may result in residual confounding when controlling for health status. In this study a great effort has been put into measuring health status in the best possible manner. Many aspects of health status have been covered: perceived general health, complaints, disabilities, handicaps and chronic condi-

Table 10.4 Mortality differences by level of education, controlling for age, sex, marital status (mortality data until july 1995)

Education	No. of respondents	No. of deaths	Mortality %	Odds Ratio [95%CI]
n=2640				
University, higher vocational training	426	14	3.3	1.00
Intermediate vocational, higher secondary school	541	18	3.3	1.24 [0.59-2.58]
Lower vocational, lower secondary school	1048	47	4.5	1.58 [0.84-3.00]
Primary education	625	37	5.9	1.47 [0.76-2.84]
Total	2640	116	4.4	
RD education, 3df				2.36 *P*=0.81

tions. Wherever possible, disease-specific questionnaires have been used to establish the severity of the overrepresented chronic conditions. The disease-specific questionnaires may compensate for differential misclassification of the overrepresented conditions, since these questionnaires contain detailed additional data and were used as one of the very standards against which misclassification has been established.

Still, health measurement may have been inadequate. Acute diseases or minor ailments have not been measured. Thus, health status measurement may have been biased toward the consequences of chronic, physical conditions. Even if psychological health, acute diseases and minor ailments were measured in this study, all information would have been derived from the respondent's answer to questionnaires. This may be insufficient for an adequate adjustment for health status. Different sources of health status measures, such as physical measurements or data from medical records, might have covered aspects of health status not encompassed in the answers to any of the questionnaires. A better classification of health status across different levels of socioeconomic status implies less misclassification. Since nondifferential misclassification leads to an attenuation of effects,[4] adjusting

Table 10.5 The association of health service use and the course of perceived general health and long-term disabilities 1991-1993: results of multiple ordinary least squares regression controlling for age, sex, marital status and base-line health status

	Regression coefficient[a]	
	Perceived general health in 1993[b]	Number of long-term disabilities in 1993[c]
No. of specialist consultations past 2 months		
0 (= ref.)	0	0
1	0.03 *P*=0.46	-0.00 *P*=0.93
2	0.13 *P*<0.05	0.05 *P*=0.34
3	0.15 *P*=0.12	0.01 *P*=0.86
≥ 4	0.04 *P*=0.65	0.06 *P*=0.43
Use of over-the-counter medicines past 14 days		
no (= ref.)	0	0
yes	-0.04 *P*=0.75	0.03 *P*=0.39

Model: health status measure 1993 = health status measure 1991 + socioeconomic status + age + marital status + base-line health status (1991) + relevant explanatory factors + health service use

[a] The higher the score, the worse health status is at follow-up; therefore, coefficients with positive signs indicate an association with worse health states at follow-up

[b] Score 1-5

[c] OECD long term disability indicator, score 0-8

for health status is likely to be better when more accuracy through the use of clinical data is achieved.

Inadequate control for health status in the explanation of *socioeconomic differences in the course of health problems* may explain a counterintuitive finding concerning the contribution of health service use: use of some health services was sometimes associated with a more unfavourable course of health problems.

Such an effect is illustrated in table 10.5. The table shows regression coefficients of specialist care and over-the-counter medicines in a multivariate analysis of the contribution of these health services to socioeconomic differences in perceived general health and long-term disabilities, controlling for base-line health status and other confounding factors. Although most coefficients are not statistically significant, the positive signs indicate an unfavourable effect of health service use on subsequent health status. E.g. for those who had two specialist consultations in the past two months, perceived general health developed more unfavourably by a mean increase of the score of 0.13.

Although it is logical and reasonable to expect that use of health services improves health status, an association of health service use with adverse developments in health status may be explained by the fact that people with health problems turn to the health service. Those who consulted a specialist may have a worse health status at the time than those who did not, even if chronic conditions and other health variables were controlled for. If this is true, also a more unfavourable development of health status is likely among those who turned to the specialist. In that case, health service use is a determinant of improvement and an indicator of health problems at the same time, a phenomenon known as 'confounding by indication'. To avoid confounding by indication base-line health status needs to be rigorously controlled for. An association between an adverse course of health status and service use persisted in the analysis despite rigorous control for base-line health status. Apparently use was still an indicator for health status and embodied an aspect of health status not covered by the (self-reported) health status measures. Use of other data sources, e.g. medical records, results from blood tests or other tests, might have alleviated some of these problems.[8]

Conclusion

Selection bias, information bias and confounding may overestimate or underestimate socioeconomic differences. The exact net effect of all influences together is hard to predict. The results also depend on the data or analysis at hand.

For *socioeconomic differences in the use of health services*, selection bias due to nonresponse may overestimate these differences, while the opposing effect may occur if one controls for health status, since socioeconomic health differences are also overestimated. Information bias due to differential mis-

classification, nondifferential misclassification and residual confounding due to imperfect control for health status may lead to insufficient adjustment for health status. Since most effects indicate insufficient adjustment for health status, it is most likely that socioeconomic differences are biased away from 1 for odds ratios above unity (e.g. general practitioner consultations), and are biased toward 1 for odds ratios below unity (e.g. specialist consultations).

For *socioeconomic differences in the course of health problems*, selection bias and information bias lead to an underestimation of these differences in the outcome. But since analyses are adjusted for health status too, this would imply residual confounding and hence an underadjustment. The principal inference made from these results – a more unfavourable course of health status is present among the lower educated – is not affected by bias; estimates of the differences may even be on the conservative side.

10.2.2 External validity

Introduction

External validity, or generalisability, refers to the validity of the inferences as they pertain to people outside the study population. The point of generalising specific findings in one population to other populations is lifting the findings out of their specific context, and go one step further in relating the results to more abstract concepts which the analysis represents.[4,9] The question of external validity depends of which results will be generalised. The scope of generalisability of socioeconomic differences in health service use is potentially different from the extent to which generalisation of socioeconomic differences in the course of health problems or chronic diseases is possible; both will be discussed separately (1). The next paragraphs contain a discussion of the generalisability of the results to the general population in the region (2), the population outside the region (3) and populations in other countries (4).

(1) Scope of generalisability of the study results

Generalisations of the results of *socioeconomic differences in the use of health services* to completely different sectors of the health care system should not readily be made, since many determinants of use are likely to be completely different. This is true for use of preventive, dental and mental health services. The question rather is whether the explanation of differential use according to educational level can be extended to other services than the general practitioner and the specialist but within the domain of the (curative) health care services discussed in chapter 4.

In descriptive analyses, use of the general practitioner was higher in groups with a lower socioeconomic status, while use of the specialist and physiotherapist was lower in these strata. The impression prevails that the use of directly accessible primary care services is higher in groups with a

lower socioeconomic status while specialised, secondary or tertiary, services are used less in these strata. This observation is shared with more studies of health service use.[10-13] Put this way, observations of the LS-SEDUHS may be generalised.

Another issue is whether results may be generalised to groups with specific diseases, other than the ones studied. Often patterns of health service use by level of education persist independently of chronic condition, but this is not always so. For instance, consultation with a specialist is lower in groups with a lower level of education. This pattern is virtually absent in heart disease and asthma or COPD, is much stronger than average in diabetes, and persists in low back trouble and the remainder of the study population (table 10.6). Results may only be generalised after careful consideration of the context for which generalisations are being made. Similar caveats apply to explanatory analyses.

Socioeconomic differences in the course of health problems may be generalisable to some extent. Socioeconomic differences in the course of generic health status measures are unlikely to be exclusively associated with the specific diseases studied in this thesis. Differences in survival by socioeconomic status have been observed in diseases like cancer, COPD and AIDS.[14-16] On the other hand, health status is not the same as survival. Differences in the course of certain health status measures will depend on the disease and may not be generalisable to other diseases or other health status measures. For instance, while a socioeconomic difference in the course of a generic measure may be quite generalisable to other diseases, this will be less obvious when specific handicaps in specific conditions are concerned.

Table 10.6 Odds ratios for consultation with a specialist, by level of education, in subgroups of the LS-SEDUHS sample controlling for age, sex, marital status and perceived general health

	All	Asthma/ COPD	Heart disease	Diabetes	Low back trouble	Other or no chronic disease
	N=2686	*N*=599	*N*=752	*N*=233	*N*=928	*N*=901
University, higher vocational training	1.00	1.00	1.00	1.00	1.00	1.00
Higher secondary school, intermediate vocational training	1.15	1.42	0.92	0.36	0.78	1.46
Lower secondary school, lower vocational training	0.83	0.89	0.84	0.29	0.57	0.92
Primary school	0.85	1.15	0.96	0.20	0.81	0.72
RD education (3 df)	8.20 *P*<0.05	3.75 *P*=0.29	0.65 *P*=0.89	7.10 *P*=0.07	8.24 *P*<0.05	7.27 *P*=0.06

Explanatory factors are often disease-specific; results of the explanatory analyses in this study are not generalisable to other diseases or health status measures, unless common risk factors are involved.

(2) Generalisability to the general population in the region

This study took place in and around the city of Eindhoven on a sample of adult non-institutionalised Dutch nationals of 15-74 years of age, oversampling people reporting asthma or COPD, heart conditions, diabetes or low back trouble. Generalising the results to the population of the whole region, would mean they are also valid for populations including children, ethnic minorities not possessing the Dutch nationality and institutionalised individuals. It also means generalising results to a population where chronic conditions are not overrepresented.

First, *socioeconomic differences in the use of health services* will be considered.

For children, determinants of health care use differ from adults.[7] For ethnic minorities the distribution of determinants of health service use by socioeconomic status may also be quite different from the Dutch population.[17] In addition, other determinants that differ by socioeconomic status may be important in ethnic minorities, because of cultural differences with the study population.[18]

The results are therefore not necessarily applicable to ethnic minorities, or populations with substantial quantities of these. Institutionalised persons will use health facilities completely differently from the research population. Many people live in an institution because of health problems, and many institutions have their own care facilities. Results are therefore only applicable to the adult non-institutionalised population in the region with the Dutch nationality.

Patterns of health services use by level of education in the LS-SEDUHS resemble those found in the Netherlands Health Interview Survey (NethHIS),[19] which is a sample of the general non-institutionalised population. Apparently, the oversampling of four major chronic conditions does not affect generalisability of the broad descriptive findings in our study.

When studying people with health problems, *socioeconomic differences in the course of health problems* or chronic conditions may also be present in populations with children and ethnic minorities since socioeconomic health differences and differences in survival, mortality and the incidence of disease have also been found in these groups.[7, 17,20-22]

(3) Generalisability to the population outside the region

It has been said before that *socioeconomic differences in the use of health services* are similar to those found in the NethHIS. Even when health status is controlled for, utilisation patterns by socioeconomic status in the NethHIS show the same tendencies as in the LS-SEDUHS. For example, the NethHIS

shows a higher use of the general practitioner in groups with a low level of education compared to those with a high educational attainment, a higher use of the specialist and a higher use of the physiotherapist, while the utilisation patterns of the latter two reverse when they are adjusted for health status, although the educational differences do not always exactly match those of the LS-SEDUHS. Since the results from the Netherlands Health Interview Survey (NethHIS) may be considered representative for the non-institutionalised Dutch population, similar results in the LS-SEDUHS and the NethHIS imply that generalisation to the (Dutch) population outside the region is justified as far as results regarding health services use are concerned (with and without adjustment for health status).

To generalise explanatory analyses, the distribution according to level of education of the explanatory factors must be similar to the rest of the country. For instance, associations between most psychosocial variables and socioeconomic status in other Dutch studies are similar to the ones found in the LS-SEDUHS[23,24] so in this respect results may be generalised.

It is unlikely that the population with a certain disease or health problem in and around Eindhoven differs in such a way from the Dutch population in general that it would result in *socioeconomic differences in the course of health problems* that are not found elsewhere. Related phenomena such as socioeconomic health differences, are found throughout the country,[25-27] which supports the idea that generalisation beyond the region is sound. The question also is whether the distribution of determinants of the outcome across educational categories is the same in Eindhoven and surroundings as in the Netherlands. GLOBE data and national data about differences in behavioural risk factors according to level of education generally show the same patterns.[25,28] Smoking, never drinking alcohol and overweight are more common in those with a lower socioeconomic status in both data sources.

(4) Generalisability to other countries

An important issue is whether the results of *socioeconomic differences in the use of health services* are applicable to countries outside the Netherlands. That is not necessarily so, and will largely depend on the organisation and finance of the health care system of the country considered. For instance, the United States have a health care system that is organised and financed completely differently from the Netherlands. Consequently, the socioeconomic patterning of health service use is quite different in the US, where people with a low socioeconomic status (with a large proportion of uninsured among them) generally show lower use rates of primary care physicians compared to those with a high socioeconomic status, instead of the higher use rates reported in the Netherlands.[29-31] In contrast to the US, health care systems in the UK and the Nordic countries are in many ways similar to the Netherlands. Some patterns of use according to socioeconomic status found in the present study can also be seen in those countries.[13,32,33] A large British

survey in general practice has studied differences in use by (occupational) social class.[32] Controlling for health status and distance to the surgery, general practitioner consultations were found to be more prevalent in lower social classes. A Norwegian study of referrals (both to physicians and hospitals) controlling for volume and geographical distribution of resources, gender, and health status found that lower educated people were less likely to be referred.[13]

Results of explanatory analyses may be generalisable to countries with comparable health care systems, but some care is warranted. Where features very specific for the Netherlands are examined, like the health insurance system, results may not be generalisable to other countries at all.

As socioeconomic health differences are an almost ubiquitous phenomenon, it is unlikely that one aspect of it, *socioeconomic differences in the course of health problems or disease,* would be a highly unique feature of the Dutch population. Survival differences by socioeconomic status have been documented internationally[14-16] which supports the notion that socioeconomic differences in the course of morbidity represents a general experience. There are few reports in the international literature about socioeconomic differences in the course of morbidity. Two studies from the US investigating functional limitations in the elderly describe a worse physical functioning over time in lower educated people.[34,35] These results indicate that socioeconomic differences in the course of health problems exist outside the Netherlands.

The results of explanatory analyses may only be generalised to other countries when the distribution of the explanatory factors by socioeconomic status is similar to the Netherlands. This may be true for many behavioural risk factors (e.g. smoking) but is less self-evident for the use of health services.

10.3 Interpreting the results

10.3.1 Socioeconomic differences in the use of health services

Are differences in health service use large or small?

present study is difficult. An epidemiological measure of impact, the population attributable risk (PAR), may assist in interpreting the differences. The PAR represents the excess risk that can be attributed to a risk factor in the population of interest. In terms of the present study the PAR would represent the proportion of people in the population who consulted, say, their general practitioner because of factors associated with lower levels of education. In this case these factors will be considered adjusted for differences in sociodemographic factors or health status. The PAR for general practice consulta-

tions is 0.29.[a] This indicates that 29.0% of general practitioner contacts in Eindhoven and surroundings takes place because of factors associated with lower levels of education. In a population of 360,000 of whom 50% had consulted a general practitioner in the past two months, this mounts to 52,200 people having had general practitioner contact. Such a calculation shows that differences in the use of health services according to educational achievement found in the present study can be regarded as substantial.

Substitution

Adjusting for health status, use of the general practitioner was higher in groups with a low socioeconomic status as compared to those with a high socioeconomic position. Lower educated people reported less specialist consultations, for which referral by the general practitioner is needed. This pattern was quite consistent and could also be observed in specific diseases like diabetes. This finding evokes the question whether the general practitioner and specialist substitute for each other. Substitution is understood here as equal quality care for the same problem, which is performed by one type of provider instead of by another, or which is used by the health care consumer in place of another service.

If substitution occurs, there may be no problem in terms of equal access for equal need. Whether general practitioner consultations substitute for specialist consultations and vice versa is impossible to decide on the basis of the data of the LS-SEDUHS, which contains no reliable information about consultation reasons. Data about diagnostic or therapeutic interventions, necessary to establish whether equivalent care was provided, are also lacking.

However, there is an argument against substitution in our data: when socioeconomic differences in consultation with the specialist, already adjusted for sociodemographic variables and health status, are additionally controlled for consultations with the general practitioner, the differences by level of education become even larger than they were (table 10.7). This implies that

[a] To calculate the Population Attributable Risk (PAR), the formula

$$\frac{R - R_0}{R}$$

is used, where R denotes the probability of contact with a general practitioner in the total population and R_0 denotes the probability of general practitioner contact among the 'unexposed', those with university education. Thus, the base-line rate is subtracted from the rate in the whole study population and calculated as a percentage of the latter. To calculate R and R_0, the regressionmodel used in table 4.3 was fitted again with all data reweighted to the population of Eindhoven and surroundings (N=363,142). The fitted values of all cases were calculated, summed, and divided by the number of cases. This yields R=0.50, the probability of general practitioner contact in the entire population. The same procedure was followed calculating fitted values as if everyone had university education; this yielded R_0=0.355. Consequently, the PAR can be computed as 0.29.

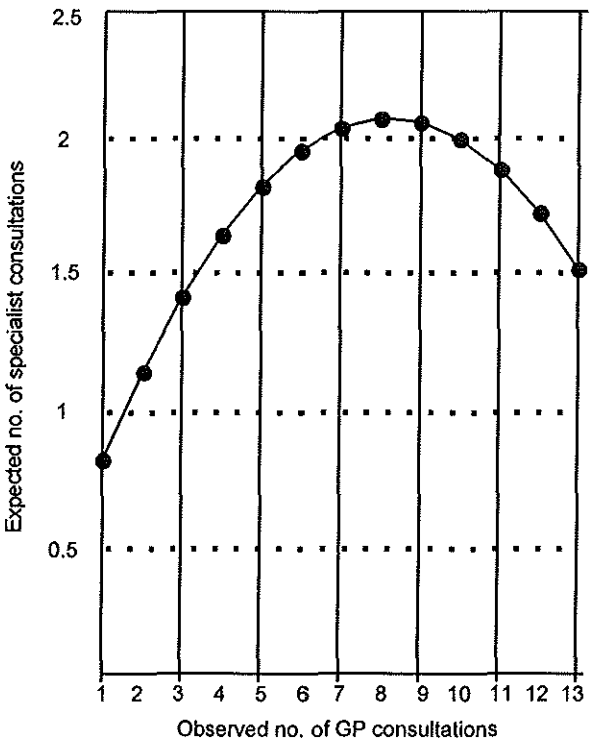

Figure 10.1 GP and specialist consultations (Specialist consultations estimated on the basis of regression)

Table 10.7 Differences by level of education in consultation with a specialist, controlling for sociodemographic confounders, health status and general practitioner consultation

Level of education	Model 1[a]	Model 2[a]
	OR [95% CI]	OR [95% CI]
University, higher vocational training (=ref.)	1.00	1.00
Higher secondary school	0.73 [0.40-1.32]	0.66 [0.36-1.20]
Intermediate vocational training, lower secondary school	0.70 [0.39-1.27]	0.62 [0.35-1.12]
Lower vocational training, primary school	0.58 [0.32-1.04]	0.51 [0.28-0.92]
Overall contribution of education[b]	5.83, *P*=0.14	7.39, *P*=0.06

[a] ***Model 1:*** specialist consultation= constant + age + sex + marital status + health status measures [+education]
Model 2: specialist consultation= constant + age + sex + marital status + health status measures + general practitioner consultation [+education]

[b] Reduction in deviance of education, 3 df

the likelihood to consult a specialist increases given a consultation of the general practitioner. An estimation of the number of specialist consultations from the number of general practitioner consultations by means of an ordinary least squares regression shows that only very frequent consultation of the general practitioner is negatively associated with specialist consultation (figure 10.1). Still, substitution between specialist and general practitioner care for certain complaints or in certain patients cannot be ruled out, although it is hard to say that 'the' general practitioner substitutes 'the' specialist. Two services may be substitutes in one case, but may be complementary in others. For example, the general practitioner may substitute the cardiologist in the treatment of hypertension, but will complement the cardiologist in the case of a myocardial infarction.

Is there no equity problem when substitution occurs? This is only so if the quality of care of the specialist and general practitioner is really exactly the same, in which case the two services together provide equal care for equal need. Otherwise, there is no real substitution and access to the specialist may be more difficult for those with a low socioeconomic status.

Who over-uses or under-uses?

If there is no substitution, the question arises whether those with a low socioeconomic status use 'too much' of the general practitioner or maybe 'too little' of the specialist, or whether those in high socioeconomic strata may have 'too low' general practitioner consultation rates or 'too high' specialist consultation rates. A preceding question is whether overuse or underuse poses problems, and for whom.

Overuse is undesirable because it generates unnecessary costs in a health care system where financial constraints are common. It is also undesirable as it constitutes an unnecessary claim on an already overloaded health care system. Furthermore, there is a danger of overtreatment and unnecessary side-effects. Underuse poses problems in terms of equitable access, undertreatment and avoidable morbidity.

Almost all results in this study are reported as differences by level of education relative to the use of those with the highest level of education. Whether care is used adequately or not is impossible to decide with the data at hand, and thus no judgments about over- and underuse can be made.

A study on the adequacy of general practitioner use in the Netherlands has demonstrated that people with a low level of education underutilise *and* overutilise at the same time.[36] Compared with highly educated people, the general practitioner was more often consulted for minor ailments by people with lower levels of education, whereas consultations for serious problems occurred less in the latter group. Similar phenomena may apply to our data, as far as general practitioner use is concerned. The results of the adequacy study are not entirely applicable to specialist consultations, since the decision to see a specialist for the first time is being made by the referring phy-

sician. Data about adequacy of referral by socioeconomic status are unknown to our knowledge.

The influence of health care reforms on the interpretation of the results

Since the beginning of this study period a number of reforms of the health care system have taken place concerning the health services in this study. Reimbursement of prescription medicines has changed as of 1 January 1992 from public or private health insurance to the exceptional medical expenses act (AWBZ) and changed back to the health insurance from 1 January 1996. The number of reimbursed physiotherapy sessions has been restricted to 9 since January 1996. Since the beginning of 1997 a deductible of 200 guilders has been introduced for the entire health care service, except for the general practitioner. Many more co-payments for services such as home care and district nursing have been introduced. Competition between the public health insurance funds and traditionally commercial private insurance companies has been introduced in 1992 and has gradually expanded.

Health care reforms may bring about changes in use for different socioeconomic groups. All these reforms are not likely to fundamentally affect the general validity of the study results, since e.g. the 200 guilder co-payment constitutes an extra threshold to use referral services, while the general practitioner is exempt from this regulation. Thus, people with a lower socioeconomic status are still likelier to use the general practitioner and may experience an (increasing) threshold to access the specialist. Data from the NethHIS show no fundamental change in the socioeconomic pattern of health service use in recent years.[25] However, when looking in close detail, an effect of health care reforms on the use of certain services according to socioeconomic status cannot be excluded.

10.3.2 Socioeconomic differences in the course of health problems

Are socioeconomic differences in the course of health problems large or small?

An interpretation of the magnitude of the findings with regard to differences in the course of health may be offered by the regressioncoefficients given as results in chapter 7. If those with primary school report 0.16 long-term disabilities more than those with higher vocational training or university after a follow-up of two years (chapter 7, table 7.4) the entire group with primary school (n=445) has 71 long-term disabilities more than the reference group, taking into account differences in sociodemographic factors and base-line health status in 1991. Reweighting the prevalence of all chronic conditions together derived from the GLOBE population to the original regional population, the number of disabilities occurring in patients with one of these conditions that could have been avoided in a two-year period in the study

region if everyone had higher vocational training or a university degree is 3356/100,000.[b] This is quite a substantial number, for these are disabilities that affect common activities in daily life.

The contribution of health services use

Health services use does not seem to contribute to an explanation of socioeconomic differences in the course of a disease in the present study. In our analysis of the course of heart disease in women, a small contribution of health services use was found, but in the analysis of the course of diabetes, health services did not contribute to the explanation of socioeconomic differences.

Two different mechanisms should be considered through which small contributions may be possible: a small contribution based on a weak association of health service use with the outcome, and a small effect based on small differences by socioeconomic status in the use of health services.

Weak associations of health service use with the outcome – There may be several explanations for a weak association with the outcome. Health and socioeconomic health differences are determined by many factors, of which health care is probably of moderate importance. An analogous thought can be applied to the course of health problems. However, specific outcome measures (e.g. severity of chest pain on exertion) are based on medically defined disease entities. For these specific health status measures some contribution of medical intervention is likely, but still not always found.

A second explanation may be that health service use has been measured on a too general level. Reasons to consult a doctor are numerous, even within specific disease categories. Some consultations will have no direct positive impact on health e.g. requesting a referral card, insertion of an IUD, or any diagnostic procedure awaiting final conclusions. Reliable information about consultation reasons was not available, so consultations with potential benefit could not be distinguished from those without a direct beneficial effect on the outcome. This is a form of non-differential misclassification. If this occurs, the association between the determinant and the outcome is always weakened.[4]

When use is measured on a general level it is impossible to tell when a beneficial effect may be expected. The effect of coronary bypass surgery on angina pectoris is already present shortly after the intervention, while the beneficial effect of regular diabetes control may become manifest only after ten years. The time-window of the questions about use in the base-line measurement encompassed two weeks to one year before october 1991.

[b] Based on the regressioncoefficients of table 7.4, model 3 and the combined prevalences of all 24 chronic conditions mentioned in the checklist question by level of education, reweighted to the non-institutionalised population of Eindhoven and surroundings.

The analysis was based on an association of use during that period with an outcome in 1993. This might be inappropriate for interventions with an immediate effect, of which the benefit had already taken place. In situations of short-term deterioration followed by swift improvement only use is recorded, but the dynamics of health status are not observed. In certain situations of quick improvement after an intervention, analysis of use in 1992, controlling for base-line health in 1991 and an outcome in 1993 might have been more appropriate. For other types of intervention or care a time-window of two years of follow-up may have been too short to record any beneficial effect.

All these explanations focus on the weakness of the effect of health service use on health status, while also the direction of the effect is an important aspect. For some services an unfavourable effect of use on the course of health status was found, possibly owing to insufficient control for base-line health status by relying on reported data. This has been discussed in paragraph 10.2.1.

Small differences by socioeconomic status in the use of health services – Another explanation for the modest contribution of health service use may be the small number of services of which the uptake is lower among those with a low level of education than among those with a high educational attainment. Of the services discussed in chapter 9, only contact with a cardiologist is reported by a lower proportion of men with primary education. The use of other services is reported by *more* lower educated men. Such a relatively low use of some services among those with a low level of education accompanied by a relatively high use of other health services is seen in diabetes (chapter 8) and also in asthma or COPD and low back trouble.[37]

In addition, if substitution mechanisms as discussed in paragraph 10.3.1 exist, lower use among lower educated persons may not have negative consequences for the course of health status since lower use may be compensated elsewhere in the health care system.

Therefore, an absence of the effect of health care use on socioeconomic differences in the course of health problems might be the result of an overall accomplishment of equal access for equal need in the health care system. The low contribution of health care to socioeconomic differences in the course of health problems may, therefore, also be interpreted as a 'real' result and may not only be there because of all sorts of errors in analysis or study design.

Decline, improvement and the course of health problems

Socioeconomic differences in the course of health status are analysed in the present study as a combination of deterioration and improvement of a particular health status measure. This was a conscious choice, as the net effect of deterioration and improvement is hard to estimate when both are ana-

lysed separately. However, both components may well have different determinants. Up to now, there is little knowledge about the difference between determinants of deterioration and determinants of improvement. Two recent studies from the US analysed differences in decline and improvement of functional status, and found different determinants for each.[38,39]

By examining recovery and deterioration in one analysis the contributions of certain determinants may have been obscured. Maybe the contribution of certain types of health service is more prominent in recovery than in preventing or mitigating deterioration, while the latter is more influenced by behavioural and psychosocial factors.

10.4 Implications of the results for health policy and research

10.4.1 Introduction

Implications of the results will be discussed in the order in which they were presented in this thesis. The implications for policy and research are summarised in separate boxes for the two main themes of the study (socioeconomic differences in the use of health services and socioeconomic differences in the course of health problems).

10.4.2 Socioeconomic differences in the use of health services

The contribution of medical need

This study confirmed earlier findings: higher use of health services by those with a low socioeconomic status can be explained by their less favourable health status in comparison with those in the upper ranks of society. The socioeconomic differences in use of many health services diminish or disappear when health status is taken into account. This implies that, generally speaking, a policy of equal access for equal need, independent of socioeconomic status, has been realised to a great extent. In specific circumstances however, for instance in the case of diabetes, important services seem to be used less by those in lower social strata.

It is a popularly held belief that frivolous use of health services is more present among people in an unfavourable socioeconomic position than among those in higher strata, because the absence of co-payments in public insurance is assumed to be an incentive for unnecessary use.[40] Although appropriateness of use could not be verified, one may say that frivolous use of health services does not seem to occur more in those with a low socioeconomic status than those with a higher social position, given the overall pattern of equal access for equal need. If the introduction of user-fees is intended to discourage frivolous use there is a chance that, if use is dimin-

ished, also essential use is reduced. Most use of care in lower socioeconomic groups is related to need, and maintaining equal access for equal need is an important task for health policy.

Despite their relatively unfavourable health status, the proportion of people with a low level of education who had consulted their general practitioner was statistically significantly higher than the proportion of persons with a high level of education. The workload of general practitioners with many patients with a low socioeconomic status in their practice is disproportionately high compared to their colleagues in less deprived areas. The results of this study support the rationale behind the measure to financially compensate general practitioners in deprived areas. Parallel to compensation formulas for health insurance, allocation of compensation may be refined by introducing socioeconomic indices in allocation criteria. Presently, compensation is only given for patients in certain postcode areas, identified on the basis of urbanisation, mean income level and the mean prevalence of people on social security.[41]

Whether low use of the specialist by those with a low educational level is substituted by the relatively high use of the general practitioner could not be established on the basis of this study. However, this is an important issue that deserves further study. Such a study would involve collecting detailed data on health status, reasons for consultation and actions taken by the doctor, preferably on a limited number of well-defined symptoms, complaints or diseases. Similar data could also help to establish over- and underuse, for instance whether the general practitioner is overused by persons with a low socioeconomic status, or whether the specialist is underused by them.

Box 1 Ingredients of a policy agenda concerning socioeconomic differences in the use of health services

- Equal access for equal need has been realised to a large extent in the Dutch health care system. In this era of health care reform it is essential to systematically monitor its preservation.
- Since socioeconomic status is a good predictor for health status, the introduction of an indicator for socioeconomic status in various resource allocation formulas may have added value.
- Health education aimed at influencing the attitude of groups with a low socioeconomic status towards consulting a doctor may partly reduce the high relative use rates in these groups. Whether this should be pursued depends on the ability of health education programmes to reduce only unnecessary use and hence stimulate appropriate use.

The contribution of enabling factors

Not all differences in the use of health services by socioeconomic status can be attributed by differences in health status. One of the other factors which may be responsible for the relatively high consultation rates of the general practitioner among lower educated persons is the health insurance system in the Netherlands.

The small contribution of health insurance to the explanation of socioeconomic differences in the use of the general practitioner (and specialist) does not seem to be related to the most obvious differences between public and private insurance: the possibility to have deductibles and partial coverage for primary care in the latter. Organisational aspects like the referral card system, which is compulsory for the publicly insured, may be partly responsible for the relatively high consultation rate of the general practitioner among those with a low socioeconomic status. A new referral card system, in operation since july 1991, has been criticised for its high administrative burden.[42] Simplifying this system might be an option to reduce the relatively high general practitioner use of people in lower socioeconomic strata. Before engaging in such an operation, prior research should examine whether the referral card system generates consultations for administrative reasons, a distinction that is usually not made in evaluations.[43]

Accomplishing equal access for equal need requires equal possibilities to insure oneself against medical costs at a fair price. Although health insurance did not explain the lower use of the specialist among those with a lower level of education, recent developments in health policy may threaten equitable access from the enabling side. Allowing market mechanisms in financing health care demands strong guarantees to ensure solidarity between higher and lower socioeconomic groups. Without it, insurance companies will inevitably demand high premiums to insure people with high risks, most of which will have a low socioeconomic status and consequently a low income. Effectively this will exclude people from essential care. There has been much discussion about resource allocation formulas to compensate insurance companies for having a disproportional amount of 'bad risks' among their insured. Since socioeconomic status and health status are so strongly interlinked, socioeconomic indices like level of education or occupation are powerful predictors for the demand of care.[37,44,45] Including these indices in the compensation formulas deserves consideration, since they are likely to improve risk estimation and reduce chances for risk selection.

The contribution of predisposing factors

The propensity to consult a doctor explained part of the higher general practitioner consultation rate of lower educated people compared to those with a high level of education. The propensity to consult a doctor could be influenced by certain health policy measures such as health education.

Health education aimed at diminishing clearly unnecessary consultations may reduce the socioeconomic differences in contact with the general practitioner, although the effectiveness of health education to influence health service use can be doubted.[46] Therefore, before launching health education campaigns on a massive scale one must be sure about its effects and its effectiveness in terms of reducing frivolous use and/or stimulating appropriate use.

Whether the higher consultation rate of the general practitioner among the lower educated under control for health status is really all unnecessary consultation is not clear. Additional data about consultation reason and various non-chronic conditions by socioeconomic status are needed to be more conclusive about the contribution of attitudes to the explanation of socioeconomic differences in the use of the general practitioner.

Predisposing and enabling factors together contribute to the explanation of socioeconomic differences in general practitioner consultation. Still, after taking these explanations into account, important differences remain and other individual characteristics like psychosocial stress, coping styles and locus of control have no additional explanatory power. This may partly be due

Box 2 Ingredients of a research agenda concerning socioeconomic differences in the use of health services

- It deserves study to establish whether the lower specialist consultation rates among those with a lower level of education are substituted by higher consultation rates in general practice.
- Such a study needs detailed data on health status, consultation reasons and interventions and should focus on a limited number of well-defined and well-measured symptoms, complaints or diseases.
- The high consultation rates with the general practitioner among those with a low level of education may be further explained if in future studies measures of short-term and minor illness are included as measures for health status.
- These high consultation rates may additionally be explained by elements in the doctor-patient communication; qualitative research may generate hypotheses on this issue.
- Research on the contribution of health insurance to the explanation of socioeconomic differences in the use of health services should also pay attention to the influence of administrative factors.
- Research on the contribution of psychosocial factors to the explanation of socioeconomic differences in the use of health services should also use health specific measures rather than generic ones.
- Explanatory research of socioeconomic differences in the use of health services which require referral should not only take the patient, but also the referring physician as the unit of analysis.

to the operationalisation of these concepts with generic questionnaires (chapter 6). Health specific questionnaires may be more suitable for measurement in this context. The high consultation rates may also be explained by elements in the doctor-patient communication.[47] Qualitative research may generate some hypotheses on this issue.[48]

Characteristics of the referring physician, rather than the user, may be important for the explanation of socioeconomic differences in use when secondary care, subject to referral by the general practitioner, is considered. For use of this type of care the influence of the user is small.[49] Future research aiming to explain socioeconomic differences in the use of health services should therefore not only have the individual patient, but also the referring health care provider as unit of analysis.

10.4.3 Socioeconomic differences in the course of health problems

This study demonstrated important differences in the course of health status according to level of education. This is an important addition to the present knowledge of socioeconomic health differences, because studies on changes in morbidity by socioeconomic status are much less common than similar studies on incidence, mortality or survival. Differences in health status not only exist because of a higher incidence of disease; given a certain disease or health status the course of morbidity is less favourable in groups with a low educational level than among those with a high level of education. Therefore, primary prevention may not be the only way to tackle inequalities in health. Policies targeted at the chronically ill and interventions concerning patients in the clinical sector may also have an impact. Evidence for the latter is accumulating, especially concerning the secondary prevention of ischaemic heart disease through life-style change.[50-54] Involvement of clinicians, as well as patient organisations in reducing socioeconomic health differences may give new opportunities for health policy.

The contribution of health service use

We were unable to demonstrate effects of health service use in the explanation of socioeconomic differences in the course of health status. However, the interpretation of our results may hinge on some methodological difficulties which often arise in research linking outcome and use of health care. Insufficient adjustment for base-line health status is a frequently observed problem. A recent review by Hammermeister on the linkage of processes and outcomes of care mentions at least six studies which were not able to demonstrate a link between the process of care (i.e. a medical procedure or treatment) and the outcome (i.e. morbidity or mortality).[55] One recent study is mentioned in which processes of care were significant predictors of mortality.[56] As in our study, the use of health care is sometimes associated with

an unfavourable course of health status and health care use is an indicator for health problems instead of a determinant of the outcome.

This has important implications for future research of the explanation of socioeconomic differences in the course of health status. Care should be taken to adjust for health status at baseline with sufficiently detailed data. In our case, we were able to record many aspects of health status (chronic conditions, functional limitations, and perceived health) which may have been insufficient to adjust for health status because they were merely based on reports by the respondent. Data on clinical parameters as well as medical record data on, for instance, severity of chronic diseases or nutritional status, could have had important additional value. Still, all these data might not even be sufficient to control for base-line risk, since for instance the studies quoted by Hammermeister may have incorporated these data. He suggests research is confronted with some fundamental problems (and challenges): "Despite major advances in the last decade, our ability to adjust outcomes for severity of illness, comorbidity, and other patient-related risk factors is crude and limited. It is likely that the major portion of variation in outcomes from any treatment for any disease is unknown".[55] In addition, not only health status but also health care variables may be measured inadequately. Inadequate documentation of processes of care, or processes that reflect medical decision making, are considered to be partly responsible for the negative results.[55]

Serious future attempts to explain socioeconomic differences in the course of health problems require a circumscribed group of patients, with a well-defined base-line health status, investigating a specific intervention and linking it to a medically plausible outcome which is relevant to the patient.

Box 3 Ingredients of a policy agenda concerning socioeconomic differences in the course of health problems

- Socioeconomic differences in health exist not only because of differences in the incidence of health problems, but also because of the course of these health problems once acquired. Measures targeted to patients with chronic diseases, for instance through patient organisations, may therefore also reduce health inequalities.
- Similarly, involving professionals in the clinical setting may reduce health inequalities, for instance by promoting healthy life-styles.
- Since diabetics with a low level of education experience a higher incidence of symptoms suggesting long-term diabetes complications and since these groups have less health checks relevant for the disease, monitoring of care use in these groups is warranted.
- The relatively unfavourable course of heart disease among individuals with a lower level of education in conjunction with their health service use calls for monitoring service use in this group as well, especially as far as women are concerned.

Furthermore, expectations about the lag time between the intervention and its effect should be made explicit, and follow-up measurements should be tailored to those expectations.

Considering all the aforementioned shortcomings of previous studies, good quality data on health status and the health care process are essential. These data should not only be based on information from respondents, but also on good quality hospital data or data from patient records.

The approach of the LS-SEDUHS has nonetheless been useful. Differences in the use of health services according to socioeconomic status were found. If one assumes that the quality of care was equal among social groups these findings may nonetheless be considered meaningful. "Process measures may need to be used as proxies for outcomes for patients with complex medical conditions, when the many variables that influence outcomes of care cannot be controlled. Further, the long lead time required for some adverse outcomes is such that process surrogates are needed".[57] This view provides a basis to recommend measures aiming to reduce socioeconomic differences in the uptake of care that are likely to reduce socioeconomic differences in the course of health status. With the low prevalence of regular checks among lower educated diabetes patients in mind, these regular checks should be encouraged in these groups as well as among their general practitioners. In addition, the lower use of certain cardiac procedures among lower educated women warrants further research regarding the care received by this group in relation to outcomes.

The contribution of behavioural and psychosocial factors

The contribution of behavioural and psychosocial characteristics to socioeconomic differences in the course of health problems creates opportunities for intervention among those already ill. Also these groups may benefit from stopping smoking and regular physical exercise. This emphasises the important role of the physician and other health personnel as health educators. With health information the health personnel can make their own contribution to narrowing the health gap between higher and lower social strata.

The contribution of psychosocial stress is smaller compared to the behavioural factors, and psychosocial factors offer less possibilities for intervention. Nevertheless, interventions to alleviate the effects of stress may have some impact on the differential course of health status especially where women with heart disease are concerned.

Implications for further research in this area builds upon the determinants that were not addressed in this thesis. The importance of structural factors in the explanation of socioeconomic health differences deserves more emphasis.[58] We have found indications that structural factors may contribute to the explanation of socioeconomic differences in the course of health problems.[37] Research to elucidate their role is needed.

Box 4 Ingredients of a research agenda concerning socioeconomic differences in the course of health problems

- For a good assessment of the contribution of health services to socioeconomic differences in the course of health problems, further studies should use a large variety of data on health status; this implies that not only reported data, but also clinical data should be used.
- In order to minimise non-differential misclassification and maximise the opportunities for interpretable results, future studies should evaluate specific outcomes in a specific, well-defined population.
- In explaining socioeconomic differences in the course of health problems or disease, research should not only pay attention to health behaviour, but also to occupational and material factors as possible explanations.

At the end of this thesis, an evaluation of its title is appropriate. We have seen that the use of health care is fairly equally distributed across social groups in the Netherlands, although we may have discovered some fissures in the system. Despite this overall equity we have demonstrated substantial socioeconomic inequalities in the course of health problems, which imply unequal decline of health status, but also unequal improvement and, hence, cure. Of course health care cannot be held entirely responsible for this situation. Health care is only one of the factors influencing the course of disease. Still, equal access for equal need remains an important principle in the finance and provision of health care. Given the unfavourable course of health status for some people with a low socioeconomic position, we might even consider that for these groups in society need is more equal than for others.

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Summary

Equal access to health care for all individuals is a basic right and fundamental to health policy in many countries including the Netherlands.

Many studies have found that people with a low socioeconomic status (as indicated by their level of education, occupation or income) use health services more often. This is in accordance with the acknowledgement of inequalities in health between people with a different social position. People in lower social strata usually experience more health problems and higher mortality than people with more privileged positions. Thus, individuals with a low social position need health services more than their fellow citizens in the higher ranks of society. Therefore, the real question is not so much whether the use of health services is equal across social groups, but whether the health care system achieves *equal access for equal need*. The existence of socioeconomic differences in the use of health services, taking health inequalities into consideration, seems to be in contrast to this policy principle, especially if it concerns a lower service use among disadvantaged groups in society. A further question is what the explanation of differences in the use of health care across social groups could be when health status differences are accounted for. In addition, one may ask whether differential use of health services across social groups has any consequences for socioeconomic health differences themselves, in terms of development of certain health problems or slower recovery from others.

Against this background, discussed in ***chapter 1***, this thesis examines:

- socioeconomic differences in the use of health services and the explanation for these differences;
- socioeconomic differences in the course of health status and the explanation for these differences.

The framework we used for the description and explanation of socioeconomic differences in the use of health services is the model of the medical sociologist Andersen. It distinguishes three important factors which influence the use of health care. These three determinants of health service use are the predisposing factors, the enabling factors and medical need. The predisposing component involves characteristics existing prior to the onset of disease which reflect a person's propensity to use health care services. The enabling component suggests that people must have the means, e.g. health insurance, to use health care facilities. The need component reflects the urge to seek medical care because of the individual's objective or subjective health status.

In the context of Andersen's framework, the questions this study specifically tries to answer are:

(1) Do socioeconomic differences in the use of health services exist?
(2) To what extent can these differences be explained by differences in:
    (a) medical need;
    (b) enabling factors;
    (c) predisposing factors.

The description and explanation of socioeconomic differences in the course of health problems relates closely to the models applied to analyses of socioeconomic differences in mortality and survival. These studies usually take base-line health status into account, while explanations are frequently sought in behavioural risk factors shared by many common chronic conditions such as smoking, alcohol consumption and exercise, while also the effect of psychosocial stress is acknowledged frequently. All these factors are known to be differentially distributed according to socioeconomic status. The contribution of health services has been studied less extensively. Thus, the specific questions this study addresses with respect to socioeconomic differences in the course of health problems are:

(1) Are there differences in the course of health problems by socioeconomic status, regarding chronic conditions, disabilities, and handicaps as well as subjective aspects of health (self-perceived health)?
(2) To what extent can these differences be attributed to differences in:
    (a) base-line health status;
    (b) behavioural factors, psychosocial stress;
    (c) use of health services?

The design and data of the Longitudinal Study on SocioEconomic Differences in the Utilisation of Health Services (LS-SEDUHS) are discussed in ***chapter 2***. The LS-SEDUHS is a study among 2867 persons in the South-East of the Netherlands (Eindhoven and surroundings), of whom a large majority has asthma or chronic obstructive pulmonary disease (COPD), heart disease, diabetes and/or severe low back trouble. These persons were interviewed about their health status, health service use, socioeconomic status and other characteristics in 1991 and followed up yearly with a postal questionnaire. In the studies reported in this thesis, we use follow-up data obtained in 1993.

Chapter 3 considers an important problem one encounters when adopting the aforementioned approach, that is when individuals from different social strata report about their health status. The agreement between self-reports of health status and, for instance, clinical examinations or medical records varies according to socioeconomic status. Thus, self-reports may give wrong impressions of socioeconomic health differences or, maybe, of socioeconomic differences in the use of health services. With respect to asthma/COPD, heart disease and diabetes, respondent's answers on a

checklist of chronic conditions were compared with detailed diagnostic questionnaires and diagnoses given by the respondents' general practitioners. Mostly, less educated persons underreported chronic conditions, and hence survey data underestimate socioeconomic inequalities in the prevalence of chronic conditions.

The next three chapters deal specifically with the research questions related to the description and explanation of socioeconomic differences in the use of health services.

Chapter 4 describes differences according to level of education in general practitioner consultations, specialist consultations, physiotherapy contact, hospital admissions and the use of prescription and over-the-counter medicines. The proportion of people reporting health service use is usually higher among lower educated people than among their counterparts with a high level of education when medical need (health status) is not taken into consideration. An exception is the lower use of over-the-counter medicines among those with lower levels of education. When the more unfavourable health situation of the latter group is taken into account, the relative surplus in general practitioner consultations diminishes, but does not disappear. The pattern of excess specialist consultations and physiotherapy contacts reverses: now the proportion of lower educated people using these services is *smaller* when compared to those with a high level of education. The pattern according to socioeconomic status in hospital admissions is not so clear, and differences in the use of prescription medicines are small when medical need is taken into account. The pattern of use of over-the-counter medicines hardly changes. The conclusion is that patterns of health service use by socioeconomic status change considerably when medical need is taken into consideration, and that medical need explains much of the differences. Nevertheless, given a certain health status the use of health services differs by socioeconomic status in the Netherlands. Whether this violates the principle of equal access for equal need could not be established, since higher use of some health services by those with a low education may replace the lower use of others.

Such substitution may exist between the general practitioner and the specialist, and may be explained by differences in the enabling factor health insurance. Since type of insurance in the Netherlands is income-related, people with a low socioeconomic status will be predominantly publicly ('ziekenfonds') insured while people with a high social position will only be eligible for private insurance. Public and private insurance offer different incentives to use general practitioner and specialist care. Private insurance policies usually remunerate specialist bills, but not all private insurances cover costs generated by the general practitioner. This would perfectly explain why, adjusting for medical need, relatively large proportions of people

with a high socioeconomic status consult the specialist while their use of the general practitioner is relatively low. The contribution of health insurance to the explanation of socioeconomic differences in the use of the specialist and the general practitioner is the focus of ***chapter 5***. Differences in specialist consultations cannot be explained by differences in health insurance, whereas health insurance explains differences in general practitioner consultations only partially. Interestingly, we found out that this is not owing to private insurances offering deductibles or limited coverage in return for premium reductions. It is more likely to be caused by differences in regulatory aspects between these two insurance schemes: the need for referral cards issued by the general practitioner under the public scheme may be causing more general practitioner visits for administrative reasons.

Even though health insurance provides some additional explanation for the relatively high proportion of lower educated people with general practitioner contact, the differences with those with a high level of education is still quite large. Since the general practitioner is easily accessible, individual characteristics may play a large role in its use. ***Chapter 6*** examines the hypothesis that predisposing factors, such as the propensity to see a doctor, psychosocial stress, social support and personality characteristics, might explain the remaining difference in the use of the general practitioner. Of these factors only the propensity to see a doctor has some explanatory power. Neither psychosocial stress, nor social support or personality characteristics like coping styles or locus of control explain the residual surplus of general practitioner consultations among those with a low level of education.

The theme in the following three chapters is the description and explanation of socioeconomic differences in the course of health status. Socioeconomic inequalities in health exist because people with a low socioeconomic status develop more new health problems than people with a high socioeconomic status. It is also possible that the diseases in people with a low social position deteriorate more quickly, or improve more slowly. Up to now, more research effort has been put into studies of mortality and incidence differences according to social class than into studies of socioeconomic differences in the course of morbidity from chronic diseases. In an era in which survival from chronic diseases improves, the latter type of study becomes increasingly important both for public health and the clinical sector.

Socioeconomic differences in the course of various dimensions of health status, such as self-perceived health and disabilities, is the focus of ***chapter 7***. People with chronic diseases and a low education appear to have a more unfavourable course of many health problems than their highly educated fellow patients. This picture may be coloured because of the higher frequency of health problems among lower educated people, which are likely to produce more unfavourable health states at a later point in time. Taking

the less favourable base-line health situation of people with a low socioeconomic status into consideration diminishes the differences found earlier, but people with primary school still have a worse perception of their health after a two-year follow-up than those with higher vocational training or a university degree. The same is true for disabilities. Lower educated people have more disabilities after a two-year follow-up than those with a high educational achievement with the same characteristics. Indeed, the less favourable health situation of those in lower social positions is at least partly due to existing chronic conditions developing more unfavourably. This has important implications for health policy, since policy measures to reduce socioeconomic health inequalities should not only be directed at lower strata in the general population, but could also specifically reach out to those with a chronic illness.

Why chronic illnesses develop relatively unfavourably in patients with a low socioeconomic status is more closely examined in ***chapters 8 and 9.*** We have seen already that base-line health status explains some of the differences found, but the role of health care use and risk factor exposure have not been explored yet. ***Chapter 8*** concentrates on the course of diabetes, evaluated by complaints indicating diabetes complications, such as visual impairments, ischaemic heart disease, and polyneuropathy. Patients with diabetes and a low educational attainment who are followed up for two years are likelier to have visual impairments than those who reached higher levels of schooling. Also the likelihood to develop any of the complications studied is larger among those with a low level of education. At the same time, the latter group has a lower uptake of medical checks which are important for diabetes, and a lower proportion of them visited the specialist or the diabetes nurse. The less favourable course of diabetes and the lower use of health services among those with a low educational attainment suggests a causal link between the two. However, in the present study a direct link could not be demonstrated: differences in the course of health status could not be explained by differences in health service use according to level of education.

Chapter 9 concentrates on the explanation of socioeconomic differences in the course of heart disease. The course of chest pain (angina pectoris) and shortness-of-breath (a symptom of heart failure) is examined. Since men and women differ in risk profile and health service use, both sexes are analyzed separately. The course of angina pectoris and heart failure is less favourable among those in the lower educated categories. The presence of heart failure explains part of these differences in angina pectoris, and vice versa. Next, the contribution of the presence of other chronic diseases (asthma, chronic obstructive pulmonary disease and diabetes), behavioural risk factors (smoking, alcohol consumption, exercise), psychosocial stress and health service use (consultations with a cardiologist, angiographies, use of medica-

tion) to the observed differences is examined. Chronic diseases do not contribute to an explanation of differences in the course of both heart diseases according to socioeconomic status. Behavioural risk factors explain a fair part of the remaining differences in men and women. In men with angina pectoris, a substantial proportion of the difference between the groups with highest and lowest educational levels is explained by these factors. In contrast to men, the relatively unfavourable course of angina pectoris in lower educated women is further explained by higher levels of psychosocial stress and lower use of some health services. The more unfavourable course of heart failure in lower educated women is modestely explained by health behaviour but is also determined by psychosocial stress. Since there is accumulating evidence that not only healthy individuals but also patients with heart disease benefit from promoting healthy lifestyles to reduce coronary events, the conclusion is that clinicians are potential partners in reducing health inequalities in heart disease by stimulating these lifestyles among their patients.

The final chapter ***(chapter 10)*** discusses some general issues surrounding the validity and interpretation of the data. The reliance on self-reported data may have influenced the size of the socioeconomic differences reported in this thesis. Whether the net results are over- or underestimated is hard to predict most of the time.

Taking differences in need into consideration, socioeconomic differences in health service use show a general pattern which is very similar to findings in other countries: primary care services are used more by those with a low socioeconomic status, whereas specialised services are used less. It is harder to generalise the explanation of these differences to other countries, because explanatory factors such as the health insurance system are unique to the Netherlands.

The question whether the observed socioeconomic differences in the use of health services are large or small is also addressed by estimating the impact on health service use if everyone used the health service the way (very) highly educated people do. It is estimated that nearly 29% of the people in the research population who consulted their general practitioner would not have done so if they had the consultation pattern of those with the highest educational level, which is quite a large difference.

Some limitations of the results are brought up: the question whether use of the general practitioner substitutes use of the specialist cannot be resolved with the study data. Equally, the question which socioeconomic groups use 'too much' and which use 'too little' of certain services is hard to answer.

The issue whether socioeconomic differences in the course of health problems should be considered large or small is, again, addressed with a measure of impact. If everyone had higher vocational training or a university

degree, the number of disabilities which could be prevented would amount to 3356/100,000 in the research area of approximately 360,000 inhabitants. This too is considered quite a large difference, since these are disabilities that affect daily life. Reasons why a less favourable course of morbidity could not always be linked to lower use of health services are discussed. One of the reasons may be that people with declining health status turn to the health service, after which their health status may improve. Consequently, health service use may be associated both with decline and improvement of health status. It is also possible that lower use of a particular health service is compensated by a higher use elsewhere in the health care system, which was not incorporated in the analysis. This would imply that, on an overall level, equal access for equal need is realised.

A review of some implications of the results for research and health policy concludes this thesis. To gain more insight in some equity questions, the issue of a possible substitution between general practitioners and specialists should be unravelled. Also additional research on the issue which socioeconomic groups overuse and which groups underuse care is important in this respect. Nevertheless, since equal access for equal need seems to be realised to a large extent in the Dutch health care system one of the main recommendations towards policy makers is to monitor closely whether this situation is maintained in this era of health care reform.

A further evaluation of the contribution of health care to the unfavourable course of chronic conditions in those with a low socioeconomic status needs a disease-specific approach in a well-defined population, using not only self-reports but also using data supplied by doctors or hospitals. The main policy implication of the less favourable course of health problems demonstrated in this study has been mentioned previously: measures targeted to disadvantaged patients with chronic diseases may reduce health inequalities in addition to measures directed at such groups in the general population. The fact that an effect of health care was not always demonstrated does not imply that an improvement of access to certain services, such as medical checks in diabetes or cardiological services in women with heart disease, is not important for disadvantaged groups.

Samenvatting

Toegang tot gezondheidszorg is een sociaal grondrecht, dat onder andere verankerd is in het VN convenant voor sociale en culturele rechten. In ons land dient de overheid volgens artikel 22 van de grondwet de volksgezondheid te bevorderen, waaronder ook het instandhouden van een goede en toegankelijke gezondheidszorg kan worden begrepen. In Nederland bestaat vrijwel nationale overeenstemming over de toegankelijkheid van de gezondheidszorg. Het idee van gelijke toegankelijkheid wordt in opinie-onderzoek gesteund door 75% van de ondervraagden. En zodra er sprake lijkt te zijn van tweedeling in de zorg, is dit altijd goed voor een flink aantal krantenkoppen.

Niettemin heeft een aantal onderzoeken aangetoond dat er verschillen bestaan in het gebruik van gezondheidszorgvoorzieningen, die samenhangen met iemands maatschappelijke positie, ofwel sociaal-economische status. Over het algemeen maken mensen met een lage sociaal-economische status (afgemeten aan hun beroep, opleiding of inkomen) meer gebruik van de gezondheidszorg. Tegelijkertijd is uit onderzoek gebleken dat mensen met een lage sociaal-economische status een slechtere gezondheidstoestand hebben dan degenen met een hoge maatschappelijke positie. Met deze grotere behoefte aan zorg moeten we rekening houden wanneer we het gebruik van voorzieningen beoordelen: gelijke toegang naar gelijke behoefte. Wanneer we rekening houden met de slechtere gezondheidstoestand van degenen met een lage sociaal-economische status, dan blijkt dat zij over het algemeen niet méér gebruik maken van de gezondheidszorg. Van sommige voorzieningen, zoals de specialist en fysiotherapeut, gebruikt deze groep zelfs minder.

Tot nu toe ontbrak een samenhangend inzicht in sociaal-economische verschillen in zorggebruik, de achtergronden daarvan en de eventuele gevolgen voor de gezondheidstoestand. Een dergelijk inzicht is van belang voor het bepalen van beleid in een tijd van gezondheidszorghervormingen, waarbij de doelstelling van gelijke toegankelijkheid gehandhaafd dient te worden.

Tegen deze achtergrond, verder uitgewerkt in ***hoofdstuk 1***, worden in dit proefschrift onderzocht:

- sociaal-economische verschillen in het gebruik van gezondheidszorgvoorzieningen en de mogelijke verklaring van deze verschillen;
- sociaal-economische verschillen in het beloop van gezondheidsproblemen en de mogelijke verklaring van deze verschillen.

Het kader voor onderzoek van de eerste groep vraagstellingen is het model van de Amerikaanse medisch socioloog Andersen. Dit model onderscheidt drie belangrijke groepen factoren die het gebruik van gezondheidszorg-

voorzieningen bepalen: consumptiegeneigdheid, consumptiemogelijkheid en consumptienoodzaak. Consumptiegeneigdheid bestaat uit factoren die reeds bestaan voordat er sprake is van gezondheidsproblemen en die de neiging weergeven om van de zorg gebruik te maken. Consumptiemogelijkheid wil zeggen dat mensen middelen moeten hebben om van de gezondheidszorg gebruik te maken, zoals bijvoorbeeld een ziektekostenverzekering. Consumptienoodzaak, tenslotte, is de behoefte om de gezondheidszorg te raadplegen vanwege iemands subjectief of objectief bepaalde gezondheidstoestand.

Een nadere precisering van de vraagstellingen binnen het model van Andersen luidt:

(1) Zijn er sociaal-economische verschillen in gebruik van gezondheidszorgvoorzieningen?
(2) In hoeverre zijn deze verschillen te herleiden tot verschillen in:
    (a) consumptienoodzaak;
    (b) consumptiemogelijkheid;
    (c) consumptiegeneigdheid.

De beschrijving en verklaring van sociaal-economische verschillen in het beloop van gezondheidsproblemen steunen voor een belangrijk deel op wat eerder onderzoek naar sociaal-economische status aan het licht heeft gebracht. Zo is onder meer gebleken dat verschillen in overleving naar sociaal-economische status zijn toe te schrijven aan verschillen in de oorspronkelijke gezondheidstoestand, maar ook aan verschillen in leefstijlfactoren (roken, alcoholgebruik, lichaamsbeweging) en verschillen in de mate waarin mensen met psychosociale stress te kampen hebben. Elk van deze factoren verschilt namelijk naar sociaal-economische status, terwijl ze tegelijkertijd van invloed zijn op de gezondheidstoestand. Het gebruik van gezondheidszorg is in beginsel ook een factor die het beloop van gezondheidsproblemen kan beïnvloeden, maar hierover is veel minder bekend dan over de eerder genoemde factoren.

Aldus kunnen nu de vragen ten aanzien van sociaal-economische verschillen in het beloop van gezondheidsproblemen nader worden gespecificeerd:

(1) Zijn er verschillen naar sociaal-economische status in het beloop van gezondheidsproblemen, zowel ten aanzien van chronische ziekten, beperkingen en handicaps, als ten aanzien van subjectieve aspecten van gezondheid (ervaren gezondheid)?
(2) In hoeverre zijn deze verschillen herleidbaar tot verschillen in:
    (a) oorspronkelijke gezondheidstoestand;
    (b) leefstijlfactoren, psychosociale stress;
    (c) gebruik van gezondheidszorgvoorzieningen?

Dit proefschrift maakt gebruik van materiaal uit de Longitudinale Studie naar Sociaal-Economische Verschillen in Medische consumptie (LS-SEVM). De onderzoeksopzet en de gegevensverzameling van deze studie komen aan bod in ***hoofdstuk 2***. De LS-SEVM is een studie die is uitgevoerd onder 2867 personen in Eindhoven en omgeving. Het is een longitudinaal onderzoek, dat wil zeggen dat over de onderzoekspersonen op meerdere momenten in de tijd gegevens zijn verzameld. Doordat de studie deel uitmaakte van een groter onderzoek, kon door gebruikmaking van eerder door de ondervraagden verstrekte gegevens een oververtegenwoordiging worden aangebracht van mensen met CARA, een hartaandoening, suikerziekte of ernstige rugklachten. In het najaar van 1991 ondervroeg een enquêteur deze mensen nader over hun gezondheidstoestand, gebruik van de gezondheidszorg, sociaal-economische status en diverse andere gegevens. Het vervolg bestond uit een jaarlijkse postenquête; in dit proefschrift worden echter alleen gegevens uit 1991 en 1993 gebruikt. Dit onderzoek gebruikt opleidingsniveau als maat voor sociaal-economische status.

Hoofdstuk 3 gaat in op een belangrijk probleem van gegevens die zijn verkregen door zelfrapportage, zoals in dit onderzoek. Zelfrapportage van gezondheidstoestand is ten opzichte van klinische gegevens niet altijd even betrouwbaar, en deze betrouwbaarheid verschilt naar sociaal-economische status. Zelfrapportage kan dus een vertekende indruk geven van sociaal-economische gezondheidsverschillen en wellicht ook van sociaal-economische verschillen in zorggebruik. De antwoorden van de ondervraagden op de vraag of zij CARA, hartaandoeningen of suikerziekte hadden werden vergeleken met twee andere soorten gegevens. De eerste vergelijking was die met de antwoorden van de ondervraagden op uitgebreide vragenlijsten die speciaal ontwikkeld zijn om symptomen van de aandoening in kwestie aan het licht te brengen. De gegevens van de huisarts van betrokkenen vormden de tweede bron van vergelijkingsmateriaal. Over het algemeen onderrapporteren mensen met een lage opleiding de betreffende chronische aandoeningen. Simpele enquêtegegevens onderschatten dus sociaal-economische verschillen in het vóórkomen van deze aandoeningen.

De volgende drie hoofdstukken bevatten het materiaal waarmee getracht is sociaal-economische verschillen in zorggebruik te beschrijven en te verklaren.

Hoofdstuk 4 is een beschrijving van verschillen naar opleidingsniveau in het contact met de huisarts, specialist en fysiotherapeut, ziekenhuisopnamen en het gebruik van medicijnen op en zonder recept. Ten opzichte van hoger opgeleiden zijn er onder lager opgeleiden meer mensen die gebruik maken van de onderzochte voorzieningen, met uitzondering van medicijnen zonder recept. Wanneer grondig met verschillen in gezondheid tussen laag en hoog opgeleiden rekening wordt gehouden, dan blijken nog

steeds meer lager opgeleiden contact met de huisarts te hebben, hoewel het verschil met de hoger opgeleiden is afgenomen. Lager opgeleiden hebben daarentegen nu minder contact met de specialist en de fysiotherapeut dan hoger opgeleiden, terwijl er nauwelijks meer systematische verschillen naar opleidingsniveau zijn in ziekenhuisopnamen en het gebruik van medicijnen op recept. Nog steeds rapporteren relatief weinig lager opgeleid gebruik van medicijnen zonder recept. De gezondheidstoestand (consumptienoodzaak) is dus, zoals verwacht, een belangrijke factor bij het raadplegen van de gezondheidszorg en deze factor verklaart een groot deel van de sociaal-economische verschillen in zorggebruik. Toch lijkt het niet de enige factor te zijn, gezien het feit dat het gebruik van de huisarts onder lager opgeleiden groter en het gebruik van specialist en fystiotherapie lager is dan onder degenen met een hogere maatschappelijke status. Of dit ook betekent dat het principe van 'gelijke toegang naar gelijke behoefte' niet is gerealiseerd, is zonder nadere gegevens niet goed vast te stellen omdat bijvoorbeeld lager gebruik van de huisarts gecompenseerd kan zijn door een hoger gebruik van de specialist.

Ter verklaring van dit verschijnsel, ook wel aangeduid als substitutie, wordt nog wel eens op ons stelsel van ziektekostenverzekeringen gewezen. Dit stelsel zou het raadplegen van de huisarts bij de merendeels particulier verzekerde hoog opgeleiden tegengaan en hen stimuleren om de specialist te raadplegen, omdat sommige particuliere polissen wel kosten van de specialist vergoeden, maar niet die van de huisarts. Omgekeerd zouden de merendeels lager opgeleide ziekenfondsverzekerden ongelimiteerd voor van alles en nog wat naar de huisarts kunnen lopen, omdat zij hiervoor niets hoeven te betalen. De bijdrage van ziektekostenverzekering (consumptie-mogelijkheid) aan de verklaring van sociaal-economische verschillen in het gebruik van de huisarts en specialist is het onderwerp van ***hoofdstuk 5.*** Verschillen in ziektekostenverzekering blijken het lagere gebruik van de specialist onder lager opgeleiden niet te kunnen verklaren, terwijl ziektekostenverzekering slechts ten dele het hogere gebruik van de huisarts in deze groepen kan verklaren. Het belangrijkste verschil tussen een ziekenfonds- en particuliere verzekering is de mogelijkheid een eigen risico of gedeeltelijke dekking te nemen bij de laatste. Maar deze aspecten van verzekering bieden geen verklaring voor de opleidingsverschillen in huisarts- en specialistcontact, zodat andere verschillen tussen ziekenfonds- en particuliere verzekering mogelijk een rol spelen. Het systeem van verplichte verwijskaarten voor ziekenfondsverzekerden zou daarvoor een kandidaat kunnen zijn, omdat alle ziekenfondsverzekerden eerst naar de huisarts moeten alvorens zij doorverwezen worden naar een specialist.

Ziektekostenverzekering verklaart dus gedeeltelijk waarom het gebruik van de huisarts onder lager opgeleiden relatief hoog is, maar er blijven nog verschillen in huisartscontact tussen hoog- en laag opgeleiden bestaan.

Consumptiegeneigdheid, in de vorm van allerlei persoonskenmerken en andere psychosociale factoren die de beslissing om medische hulp te zoeken kunnen beïnvloeden, kan hiervoor de verklaring zijn. ***Hoofdstuk 6*** onderzoekt de bijdrage van dit type factoren aan de verklaring van verschillen in het gebruik van de huisarts. Alleen de houding van mensen tegenover gezondheidszorg, afgemeten aan iemands gedragsintentie (het voornemen om in een bepaalde situatie een arts te raadplegen) blijkt deze verschillen deels te verklaren. Andere factoren zoals coping (het omgaan met moeilijkheden), beheersingsoriëntatie (de mate waarin iemand zelf controle denkt te hebben over zijn/haar situatie), psychosociale stress en sociale steun bieden geen aanknopingspunten voor een verklaring. De hoge werkdruk van huisartsen met veel patiënten met een lage sociaal-economische status in hun praktijk lijkt dus maar zeer ten dele te kunnen worden verlicht door de houding van deze mensen tegenover de gezondheidszorg te beïnvloeden.

In de ***hoofdstukken 7, 8 en 9*** staan sociaal-economische verschillen in het beloop van gezondheidsproblemen centraal, gemeten over een periode van twee jaar (1991-1993). Sociaal-economische gezondheidsverschillen komen tot stand doordat nieuwe gezondheidsproblemen zich meer manifesteren onder degenen met een lagere sociaal-economische status, maar ook omdat bestaande gezondheidsproblemen in deze groepen mogelijk sneller verslechteren, of minder snel weer verbeteren dan onder degenen hoger op de maatschappelijke ladder. Tot nu is veel onderzoek gedaan naar sociaal-economische verschillen in sterfte en in het vóórkomen van nieuwe ziektegevallen, maar aan verschillen in het beloop van gezondheidsproblemen werd in deze context nog weinig aandacht besteed. In een tijd waarin sterfte aan chronische aandoeningen wordt uitgesteld door toegenomen behandelingsmogelijkheden, ligt het voor de hand om, in aanvulling op onderzoek naar sociaal-economische verschillen in sterfte, aandacht te besteden aan sociaal-economische verschillen in het beloop van chronische aandoeningen of gezondheidsproblemen. Voor public health is dit belangrijk omdat de taak om de ongelijke verdeling van gezondheid tussen groepen mensen te verminderen voor een belangrijk deel op dit terrein van de gezondheidszorg ligt. Maar omdat het bij sociaal-economische verschillen in beloop vooral mensen met chronische aandoeningen betreft hebben ook de patiëntenorganisaties en de curatieve sector belang bij bestudering van dit terrein. ***Hoofdstuk 7*** bevat een beschrijving van verschillen in beloop van diverse dimensies van de gezondheidstoestand naar opleidingsniveau. Het gaat om beloopverschillen in ervaren gezondheid, klachten en beperkingen in activiteiten van het dagelijks leven. Lager opgeleiden blijken in de onderzoeksperiode van twee jaar een ongunstiger beloop van hun gezondheidsproblemen te hebben dan hoger opgeleiden. Dit beeld kan vertekend

zijn doordat lager opgeleiden bij aanvang van het onderzoek al minder gezond waren. Maar ook wanneer dit in aanmerking wordt genomen, oordelen mensen met een lage opleiding na twee jaar ongunstiger over hun gezondheid dan hoger opgeleiden; ook rapporteren lager opgeleiden meer lichamelijke beperkingen. Bij de bestrijding van sociaal-economische gezondheidsverschillen is het dus niet alleen belangrijk maatregelen te richten op de algemene bevolking, maar om ook chronisch zieken als doelgroep te zien.

Sociaal-economische verschillen in het beloop van suikerziekte (diabetes) komen aan bod in ***hoofdstuk 8.*** Een maat voor het beloop van de ziekte is de mate waarin diabetespatiënten complicaties hebben die veel bij diabetes voorkomen, zoals oogcomplicaties, hart- en vaatziekten, en zenuwafwijkingen. Bij twee jaar lang volgen van de ondervraagden met suikerziekte is de kans om symptomen van één of meer van de genoemde complicaties te hebben onder lager opgeleiden groter dan onder hoog opgeleiden. Met name de kans op stoornissen van het gezichtsvermogen is groter onder lager opgeleiden. Tegelijkertijd ondergaan beduidend minder laag opgeleiden controles die belangrijk zijn bij diabetes en gingen zij minder naar specialist of diabetesverpleegkundige. De combinatie van minder zorg en een ongunstiger beloop in deze groepen suggereert dat beide oorzakelijk met elkaar samenhangen. In dit onderzoek konden we dat niet aantonen.

Hoofdstuk 9 bespreekt sociaal-economische verschillen in beloop van hartaandoeningen, en probeert tevens een verklaring voor deze verschillen te vinden. Pijn op de borst (angina pectoris) als uiting van verminderde doorstroming van de kransslagaderen, en benauwdheid als uiting van onvoldoende pompfunctie van het hart (hartfalen) hoorden tot de onderzochte hartklachten. Omdat bekend is dat risicofactoren en zorggebruik bij hartklachten verschillen tussen de sexen, zijn sociaal-economische verschillen in beloop apart bestudeerd bij mannen en vrouwen met hartklachten. Het beloop van hartfalen en angina pectoris is onder mannen en vrouwen met een lage opleiding ongunstiger dan onder hartpatiënten die hoog zijn opgeleid. Het feit dat lager opgeleiden vaker te maken hadden met gelijktijdige aanwezigheid van beide hartaandoeningen kon het ongunstiger beloop van beide hartklachten gedeeltelijk verklaren. De aanwezigheid van chronische aandoeningen als CARA en diabetes droeg niet bij aan de verklaring. Dit was wel het geval bij bekende leefstijlfactoren die van invloed zijn op hartaandoeningen, zoals roken, alcoholgebruik, (over-) gewicht en lichaamsbeweging. Deze factoren verklaren een flink deel van de sociaal-economische verschillen in het beloop van hartaandoeningen bij mannen en vrouwen. In tegenstelling tot bij mannen kon bij lager opgeleide vrouwen het ongunstiger beloop van angina pectoris ook deels worden verklaard door een lager zorggebruik en hogere blootstelling aan psycho-

sociale stress. Bij het ongunstiger beloop van hartfalen bij lager opgeleide vrouwen valt vooral de bijdrage van psychosociale stress op. Hoe langer hoe meer wordt duidelijk dat niet alleen gezonde individuen, maar ook degenen die al een hartziekte hebben, baat hebben bij een gezonde leefstijl. Wanneer men via beleidsmaatregelen sociaal-economische verschillen bij hartaandoeningen zou willen verkleinen zou men clinici, maar ook patiëntenorganisaties bij zulk beleid moeten betrekken.

De discussie in ***hoofdstuk 10*** plaatst de resultaten van de studie in een breder kader. Bovendien bevat dit hoofdstuk aanbevelingen voor onderzoek en beleid.

Door gebruikmaking van zelfrapportage kan vertekening in de schatting van sociaal-economische verschillen zijn opgetreden. Over het algemeen is niet te zeggen of dit netto tot een over- of onderschatting van de gevonden verschillen zou leiden.

Rekening houdend met verschillen in gezondheid tussen mensen met een uiteenlopende sociaal-economische status, valt op dat het patroon van de resultaten overeenkomt met bevindingen uit andere landen: het gebruik van eerstelijnsvoorzieningen (zoals bij ons de huisarts) is hoger onder degenen met een lagere sociaal-economische status, het gebruik van specialistische zorg is juist lager in die groepen. De bevindingen uit dit onderzoek ten aanzien van de bijdrage van ziektekostenverzekering kunnen moeilijker gegeneraliseerd worden naar andere landen, omdat het verzekeringsstelsel in elk land tamelijk uniek is.

Een antwoord op de vraag of de gevonden verschillen in zorggebruik naar opleiding nu groot zijn of klein wordt gegeven aan de hand van het denkbeeldige geval dat iedereen het gebruikspatroon van degenen in de hoogste opleidingsklasse zou hebben. In dat geval zou bijvoorbeeld bij bijna 29% van de ondervraagden die hun huisarts raadpleegden het consult achterwege blijven. Zo bezien zijn dit dus grote verschillen.

Enkele beperkingen van de onderzoeksopzet komen eveneens ter sprake. Zo kan door het ontbreken van de juiste gegevens niet worden vastgesteld of er sprake is van substitutie tussen huisarts en specialist. Het is ook niet mogelijk vast te stellen wie 'te veel' zorg gebruikt en wie 'te weinig'.

Ten aanzien van sociaal-economische verschillen in het beloop van gezondheidsproblemen komt ook hier de vraag op of de gevonden verschillen nu groot zijn of klein. In het denkbeeldige geval dat iedereen het beloop van de hoogst opgeleiden zou hebben zou dit betekenen dat over een periode van twee jaar per 100.000 mensen 3356 langdurige beperkingen voorkomen zouden kunnen worden. Dit wordt beschouwd als een belangrijk verschil, omdat het om beperkingen gaat die iemand dagelijks hinderen. Het soms ontbreken van een verband tussen een ongunstiger beloop van de

gezondheidstoestand onder lager opgeleiden en een lager gebruik van de gezondheidszorg wordt besproken. Eén verklaring kan zijn dat men, uiteraard, bij gezondheidsproblemen een beroep doet op de gezondheidszorg, terwijl tegelijkertijd een gunstige invloed van zorggebruik wordt verwacht. Zorggebruik houdt dus verband met slechte en met goede ontwikkelingen in de gezondheidstoestand. Een andere verklaring is, dat een geringer gebruik van een bepaalde zorgvoorziening gecompenseerd kan zijn door een groter gebruik van een andere voorziening, die niet in de analyse is betrokken. Dit zou betekenen dat over de hele linie een gelijke toegang naar gelijke behoefte is gerealiseerd.

Aanbevelingen voor beleid en verder onderzoek besluiten dit proefschrift. Nader onderzoek naar de reden van huisarts- of specialistcontact kan licht werpen op de vraag of er werkelijk sprake is van substitutie of dat wellicht toch de toegang tot de specialist voor lager opgeleiden bemoeilijkt is. Daarmee samenhangend kan dergelijk onderzoek ook vaststellen of er groepen zijn die 'te veel' zorg gebruiken, of juist 'te weinig'. Niettemin lijkt 'gelijke zorg naar gelijke behoefte' in ons land voor een belangrijk deel gerealiseerd te zijn. Het bewaken van deze gelijke toegang moet dan ook een belangrijke doelstelling van beleidsmakers zijn in deze tijd van gezondheidszorghervormingen.

De kans om in onderzoek een bijdrage van de gezondheidszorg aan sociaal-economische verschillen in het beloop van gezondheidsproblemen te vinden wordt vergroot door zich te richten op het beloop van specifieke chronische aandoeningen in een beperkte, welomschreven groep patiënten, waarbij niet alleen zelf-gerapporteerde gegevens over de gezondheidstoestand worden gebruikt, maar ook gegevens van artsen en ziekenhuizen.

De voornaamste beleidsimplicatie van de gevonden sociaal-economische verschillen in het beloop van gezondheidsproblemen is reeds aan de orde geweest: voor het terugdringen van sociaal-economische gezondheidsverschillen zijn in aanvulling op beleidsmaatregelen gericht op de algemene bevolking ook maatregelen van belang die zijn gericht op chronisch zieken. Dat niet altijd een bijdrage van zorggebruik aan verschillen in beloop naar sociaal-economische status kon worden aangetoond, betekent niet dat een betere toegang tot bepaalde voorzieningen, zoals diabetescontroles en bepaalde cardiologische voorzieningen bij vrouwen, niet belangrijk zou zijn voor groepen met een maatschappelijke achterstand.

Appendix

Criteria for the severity of the four over-represented conditions

Asthma/COPD

The questionnaire on asthma and COPD was based on the Dutch questionnaire by van der Lende, which itself was based on the British MRC questionnaire.[1]

The number of items used to establish severity in the asthma/COPD questionnaire was 13. Criteria were: period of coughing lasting at least 3 months a year, and/or period of productive cough lasting at least 3 weeks a year, and/or attacks of shortness-of-breath and/or wheezing, and/or shortness-of-breath in rest and on exertion. Severity was based on the number of these symptoms and their combination with shortness-of-breath, resulting in three grades for asthma/COPD.

Heart conditions

The questionnaire on angina pectoris was a Dutch adaptation of the Rose-questionnaire.[2,3]

The number of items used to establish angina pectoris was 10. Criteria were: a heavy feeling on the chest, and/or chest pain or discomfort, and/or attack of pain in the jaw, throat, fingers or shoulders on exertion, when walking, after a meal or when coming into the cold, which disappears in rest or when taking medication. Severity was rated according to the occurrence of symptoms on moderate exertion (grade 1) and light exertion or in rest (grade 2).

Heart failure was established with a Dutch questionnaire.[3] A combination of at least two positive responses to questions on swollen legs, nocturia and orthopnea, or shortness-of-breath (in the absence of asthma or COPD) was the criterion for heart failure.

Severity of heart failure was only distinguished in the analyses of chapter 9. Here, severity was characterised as dyspnea. Three grades of dyspnea were distinguished: dyspnea occurring on moderate exertion, dyspnea occurring on light exertion and dyspnea in rest.

Diabetes

Diabetes questions were partly taken from a Dutch study.[4] For diabetes the diagnosis and severity was based on 6 items. The difference between IDDM and type NIDDM diabetes was ignored in most analyses, except for those in

chapter 8. Diabetic were all respondents who reported diabetes and treatment with tablets and/or insulin and a diet.

Except for analyses in chapter 8, severity was established using the respondent's positive response to the symptoms of one or more diabetic complications: pain in the legs/badly healing leg ulcers (peripheral vascular complications), numb feeling when walking, difficulty in fastening buttons (polyneuropathy). This resulted in two classes: diabetes without complications, and diabetes with one or more complications.
In chapter 8, additional criteria to establish severity were: angina pectoris, and visual impairment according to two items from the OECD disability indicator.

Low back complaints

To establish low back complaints some questions from the Standardised Nordic Questionnaires were used.[5] Criteria for severe low back trouble were self-report of such pain and indicating the pain on a drawing provided with the questionnaire in the area between Th12 and the buttocks. The severity of back complaints was based on 6 items, using prognostic criteria derived from the medical literature, such as radiation of pain to the legs and duration of symptoms longer than 3 months,[6] resulting in 4 classes.

In analyses of socioeconomic differences in the use of health services, respondents reporting one of the specified condition(s) who did not meet any of the criteria were given a separate code, as it is likely that their health status is different from someone reporting no condition at all. Also respondents who did not report suffering from one of the mentioned diseases, but who reported symptoms not severe enough to meet any of the diagnostic criteria, were given a separate code for the same reason.

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List of abbreviations

ADL	Activities of daily living
CBS	Centraal Bureau voor de Statistiek; Central Bureau of Statistics (Netherlands)
CI	Confidence Interval
COPD	Chronic Obstructive Pulmonary Disease
EGP	Occupational classification scheme named after Erikson, Goldthorpe and Portocarero
ERGO	Eramus Rotterdam Gezondheid en Ouderen (Erasmus Rotterdam Health and the Elderly)
GLOBE	Gezondheid en LevensOmstandigheden Eindhoven en omstreken (Health and Living Conditions Eindhoven and surroundings)
GP	General Practitioner
IDDM	Insulin Dependent Diabetes Mellitus
LS-SEDUHS	Longitudinal Study on SocioEconomic Differences in the Utilisation of Health Services
LS-SEHD	Longitudinal Study on SocioEconomic Health Differences
MRC	Medical Research Council
NethHIS	Netherlands Health Interview Survey
N.s.	Not (statistically) significant
NHP	Nottingham Health Profile
NIDDM	Non-Insulin Dependent Diabetes Mellitus
OECD	Organization for Economic Co-operation and Development
OR	Odds Ratio
OTC medicines	Over-The-Counter medicines (as opposed to prescription medicines)
PAR	Population Attributable Risk
PGH	Perceived General Health
PR	Preventable Risk
RD	Reduction in Deviance
WHO	World Health Organisation

Curriculum vitae

The author was born on November 22, 1958 in Amsterdam. Already when he was 3 years of age, he prepared for this thesis by exposing himself to the living conditions in Eindhoven and surroundings during one year. Further preparation was done in Amsterdam, where he did secondary school (Gymnasium ß) and decided to join the upper educational level by studying medicine in 1977, where he soon developed an interest in public health. In 1980, he joined the editorial board of the Journal of Health and Politics (Tijdschrift voor Gezondheid en Politiek) and became involved with WEMOS, a Dutch non-governmental organisation involved in public health issues in developing countries. He discontinued his studies from 1983-1985, during which he worked as a conscientious objector for WEMOS and campaigned against double standards in marketing of medicines by the pharmaceutical industry in the third world. He continued doing similar work for WEMOS after he became a medical doctor in 1988. From 1989 until 1990 he was a house officer in internal medicine, cardiology and pulmonology at the St Lucas Ziekenhuis in Amsterdam. From 1990 until 1997 he worked at the Department of Public Health of the Erasmus University Rotterdam, on the project of which this thesis is the final result. In the mean time, he couldn't resist treating a patient or two sometimes during nights or weekends at the Prinsengracht Ziekenhuis in Amsterdam. He lives in Amsterdam with his partner, the painter Anne-Lore Kuryszczuk.

Stellingen

behorende bij het proefschrift
Equal care, equal cure? Socioeconomic differences
in the use of health services and the course of health problems
van Joost van der Meer

1. Gezondheidsenquêtes onderschatten sociaal-economische verschillen in de prevalentie van chronische aandoeningen.
2. Het meest rationele beleid om sociaal-economische verschillen in gebruik van gezondheidszorgvoorzieningen terug te dringen is het terugdringen van sociaal-economische gezondheidsverschillen.
3. Dat hoger opgeleiden meer gebruik maken van de specialist komt niet doordat hoger opgeleiden meestal particulier verzekerd zijn en lager opgeleiden meestal in het ziekenfonds zitten.
4. Behalve doordat in lagere sociale strata meer nieuwe gezondheidsproblemen ontstaan dan bij mensen met een hogere sociale positie, ontstaan sociaal-economische gezondheidsverschillen ook omdat het beloop van bestaande gezondheidsproblemen in de lagere strata ongunstiger is.
5. Voor een analyse van de bijdrage van de gezondheidszorg aan het verminderen van sociaal-economische gezondheidsverschillen kan niet volstaan worden met enquêtegegevens uit de algemene bevolking.
6. Het minder uitvoeren van belangrijke diabetescontroles onder lager opgeleide diabetespatiënten is een ontsierende barst in het Nederlandse gezondheidszorgsysteem.
7. Clinici die menen dat bestrijding van sociaal-economische gezondheidsverschillen hun pakkie an niet is, kunnen hun witte jas beter aan de wilgen hangen.
8. De veelgehanteerde term "medische consumptie" kan beter vermeden worden: hij suggereert ten onrechte dat gezondheidszorg een consumptieartikel is; bij concrete toepassing op zorgverleners kan bovendien de indruk ontstaan dat de patiënt zijn arts oppeuzelt.
9. Op de lijst van chronische aandoeningen van het Centraal Bureau voor de Statistiek komen aandoeningen voor die niet chronisch zijn.
10. De smalle empirische basis waarop maatregelen stoelen die de Wereldbank in ontwikkelingslanden introduceert om de gezondheidszorg te hervormen staat in schril contrast tot de eisen waaraan de farmaceutische industrie moet voldoen bij het introduceren van een nieuw geneesmiddel.

11. Geneesmiddelendonaties die bestaan uit retourmedicatie zijn een gevaar voor de volksgezondheid in het ontvangende land.

12. De mening dat muziek van hedendaagse componisten niet om aan te horen zou zijn, berust op een ongehoord vooroordeel.

13. Epidemiologie is een vaccinerende wetenschap.