HEALTHY QUESTIONS ABOUT ILL-HEALTH

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INTRODUCTION

This article consists of three sections. The first is a detailed survey of the present state of stratification sociology. The section begins by breaking down the subject of stratification into a sequence of often posed questions. It then goes on to describe the direction in which the results of present research are leading, and finishes by describing measuring-instruments particularly scales for measuring occupation.

The second section starts by discussing the methods used by epidemiologists to measure occupations, comparing them with the instruments used by sociologists. The standard epidemiological question about the relationship between a person's occupation and health and/or mortality is then related to the sequence of stratification questions established in sociology. It is then argued that, against the background of the sub-division of the subject and the results of stratification research, certain substantive questions form valuable additions to this standard question.

In the third section of the article, two of these substantive questions are examined in the light of existing data.

THE SEQUENCE OF STRATIFICATION QUESTIONS

Sociologists have sub-divided the issue of social stratification into a number of individually important subsidiary questions, ranging from the simple to the complex. Key words are inequality, mobility, connubium and consolidation.

Inequality

Taking income as a scarce good, the first category of subsidiary questions concern the degree of inequality in the income distribution of a particular country. A conventional method of
measurement is the GINI-coefficient. The higher the GINI-coefficient, the greater the inequality. According to the Central Bureau of Statistics, the GINI's for the Netherlands were 0.397 in 1954 and 0.281 in 1982. Inequality questions are simple as they pertain to a univariate distribution.

Mobility

Suppose it were established that the GINI-coefficient for the Netherlands had remained unchanged since the end of the Second World War. This would not necessarily mean then the rich had remained rich and the poor had remained poor, as an unvaryingly unequal distribution of incomes can be easily reconciled with the occurrence of and an increase in individual mobility.

Sociologists have carried out extensive research into the subject of mobility, and in particular the question of intergenerational mobility, or the upward or downward mobility of children compared to that of their parents. Due to the fact that respondents in surveys provide even less satisfactory data on the incomes of their parents than on their own incomes, income mobility has remained understudied whereas occupational prestige mobility is used instead as a second-best alternative. People (until now mostly men) are asked about their occupation and that of their father. By way of an occupational prestige ladder, titles for occupations are assigned a higher or lower prestige score. By cross-classifying the scores for men with those of their father an occupational-mobility table is created.

The degree of mobility in this kind of table is expressed by an odds ratios\(^1\). Because an odds ratio refers to a bivariate distribution, questions about mobility are more complex than those dealing with inequality. According to Ganzeboom and De Graaf\(^2\), occupational mobility in the Netherlands was higher in 1977 than in 1954.

Connubium

A society where there is no mobility is in a certain sense a closed society, with no-one venturing off the lowest rungs of the ladder of occupational prestige, and with no-one making their way to the highest echelons of that society. The degree of openness or closure of a society is also indicated by its patterns of
marriage. Marriage partners may come from the same or from differing social backgrounds. According to Weber\(^3\), the degree of openness can be determined by the number of people admitted to a particular social stratum, while higher stages in the process of exclusion are indicated by the frequency that certain occupations are passed down from father to son, i.e. a form of intergenerational stability, and even more so by the frequency that marriages take place within the same social circle, i.e. connubium. The total number of socially-mixed marriages in connubium tables is measured by way of odds ratios. As these data characterize a bivariate distribution, questions of homogamy are more complex than those dealing with inequality.

Due to the high proportion of women without any form of paid employment, there is little point in examining the extent to which the incomes or jobs of spousal correspond to one another. The best alternative criterion is that of educational heterogamy, i.e. the extent to which spousal are from different educational backgrounds.

According to Sixma & Ultee\(^4\), between the years 1959 and 1977 in the Netherlands there was an increase in the number of marriages with partners differing in education.

Consolidation

In view of the existence of various scarce goods (e.g. income, occupational prestige and education), another question concerns the relationship between two or more dimensions of stratification. A question of this sort can be described as one of consolidation\(^5\). (When new political rulers take control of economic resources, they consolidate their position: by their gains with respect to one dimension of social stratification, they increase their score on another.) Because a question of consolidation deals with a bivariate distribution, it is more complex than one dealing with inequality.

By combining notions from the various theoretical traditions of sociology, a wide range of questions on the topic of consolidation can be obtained. According to one particular tradition a person's economic class (i.e. the possession or otherwise of capital goods) affects not only his income, but other life circumstances as well. This tradition initially recognized factors such as arduous
physical work, long working hours and poor health. Nowadays this school of thought regards life expectancy, living standards and life-style as aspects of a person's life circumstances. A person's life-style is measured by the degree of participation in cultural activities, such as visits to museums, theatres and concerts.

According to another theoretical tradition within sociology, a person's life circumstances do not merely depend on that person's economic class. Economic, political and symbolic resources all affect a person's life circumstances. Property of and the command over capital goods are regarded as economic resources, as is the possession of occupational skills. The right to vote is a political resource. Occupational prestige is a symbolic resource. (A white coat and a stethoscope will open many doors and titles sometimes do wonders.)

By combining lists of resources with those of life circumstances, a whole range of questions about consolidation can be obtained. Two typical examples are:

a) to what extent does a person's life expectancy depend on his/her occupational prestige, and,

b) to what extent does education influence a person's decision to visit a museum?

These questions refer to two dimensions of social stratification.

Other questions about consolidation deal with a higher number of dimensions. A typical multi-dimensional question examines to what degree the frequency of a person's visits to a museum is influenced not just by the person's own education, but also by that of his/her father's. Even more complex is the question as to what extent the frequency of the museum visits is governed by the person's own education, that of his/her father plus that of his/her spouse.

The drift of research findings

Most industrial societies have a democratic form of government, where general elections decide which party or parties will hold office and where several political parties campaign a strongly egalitarian election programme. According to Lenski hypotheses government by egalitarian parties make a county less stratified. Financial intervention on the part of a country's government would
help break down the link between economic resources and the life circumstances of the inhabitants of this country.

Research carried out since Lenski indicates the inadequacy of his hypotheses. In the Netherlands, for example, the link between income and participation in cultural activities has hardly altered, despite heavy government subsidies to the arts.\(^\text{12}\)

Symbolic resources, i.e. cultural handicaps, may be involved here: "Ballet isn't for the likes of us". It could also be that lack of knowledge is the deciding factor; in order fully to appreciate so-called "Culture", a person must be able to decode certain cultural signals. Be that as it may: the link between income levels and life style is to some degree spurious, and other interpretations cite occupational prestige and cultural knowledge as determinants of life circumstances.

Other findings also suggest the link between economic resources and life circumstances to be somewhat tenuous. Subsidised education - at less than cost-price - and educational grants have only slightly lessened the under-representation of children from low-income families at higher educational establishments in the Netherlands.\(^\text{13}\) According to another interpretation children with parents from a similar educational background are better equipped to succeed in these types of schools. It could also be that the so-called "lower echelons of society" look down on people they would label as "eggheads". These findings also make it clear that in contemporary Dutch society a person's life circumstances are influenced by a variety of factors, and not merely the purely economic.

**How do stratification sociologists classify occupations?**

In this section reference has been made to data from research into stratification. To obtain such data, sociologists have scaled occupations.

Although in surveys items regarding a person's occupation and those of his/her father and partner are satisfactorily answered, practical difficulties then arise. Open-ended questions produce such an abundance of specific occupational titles that they have to be reduced to a limited number of categories. The question arises as to which. Even if researchers only employ a limited
number of categories, the system of categories sometimes is purely nominal. A system of this type is of little practical use; researchers would far rather use an ordinal scale. The question then arises: after what criteria are occupation to be ranked?

**Occupational prestige scales**

Stratification sociologists have devised the following solution to these problems. In 1968 the International Labour Office\(^\text{14}\) published an International Standard Classification of Occupations (ISCO), which has its origins in the occupational classifications used by the majority of government census bureaus in the industrial nations. The 1984 occupational classification from the Dutch Central Bureau of Statistics\(^\text{15}\) closely resembles the ILO's ISCO, and distinguishes eight occupational sectors, 86 occupational classes, 317 occupational groups and 868 occupations.

The ISCO classification is a purely nominal system. Stratification sociologists used it as a stepping stone to their own occupational ladders: in a survey respondents were asked to rank printed cards bearing ISCO occupational titles after their prestige, i.e. with high-prestige titles at the top and low-prestige titles at the bottom of the list. Treiman\(^\text{16}\) drew up an international occupational prestige scale based on occupational prestige scales from many different countries. A recent Dutch prestige scale was that drawn up by Sixma and Ultee\(^\text{17}\), who also assigned a prestige score to the 86 occupational classes listed in the CBS occupational classification.

**A scheme for economic classes**

In recent years for research into occupational mobility occupational titles also had been combined into economic classes. The exemplar is Erikson, Goldthorpe & Portocarero\(^\text{18}\), a Dutch example is the mobility table drawn up by Ganzeboom et al. The EGP-scheme consists of ten economic classes and is based on four variables: financial independence (property owner or not); supervision (none, under 25 or more than 25 employees); required level of education (primary, secondary, higher); and nature of work (agriculture, other manual work, non-manual work). An economic class consists of a combination of scores obtained from these four variables. As some combinations were grouped together
under a single heading, the total number of economic classes is
less than the total number of possible combinations. Conversion-
tables (keys) are available for converting ISCO occupational
titles to EGP economic classes. One practical disadvantage of
the EGP-scheme is that economic classes are only partially ranked.

Occupational prestige scales versus schemes for economic classes

The EGP-argument for grouping occupations into economic classes is
that the principal dimension of stratification in contemporary
Western industrial nations is still that of economic class.
Although one might at first think otherwise, this argument in no
way renders the use of occupational prestige scales superfluous.
The argument that economic class is the most important
determinant does not contradict the argument that social
stratification is a multi-dimensional phenomenon, and neither the
argument that economic class has declined in importance as a
dimension of stratification. For that matter, EGP have argued but
not demonstrated that class is a more important dimension in
stratification than prestige. Simultaneous use of measuring
instruments for both dimensions will resolve any questions as to
their relative consequences for life circumstances.

Classification of people by education

Sociologists often classify people in terms of their education as
well as by their occupation. The instrument used here is the
standard educational classification of the CBS, which is based
on the UNESCO International Standard Classification of Education.
This system of classification is ordinal and consists of levels
and sub-levels.

The reason for classifying people by their education is not simply
because so many people are without a full-time occupation. A
conventional "solution" to part of this question is for wives to
be classified by their husband's occupation, but this method led
to a confusion between

a) the question of how far a person's own score on one dimension
   of stratification would influence his/her life
   circumstances and

b) the question what part of this person's life circumstances
was in fact determined by the score of this person’s partner on this dimension of stratification.

Another reason for classifying people according to education is that secondary analysis of surveys conducted in the United States and Canada in the 1950s and 1960s indicated that a person’s level of education had lasting consequences for their knowledge of current affairs and new developments. If that knowledge has a bearing on a person’s life circumstances - as would appear likely - determining that person’s level of education clearly becomes relevant.

**STRATIFICATION SOCIOLOGY AND EPIDEMIOLOGY**

This section looks at epidemiological research into the unequal distribution of health in the light of current developments in stratification sociology.

**Sociological instruments in epidemiological research**

Up until now epidemiologists in the Netherlands have made sparing use in their research of sociological instruments such as occupational prestige scales and socio-economic class schemes. This does however create certain problems. Whenever sociological findings on changing occupational structures and mobility are cited in providing interpretations of the relationship between occupation and health, the results are not entirely convincing as sociologists and epidemiologists use different methods for classifying occupations.

Arguments may be advanced in favour of both an economic class scheme and an occupational prestige scale for carrying out research into socio-economic differences in health. If one takes the line that people in a particular occupation have a particular life-style which influences their health, classifying occupational titles in terms of occupational prestige would then be the obvious method. If one wishes to establish whether a person’s working conditions influence that person’s health, a scheme of economic classes would be appropriate.

Epidemiologists could also make more use of the findings of stratification sociologists on mobility in contemporary industrial
societies. Mackenbach and Van der Maas\textsuperscript{22} have for example argued that the link between occupation and mortality in various countries must be judged in the light of their mobility. It would thus be desirable to establish the extent to which mobility corresponds (or not) with the strength of the relationship between occupation and mortality in those countries. For this task a list would be required showing odds ratios for their mobility. The same argument can be advanced for connubium. Ultee and Luijkx\textsuperscript{23} provide odds ratios for mobility and connubium in a large number of industrial countries. These odds ratios, together with mobility rates and rates of out-marriage, are presented in Table 1.

**Questions of occupation and health as questions of consolidation**

Questions concerning occupation and health are standard in epidemiology. How can these be evaluated, bearing in mind the way in which the subject of social stratification has been broken down into a sequence of questions in sociology?

Health is a scarce good and forms part of a person's life circumstances. Questions on the relationship between occupation and health are thus questions of consolidation. Due to the nature of the sequence of questions in the field of stratification, these questions assume a position of intermediate complexity, with simpler and more complex questions also being possible.

**Questions of inequality: the unwarranted criticism of Le Grand**

It is striking to note the speed with which epidemiologists move from discussing the simple question of inequalities in health to examining the - more complex - link between occupation and health. Thus in 1987 the Scientific Council for Government Policy (WRR) organized a conference entitled "Health Inequalities and Socio-economic Status", whereas the report of the conference appeared under the title of "The Unequal Distribution of Health". This shift in emphasis involves the assumption that socio-economic inequalities are the most important source of all inequalities in health (and life expectancy).
Table 1 Occupational mobility and educational heterogamy data for 23 industrial nations.

<table>
<thead>
<tr>
<th>Country*</th>
<th>Mobility rate**</th>
<th>Heterogamy rate***</th>
<th>Odds ratio mobility</th>
<th>Odds ratio heterogamy</th>
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<tr>
<td>Australia 65-66</td>
<td>31</td>
<td>14</td>
<td>3.9</td>
<td>13.1</td>
</tr>
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<td>31</td>
<td>10</td>
<td>6.0</td>
<td>21.0</td>
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<td>35</td>
<td>12</td>
<td>4.7</td>
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<td>3.9</td>
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</tr>
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<td>12</td>
<td>7.1</td>
<td>22.9</td>
</tr>
<tr>
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<td>33</td>
<td>19</td>
<td>3.9</td>
<td>8.1</td>
</tr>
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<td>5.3</td>
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<td>16</td>
<td>3.5</td>
<td>16.3</td>
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<td>4.5</td>
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<td>4.5</td>
<td>12.0</td>
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<td>4.5</td>
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<td>8</td>
<td>8.1</td>
<td>44.2</td>
</tr>
</tbody>
</table>

* Behind country name: year of mobility and heterogamy table
** Percentages of males mobile into and out of the non-manual category (odds ratios for mobility were calculated using the same division)
*** Percentages of couples where, out of four levels of education, one spouse has the lowest or one but lowest level of education and the other spouse the highest or one but highest level (odds ratios for educational heterogamy were calculated using the same division).
This general inequality has seldom been established within epidemiology. Work dealing with this topic is new and controversial. Le Grand\textsuperscript{24} used GINI-coefficients when calculating inequalities in life expectancy - an approach that was dismissed in no uncertain terms. The question that Le Grand answered by means of GINI-coefficients was said to have differed from standard questions. Carr-Hill\textsuperscript{25} reconciled the parties by arguing that the standard question was not necessarily the only acceptable question. His observations however by-passed the fact that there are both simple and complex questions, that complex questions should be posed in the light of replies to simple ones, and that until now complex questions had been posed while by-passing simple ones. Although simple, questions on life expectancy are an important addition to standard questions on the link between occupation and mortality.

Mobility and health: Stern's insufficiently complex question

The finding from a sample survey that a person’s current occupation exhibits a specific link with that person’s current state of health (i.e. mortality risk) does not necessarily mean that a person’s occupation determines his/her health to that degree. This finding can in fact also be reconciled with the hypothesis that health is a determining factor in the choice of a person’s occupation: healthy people are upwardly mobile, whereas unhealthy people are unable to cope in higher-ranking jobs. How should this be taken into account?

Stern\textsuperscript{26} suggests substituting the question on the strength of the connection between occupation and mortality with the question of the strength of the link between a person’s mortality and their father’s occupation. This recommendation is based on model simulations, which are not wholly convincing on account of insufficient support by existing findings. There would thus appear to be a dilemma, i.e. should one ascertain the link between the father’s occupation and mortality or the link between the person’s own occupation and mortality?

This dilemma is however more apparent than real. There is no need to choose between ascertaining a person’s own occupation or that of the father: both can be ascertained. Additionally, the question can be asked as to how far a person’s health is affected by both his/her current occupation and that of his/her father. As this
question involves a trivariate distribution, one is now faced by an even more complex question, and one which deserves more attention from epidemiologists. Stern suggested by contrast replacing a question on a bivariate distribution with another which also pertains to a bivariate distribution, albeit of a different kind.

Questions of connubium and health: Illsley's approach

In addition to occupational mobility, the sub-division of the issue of stratification also considers the question of connubium. Thus the question can be asked as to what extent a person's health also is affected by the occupation of his/her person's partner.

This is an important question due to the fact that a person's health might well depend more on his/her partner's occupation than on that of his/her father. Most people live longer in the family unit they themselves have created than in the parental home. Because an occupation not only comprises specific activities (the effects of which are to some extent taken back home at the end of the working day) but also consists of a life-style that is shared with another person, the partner's occupation could have a considerable consequences for the health of the respondent.

Questions on connubium and health are less common in epidemiology than ones about mobility and health. Illsley is credited as having carried out the first research into health and mortality with particular attention to mobility and patterns of marriage. Illsley's data however covered the middle ground between data on connubium and data on mobility, relating the total number of still births by first-time mothers to their husband's and father's occupation. He left the mother's occupations unascertained. Illsley discovered a link between the husband's occupation and the mortality rate of first-born children. In order to explain this relationship, he pointed out that lower-class women with better health married into a higher social class, and that women from a higher social class but with poorer health married downwards.

To a sociologist, however, an interpretation based on educational homogamy, i.e. connubium based on educational similarity, would be more obvious than one based on connubium for reasons of identical health, i.e. "health-homogamy". People marry one another because they share the same level of education, not because they have the
same health. The relationship between the health of a married
person and that of his/her spouse is a by-product of educational
homogamy: the initial connection is due to the fact that education
is closely bound up with health and the fact that partners share
the same level of education. Epidemiologists\textsuperscript{28} have also offered a
similar interpretation.

Questions of education and health

Illsley may well have neglected the occupation of first-time
mothers for the very reason that so many of them had no occupation
at all. Be that as it may, education forms an additional dimension
of stratification to a person's occupation, and there are
virtually no practical difficulties when replying to the question
of how far a person's own education, plus that of his/her father
and partner, affect this person's own health. The question is in
line with Illsley's research and is even more complex than that
posed by Illsley himself, as it pertains a distribution containing
four variables.

The choice of education as a dimension of stratification is also
important in another sense. Education is subject to fewer changes
than occupation, so that it is harder to explain a link between
education and health as a consequence of health specific mobility
than it is to explain a link between occupation and health.

Another argument in favour of relating education and health runs
as follows. A link between occupation and health could be
explained on the basis of the link between occupation and income
and the effects of income on health. The first section of this
article referred to findings from stratification sociology, which
implied that a link between economic resources and specific life
circumstances was to some extent spurious. If there were any
generalizations to be made on the basis of these findings, the
above explanation of the link between occupation and health is
incomplete and this link needs mainly to be explained on the basis
of the relation between education and occupation and the effects
of education on level of health. It is also probable that these
findings on life circumstances in general applied to health in
particular. As countries such as the Netherlands have a compulsory
health insurance scheme, a low level of income could hardly be a
factor affecting a person's health on the grounds of the cost of
health care.
Moreover these countries possess legislation limiting the ill-effects on health caused by adverse working conditions, such as laws controlling the length of working hours and rest-breaks, regulations prohibiting exposure to hazardous substances, and rules to prevent industrial accidents. At the same time these countries have seen a decline in inequalities in occupational incomes. If one were still to encounter health differences between people of various occupations, it would then be desirable to research the effects of other resources besides the purely economic.

A person's education is one such resource. If education leads on to the acquisition of knowledge in all manner of different fields, more highly educated people will be better informed about healthy and unhealthy life-styles. If they apply this knowledge correctly, higher education in turn gives rise to improved health. Following this line of argument, a person's education can also affect that person's health through the use of health-care facilities. To take this argument one step further, a person's health could be affected not only by his/her own education, but also by that of his/her father and spouse.

TWO ANALYSES OF EXISTING DATA

In the light of current developments in stratification sociology, interesting questions exist that are less complex than the standard epidemiological questions concerning occupation and health. Conversely there are also important questions that are more complex than the standard epidemiological questions. The final section of this article uses existing data to answer both a simple and a more complex question.

GINI-coefficients for inequalities in life expectancy

First the answers to the less complex questions. Almost all industrial countries have drawn up mortality tables over long periods of time, showing how many people in a cohort died in a particular year, and their ages at death. Mortality tables provide the data needed to calculate GINI-coefficients for inequalities in life expectancy.
Table 2 is based on Dutch mortality-tables for the years 1840-1851 up to and including the years 1976-1980 and shows their GINI-coefficients. The tables list men and women in separate categories. A zero GINI-coefficient represents maximum equality, a coefficient of 1 maximum inequality. In the case of men, a gradual decrease in the figures has taken place. The period 1961-1965 saw the only (slight) increase. The trend was even more marked in the case of women.

Table 2 GINI-coefficients for inequalities in life expectancy for men, women, men over 10 years old, and women over 10 years old; the Netherlands, 1840-1851 up to and including 1976-1980

<table>
<thead>
<tr>
<th>Year</th>
<th>Men</th>
<th>Women</th>
<th>Men over 10 years old</th>
<th>Women over 10 years old</th>
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<td>114</td>
<td>116</td>
<td>103</td>
</tr>
<tr>
<td>1956-1960</td>
<td>125</td>
<td>105</td>
<td>116</td>
<td>99</td>
</tr>
<tr>
<td>1961-1965</td>
<td>126</td>
<td>102</td>
<td>119</td>
<td>97</td>
</tr>
<tr>
<td>1966-1970</td>
<td>124</td>
<td>100</td>
<td>121</td>
<td>98</td>
</tr>
<tr>
<td>1971-1975</td>
<td>120</td>
<td>097</td>
<td>120</td>
<td>096</td>
</tr>
<tr>
<td>1976-1980</td>
<td>114</td>
<td>094</td>
<td>117</td>
<td>095</td>
</tr>
</tbody>
</table>

The question arises as to how far this trend persists if one takes into account child-mortality. To answer this question the following steps were taken:
a) all records of children under 10 who had died were removed from the mortality-tables;
b) 10 years were then subtracted from the remaining age-totals; and
c) new GINI-coefficients were calculated from the amended figures. According to Table 2 there is a continuing trend towards less inequality in life expectancy. There is somewhat greater irregularity in the case of men; in the case of women, two lesser irregularities occur.

Table 3 shows GINI-coefficients for inequality in life expectancy in industrial countries around the years 1960 and 1980, these figures being based on mortality tables in United Nations’ demographic year-books. All countries have experienced a reduction in the level of inequality of life expectancy. The Netherlands initially found itself classed as one of the industrial countries with the lowest level of inequality of life expectancy, and still remains within this category. The position of Japan has altered dramatically: from its previous status as an industrial nation with a relatively high level of inequality of life expectancy, Japan has now been transformed into the industrial nation with the lowest level of inequality in life expectancy. This could be the result of Japan’s impressive economic development within that period. Communist countries have a high GINI-coefficient, possibly linked to their lower level of economic development.

This raises the question as to how far one can explain inequalities of life expectancy in different countries in terms of their political systems and degree of economic development. In the section below an even more complex question is answered, in which the extent of health-care within a country is itself a variable between - on the one hand - economic development and the political system, and - on the other - inequalities in life-expectancy.
Table 3 GINI-coefficients for inequality of life expectancy in men in 26 industrial countries around the years 1960 and 1980

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>GINI</th>
<th>Year</th>
<th>GINI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>1960-1962</td>
<td>142</td>
<td>1983</td>
<td>113</td>
</tr>
<tr>
<td>Austria</td>
<td>1959-1961</td>
<td>159</td>
<td>1983</td>
<td>125</td>
</tr>
<tr>
<td>Canada</td>
<td>1960-1962</td>
<td>150</td>
<td>1975-1977</td>
<td>128</td>
</tr>
<tr>
<td>Czechoslovakia</td>
<td>1958</td>
<td>146</td>
<td>1983</td>
<td>130</td>
</tr>
<tr>
<td>Denmark</td>
<td>1956-1960</td>
<td>128</td>
<td>1982-1983</td>
<td>113</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>1956-1960</td>
<td>151</td>
<td>1983</td>
<td>114</td>
</tr>
<tr>
<td>France</td>
<td>1964</td>
<td>138</td>
<td>1980-1982</td>
<td>125</td>
</tr>
<tr>
<td>German Democratic Republic</td>
<td>1960-1961</td>
<td>149</td>
<td>no data</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>1959-1960</td>
<td>166</td>
<td>1983</td>
<td>145</td>
</tr>
<tr>
<td>Italy</td>
<td>1960-1962</td>
<td>157</td>
<td>1977-1979</td>
<td>121</td>
</tr>
<tr>
<td>Japan</td>
<td>1959-1960</td>
<td>156</td>
<td>1982</td>
<td>101</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1956-1960</td>
<td>121</td>
<td>1982-1983</td>
<td>104</td>
</tr>
<tr>
<td>New Zealand</td>
<td>1960-1962</td>
<td>125</td>
<td>1983</td>
<td>119</td>
</tr>
<tr>
<td>Poland</td>
<td>1960-1961</td>
<td>176</td>
<td>1983</td>
<td>142</td>
</tr>
<tr>
<td>Rumania</td>
<td>1964-1967</td>
<td>162</td>
<td>no data</td>
<td></td>
</tr>
<tr>
<td>Soviet Union</td>
<td>1958-1959</td>
<td>169</td>
<td>no data</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>1960</td>
<td>150</td>
<td>no data</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>1956-1960</td>
<td>120</td>
<td>1983</td>
<td>102</td>
</tr>
<tr>
<td>United States of America</td>
<td>1957</td>
<td>151</td>
<td>1983</td>
<td>124</td>
</tr>
</tbody>
</table>

To answer this particular question, a multiple regression analysis was carried out. Due to the limited number of countries listed in Table 3, the data for the years 1960 and 1980 were combined as one set, and GINI-coefficients for circa 1970 were added. This resulted in a total of 71 cases. The GINI-coefficients were multiplied by 1000. Political systems were categorized as communist, social-democratic or conservative. Economic development was measured in terms of per capita GNP according to purchasing-
power parity. The degree of health care available in a given country was measured as the total number of doctors per million population. The values for these variables were taken from statistical hand-books. (The data matrix is available on request from the main author.)

Table 4 shows the results of this analysis. The direct effect of communism in an industrial country is significant and increases inequalities in life expectancy. The direct effect of economic development is significant and reduces the GINI-coefficient. The effect of social democracy is not significant. The effects of the degree of available health care in a country are border-line; by this token there is proportionately less inequality the greater the degree of health care. Because the standardized regression for economic development is higher than that for communism, the direct effect of the first factor is larger than that of the second factor.

Table 4 Regression of inequalities in life expectancy according to national characteristics: 26 countries around the years 1960, 1970 and 1980 (n = 71 due to 7 missing observations)

<table>
<thead>
<tr>
<th>independent variables</th>
<th>B</th>
<th>Standard Error B</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>log per capita income</td>
<td>-19.5</td>
<td>5.5</td>
<td>-.43</td>
</tr>
<tr>
<td>communism</td>
<td>17.7</td>
<td>4.3</td>
<td>.39</td>
</tr>
<tr>
<td>social-democracy</td>
<td>-4.9</td>
<td>3.9</td>
<td>-.09</td>
</tr>
<tr>
<td>log of total number of doctors per 1,000,000 inhabitants</td>
<td>-11.1</td>
<td>5.9</td>
<td>-.20</td>
</tr>
<tr>
<td>constants</td>
<td>372.6</td>
<td>31.3</td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>0.67</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Table 5 Relationship of education of respondent and that of father to average number of chronic illnesses of these respondents in the Netherlands in 1983 (figures on which averages are based shown in brackets)

<table>
<thead>
<tr>
<th>Father</th>
<th>Father</th>
<th>Father</th>
<th>Father</th>
</tr>
</thead>
<tbody>
<tr>
<td>only</td>
<td>1.7(578)</td>
<td>1.4(24)</td>
<td>1.0(8)</td>
</tr>
<tr>
<td>lbo</td>
<td>1.2(365)</td>
<td>0.9(49)</td>
<td>1.2(20)</td>
</tr>
<tr>
<td>mulo or mavo</td>
<td>1.2(204)</td>
<td>1.1(44)</td>
<td>0.6(22)</td>
</tr>
<tr>
<td>vwo or higher</td>
<td>0.8(590)</td>
<td>0.7(186)</td>
<td>0.7(88)</td>
</tr>
</tbody>
</table>

| total | 1.2(1737) | 0.9(303) | 0.8(138) | 0.8(449) | 1.1(2627) |

Diagonal models

Now an empirical answer to the more complex question of the relative influence of a person's education and that of his/her father and spouse on that person's health. The data originated from the 1983 CBS Survey of Living Conditions and were made available by the Steinmetz Archives, Amsterdam.

The educational categories for the respondent, the father and the spouse consisted of the following grades: primary education; junior vocational; intermediate general secondary education; and pre-university or higher.

A total of 27 chronic disorders (asthma, strokes, gall-bladder disorders, diabetes, etc.) were taken from the health data; for each respondent a tally was kept of the number of times a respondent scored for each of these items.

Table 5 shows the connection between the respondent's education, the father's education and the respondent's health. This table and similar ones may be analysed by means of diagonal reference models, thus named because stable persons for the backbone of the models and stable persons are shown on the main diagonal of
Table 5. By using this technique, the averages in two cells on the main diagonal of a table such as Table 5 were allocated specific weights which enabled the prediction of the averages for those who were moving from one cell to another on the main diagonal.

Now the estimated diagonal models. Model 1 in Table 6 is a model in which health is predicted only on the basis of the person's own education. Model 2 predicts health on the basis of the person's own education plus that of his/her father, while Model 3 predicts health on the basis of the person's own education and that of the spouse. Estimated results can be found listed under each model. If the models have the same number of degrees of freedom (DFs), their Residual Mean Squares (RMS) may be compared. In this sense Model 3 fits better than Model 2.

Where the DF's are not equal, a test statistic needs to be calculated using both RMSs and DFs. Then Model 3 fits better than Model 1, and Model 2 better than Model 1. According to Model 3, the effect of the spouse's education on a person's health is significant, but markedly smaller than the effects of the person's own education.

Finally Model 4, which examines the relationship between health and the respondent's own education, that of the father, plus that of the spouse. The test statistic for the difference between Models 3 and 4 reveals that Model 4 fits no better than Model 3. In Model 4, the parameter for the father's education is borderline significant. The effects of the spouse's education on the respondent's health are more marked than the effects of their father's education. The strongest effects are those of the respondent's own education.
Table 6 Parameters, Residual Mean Square and Degrees of Freedom of diagonal reference models for health and education of respondent, education of respondent and father, education of respondent and spouse, and education of respondent, father and spouse; the Netherlands 1983; (shown in brackets: standard errors of parameters)

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education, Respondent only</td>
<td>Education, Respondent only</td>
<td>Education, Respondent and Spouse</td>
<td>Education, Respondent and Spouse</td>
</tr>
<tr>
<td>RMS</td>
<td>.81 (06)</td>
<td>.68 (06)</td>
<td>.64 (05)</td>
</tr>
<tr>
<td>DF</td>
<td>2623</td>
<td>2622</td>
<td>2622</td>
</tr>
</tbody>
</table>

u1, u11 or u111 = estimated health of persons, who, with regard to
a) their own education;
b) their own education and father's education (or their own education and spouse's education); and
c) their own education, father's education and spouse's education respectively, score 'primary education only'.

u2, u22 or u222 = ditto, but junior vocational instead.
u3, u33 or u333 = ditto, but intermediate secondary instead.
u4, u44 or u444 = ditto, but pre-university or higher instead.

CONCLUSION

Epidemiologists studying the unequal distribution of health from time to time ask stratification sociologists how occupations are to be measured when establishing the link between occupation and health. This article has provided the answer to that question. Epidemiologists have a choice of
a) a standard instrument for measuring occupational prestige, and
b) a standard scheme of economic classes.
This article has also examined the background to questions concerning the relationship between a person's occupation and their health. There proved to be room for improvement on three specific points.

First, it is not enough to ascertain a person's own occupation; the father's and spouse's occupation are also important. While interest certainly exists in epidemiology regarding the relationship between health and occupational mobility (i.e. the difference between the person's own occupation and that of the father), stratification sociology suggests that the relationship with socially-mixed marriages (i.e. cases where there is a difference between the person's own occupation and that of the spouse) is just as important.

Second, according to current developments in stratification sociology it has not yet been established that occupation is the sole or principal dimension of stratification. Hence it is important to establish the level of a person's education, and that of their father and their spouse and to relate these characteristics to a person's health.

Third, it is not necessary - from the standpoint of stratification sociology - to focus on the link between health and one dimension of stratification (e.g. occupation or education) in order to establish inequalities in health. The degree of inequality can be established in the distribution of health alone. Mortality tables are used to calculate the extent of inequalities in life expectancy.

Mackenbach and Van der Maas argued that "the lack of a theoretically-based concept of social stratification on the basis of which an accurate analysis of socio-economic status can be made with the aid of sound data" may be regarded as one of the weak points in the tradition of research into socio-economic inequalities in health. Can this criticism also be levelled at sociology? What does sociology offer?

Within sociology two occupational classifications have been developed which can be usefully employed when researching socio-economic inequalities in health. These classifications have to be viewed against the background of certain hypotheses. It has not yet been established whether these hypotheses are all worthy of more detailed examination: the question currently being debated by
sociologists - as to which dimension of stratification is the most important - smacks of the unanswerable question as to what the essence of stratification is. Besides, sociology has not as yet provided definitive answers to the answerable question of whether a person's life circumstances are influenced more by their class than by their occupational prestige.

Current developments within stratification sociology may be summarized by saying that stratification is a multi-dimensional phenomenon, and that for countries such as the Netherlands the consequences of the financial and political dimensions have been over-estimated and the effects of the educational and occupational prestige dimensions correspondingly under-estimated.

In addition to instruments of measurement, sociology can offer its sequence of stratification questions. By using this sequence, the complex question of mobility, connubium and health, and the simple question of inequalities in life expectancy, have been broached. The standard epidemiological question of socio-economic inequalities in health is at once too complex and not complex enough. When it is regarded as a one question within a sequence of stratification questions, a more satisfactory answer can be obtained.

REFERENCES


33. Mackenbach and van der Maas, endnote 22.