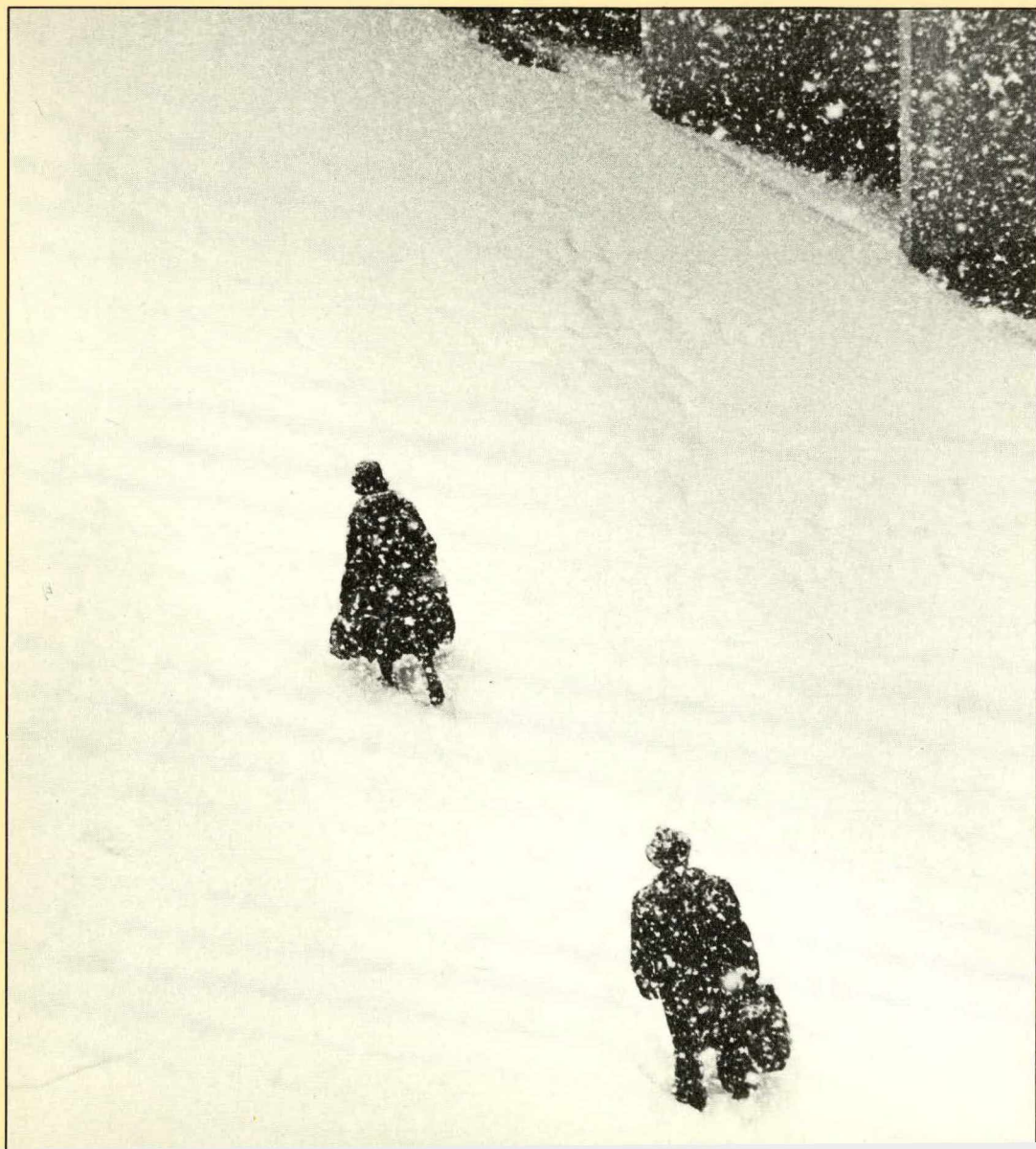


Socio-economic mortality differences in Finland 1971 – 85

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Preface

The Central Statistical Office of Finland publishes this study on socio-economic differences in mortality and related changes during the period 1971 – 85. The linking of census data with information on mortality offers a perspective which makes it possible to investigate the achievement of one of the key goals of Finland's Health for All by the Year 2000 programme, which was approved in 1986 – equality in the health field. This study monitors changes in mortality during a 15-year period from the early 1970s to 1985 according to occupational class and level of education among different age groups.

Resources were combined in order to accomplish this task as well as possible. In 1988 the Central Statistical Office entered into a co-operation agreement with a team of researchers at the University of Helsinki which is headed by Prof. Tapani Valkonen and operates with funding from the Academy of Finland. On the basis of this agreement, the Central Statistical Office was responsible for compiling data, while the researchers took charge of planning the content of the study and conducting analyses. The National Board of Health supported the project by funding the work performed by the Central Statistical Office. The present report provides a basic description of the findings. Prof. Valkonen and the other members of his team will continue analysing various aspects of the data.

The Central Statistical Office has previously investigated variations in occupational mortality with the help of census data and published two reports on this matter¹. In addition, the Central Statistical Office has participated in a joint study concerning occupational mortality differences in the five Nordic countries². Prof. Tapani Valkonen and his research team at the Department of Sociology at the University of Helsinki have also published various studies on regional and socio-economic differences in mortality on the basis of data covering the 1970s which were supplied by the Central Statistical Office.

The Central Statistical Office would like to thank all those who took part in the project and particularly the authors, Prof. Tapani Valkonen, Ms Tuija Martelin, M.Soc.Sc., and Docent Arja Rimpelä, for the work input which has made this study possible.

The Central Statistical Office was represented in the project by Senior Statisticians Hilikka Aho-nen, Soili Savela and Anne Koponen. Mr Olli Räisä was in charge of data processing.

Helsinki, December 1990

Olavi E. Niitamo

Mauri Nieminen

1 Hannele Sauli, *Occupational Mortality 1971 – 75*, Studies No. 54. Helsinki 1979. Ritva Marin, *Occupational Mortality 1971 – 80*, Studies No. 129. Helsinki 1986.

2 *Occupational Mortality in the Nordic Countries 1971 – 1980*, Nordisk statistisk skrifserie 49. Copenhagen 1988.

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1 Introduction

1.1. Background of the study

Studies regarding socio-economic differences in mortality generally examine mortality according to occupational class or other variables describing social stratification. The social classifications and variables used in different studies vary (see Valkonen, 1987). In addition to occupation, researchers have attempted to measure mortality differences according to level of education, income, standard of housing and other such variables.

Finnish health policy and related statistical and research activities have traditionally given a great deal of attention to regional differences in morbidity, mortality and the use of health services. However, regular statistics have not been collected on differences between socio-economic groups, based for example on occupation. Health differences between socio-economic groups are nevertheless of major importance from the viewpoint of health policy and social equality. Mortality differences are also clearly larger between social groups than between different regions.

The long-term programme on Finnish health policies and objectives which was prepared in 1986 discussed differences between various segments of the population and set the goal of reducing these differences during the coming decades (Ministry of Social Affairs and Health, 1987, p. 49). A separate section of the programme concerning information systems notes the necessity of developing capacities for describing and analyzing different phenomena according to social group (p. 180).

Internationally, the compilation and analysis of statistics on socio-economic differences in mortality and the use of such findings in directing health policy remained minor in scope up until recent times. Britain constitutes an exception in this regard, with authorities having published official statistics on mortality by social class at roughly ten-year intervals since 1911. Brisk discussion has also taken place in Britain concerning research findings (see, for example, *Inequalities in Health*, 1988; Wilkinson, 1986). Special studies have been conducted in around a

dozen other countries, including Finland and the other Nordic nations, on relative mortality by occupational group, social class, educational level or income (see Valkonen, 1987).

The shortage of information on socio-economic differences in mortality compared with data on regional differences is due partly to the difficulty involved in producing statistics based on socio-economic variables. Death certificates indicate where a person has died, and population statistics show how many people live in a particular area. The data on deceased persons and the risk population which are required for calculating mortality figures are therefore easy to obtain for different geographical areas. On the other hand, the information on occupation and other socio-economic factors which is included in death certificates is both incomplete and unreliable. Data on the number of deceased persons by social group cannot be obtained in such a way as to guarantee comparability with figures for the population as a whole. The British statistics mentioned above and other studies based on occupational data collected from death certificates therefore may provide misleading results (see, for example, OPCS, 1986).

The distortion caused by so-called numerator/denominator bias can be avoided if information on each deceased person's occupation, for example, can be obtained from the same source used in determining the occupational breakdown of the population as a whole, generally the population census. Studies linking mortality and census data have been performed in a number of countries since the 1960s. In countries which do not have a personal identification-number system, compiling linked data is extremely laborious and costly. Studies have therefore been conducted using sampling methods. The most important studies of this type have been conducted in Britain (Fox and Goldblatt, 1982), France (Desplanques, 1984) and the United States (Kitagawa and Hauser, 1973).

In the Nordic countries the formation of linked data has been a relatively simple matter thanks to the existence of identification numbers. The

statistical centres of all the Nordic countries have in fact compiled linked data on deceased persons since the 1970s and have published national statistics on mortality by occupational class (Sauli, 1979; Andersen, 1985; Borgan and Kristoferssen, 1986; Marin, 1986). Studies comparing data in the different Nordic countries have also been performed (Occupational Mortality..., 1987; Valkonen, 1988). Studies on special aspects of this question have likewise been conducted at the University of Helsinki (e.g. Koskinen et al., 1983; A. Rimpelä et al., 1987; Valkonen, 1987).

From the viewpoint of Finland's long-term health-policy programme as well as basic research on demographic and public-health issues, it is important that the research on differential mortality which was begun in the 1970s be continued with linked data regarding the 1980s. The Central Statistical Office and the Department of Sociology at the University of Helsinki consequently reached an agreement in August 1987 on the basis of which this study regarding socio-economic differences in mortality during the period 1971-85 was performed.

1.2. Purpose of the study

The main purpose of this study is to describe socio-economic differences in mortality and related changes in Finland during the period 1971-85. This is probably the first study presenting annual time series on mortality according to socio-economic variables based on information for a nation's entire population.

The study uses two variables in the formulation of socio-economic groups: occupational class and level of education. Child mortality is also described by type of family.

According to the original plan, standard of housing was also meant to be applied as a socio-economic indicator. A variable combining dwelling space per person and the level of amenities was devised and used in basic tabulations. Analysis showed, however, that the data for 1975 and 1980 were not comparable. This report therefore does not present information on mortality by standard of housing. Since the classification of causes of death and the formulation of social groups vary in different age groups, age groups are discussed separately. Chapter 2 deals with children (aged 5 to 14),

Chapter 3 with the "middle-aged population" (35 to 64) and Chapter 4 with the "elderly population" (60 and above). Information on people aged 60 to 64 is therefore included in both Chapters 3 and 4. Chapter 5 presents a summary of the study's main findings. Chapter 2 was written by Arja Rimpelä, Chapter 3 by Tapani Valkonen and Chapter 4 by Tuija Martelin.

Linked information on parents' socio-economic status was not available for children born after the census during each five-year period, making it impossible to calculate mortality figures for children aged 0 to 4 in a comparable manner with regard to other age groups. Therefore mortality among children aged 0 to 4 is not discussed in this study. A separate study has been published on socio-economic differences in infant mortality and related changes (Notkola and Valkonen, 1989). Since the occupation and educational level of people aged 15 to 34 change rapidly, it is difficult to obtain reliable socio-economic mortality data using information collected at five-year intervals. Consequently this age group has also been excluded.

1.3. Data and reliability

1.3.1. Data

Research involved three different sets of data, each covering a five-year period. The data set for the period 1971-75 is based on the 1970 population and housing census. Using identification numbers, information on the date and cause of death was added for each person who died during the period 1971-75. The data were compiled in the same way as those for the Central Statistical Office's study "Occupational Mortality 1971-75" (Sauli, 1979).

The data for the period 1976-80 were obtained from information obtained for the Central Statistical Office's study "Occupational Mortality 1971-80" (see Marin, 1986), which is in turn based on the 1975 population and housing census.

The data for the period 1981-85 were compiled for this study and its follow-ups. Population data were obtained from the 1980 population and housing census.

Regularly (e.g. annually) updated data on people's occupational class and education would be most useful for studying socio-economic differences in mortality. This study only includes data collected at five-year intervals, however. For example, if we look at mortality in 1974, the information on a person's occupational class and level of education does not apply to that year, but to what that person reported in the 1970 census. Age is the only factor which is continuously updated during each five-year period.

1.3.2. Data on population and deaths

In 1971 the population included around 800,000 children aged 5 to 14, around 1,600,000 persons aged 35 to 64 and around 700,000 persons aged 60 and above. During the research period the number of children declined while the number of persons in the middle-aged category and particularly the elderly group increased.

Since censuses were used as the source of population data, the same deficiencies found in census information are also found in the present data. The most important of these deficiencies are undercoverage (e.g. 0.7% in 1970) and insufficient information on occupation (e.g. 1.7% in 1975). The effect of these deficiencies on findings is quite minor.

The identification number and cause of death of deceased persons were obtained from information compiled for death statistics based on death certificates for the period 1971-85. Information on "unmatched persons", i.e. those not covered by the five-year census, was omitted. The number of deaths covered by the data is therefore slightly lower than the number of deceased persons according to official death statistics for the period 1971-85.

The reasons for unmatched cases of death have been discussed by Sauli (1979, pp. 7-9) and Marin (1986, pp. 137-141), who found about 1,200 such cases or 0.5% of all deaths in 1971-75 and 400 such cases or 0.2% of all deaths in 1976-80. The percentage was even lower in 1981-85. On the whole the number of cases which cannot be linked to census data is so small as to have no practical significance. It is worth pointing out that, in a study conducted by Kitagawa and Hauser (1973) in the United States, 26% of deaths were not linked to census data, but the findings were nevertheless considered usable.

1.4. Methodology

As indicated above, this study comprises three sets of data comprising census information as well as information on deaths during each five-year period. Data analysis proceeded in five stages:

1. Preparation of basic multivariable tables by the Central Statistical Office
2. Description of socio-economic breakdowns and related checks
3. Description of socio-economic differences in mortality and related trends according to education and occupational class with the help of life tables
4. More detailed analysis of mortality using log-linear regression analysis
5. Description of differences in mortality and related changes by cause of death

1.4.1. Raw tables and person-year breakdowns

The Central Statistical Office prepared a total of 15 raw tables from the basic data, nine of which were used for this study (3 periods x 3 age groups). The tables contain the basic information necessary for calculating annual mortality figures, including annual person-years and the annual number of total deaths and deaths by different causes in different population segments. The number of cells covered by the tables is large, since each table includes cross-tabled information not only on sex, year, five-year age group, occupational class, education and standard of housing, but also on control variables such as type of family, main activity, region, marital status and type of municipality. The contents of the raw tables in some respects varied for different age groups.

The population at risk was calculated for each cell of the table to the nearest day. Thus the population at risk for a particular cell of the population in year j in the five-year age group i was calculated as 365 days for all persons in the segment who belonged to this five-year age group the entire year. Persons who died during year j or belonged to age group i only part of the year contributed less than 365 person-days.

The raw tables were used to prepare summary tables showing the breakdown of person-years according to age, education, occupational class and other variables. Some of these tables are presented in connection with findings. The information obtained from the data was likewise compared with corresponding published census data, and variations in the classifications used in different censuses were investigated.

1.4.2. Age-standardization and method of statistical analysis

Descriptive findings are generally presented in this report in terms of age-standardized mortality rates or indices. The findings thus show differences in mortality between social groups when the effect of differences in groups' age structures have been eliminated. Conventional indirect or direct standardization methods have not been used in age-standardization, however. The basic findings concerning total mortality are presented with the help of figures based on life tables. In the more detailed analysis of findings, for example when variations in mortality are examined according to several explanatory factors simultaneously, a log-linear regression analysis based on the theory of generalized linear models has been applied.

The applied method or exponential model is based on the assumption that expected mortality (m_i) in a particular subgroup i formulated according to background factors can be expressed as a function of these factors in the following way:

$$(1) \quad m_i = E(d_i) / V_i = \frac{\exp(a + b_1x_{1i} + b_2x_{2i} + \dots + b_px_{pi})}{\exp(a) * \exp(b_1x_{1i}) + \exp(b_2x_{2i}) * \dots * \exp(b_px_{pi})}$$

or

$$(2) \quad \log(m_i) = \log(E(d_i)) - \log(V_i) = a + b_1x_{1i} + b_2x_{2i} + \dots + b_px_{pi}$$

where $E(d_i)$ is the expected number of deaths in the subgroup i , V_i is the number of person-years lived in this subgroup, x_1, \dots, x_p represent explanatory variables and a, b_1, \dots, b_p are parameters describing the effects of the corresponding

variables, whose values are estimated on the basis of the data with the help of the applied model.

The models have been fitted using the GLIM system (see Payne, 1985), in which the number of observed deaths (d_i) in a specific subgroup i is used as the concrete dependent variable and the number of person-years (V_i) is taken into account by treating it as an explanatory variable with the coefficient fixed at one. With regard to the above formal presentation, this means that the term $\log(V_i)$ is moved to the right side of equation (2). (See, for example, Aitkin et al., 1989, for the statistical basis of the model and its technical implementation in the GLIM system.) If one wishes to describe age-standardized differences in mortality between educational groups, for instance, age and level of education are used as the independent variables in the regression analysis. The index figures thus obtained for educational groups correspond to age-standardized mortality ratios (SMRs) obtained with conventional indirect age-standardization. The difference is that in using SMRs, the index values 100 or 1.00 indicate mortality for the entire population, while in this report one of the groups being compared has been chosen as the basis for comparison.

The interpretation of the log-linear model can be illustrated by the following example, in which the dependent variable is mortality among elderly women and the independent variables are age (five-year group, 1=60-64, ..., 8=95+) and level of education (1=higher, 2=secondary, 3=basic). If mortality is assumed to depend additively on these two factors, i.e. if education is thought to have a similar influence in each age group, mortality in age group i and at level of education j can be expressed as follows:

$$m_{ij} = m_{11} * r(\text{AGE}_i) * r(\text{EDU}_j)$$

in which m_{11} is mortality among women aged 60 to 64 with a higher education and $r(\text{AGE}_i)$, for example, signifies the relative mortality rate in age group i compared with the first age group, with the level of education having been standardized. In this case the original parameter estimates and the relative mortality rates calculated with the help of them are as follows:

Parameter	Estimate	exp(estimate)
"Constant"	-4.55	0.01
AGE ₁	0	1
AGE ₂	0.55	1.73
AGE ₃	1.14	3.11
AGE ₄	1.72	5.56
AGE ₅	2.27	9.66
AGE ₆	2.75	15.62
AGE ₇	3.16	23.45
AGE ₈	3.44	31.28
EDU ₁	0	1
EDU ₂	0.07	1.07
EDU ₃	0.28	1.32

The results show, among other things, that mortality is 32% higher for women with a primary education than for women with a higher education, taking into consideration differences in the age structure of these groups. Since this model assumes that age and education do not have interactions, the figure obtained corresponds to the average difference in different age groups. Interactions have been used in this report in examining the effect of occupational class and some other factor simultaneously (e.g. Table 3.4) and also in describing changes in mortality from the period 1971-75 to the period 1981-85 (i.e. relative differences in mortality between these two periods) separately in some background factor classes (e.g. Table 3.6).

1.5. Socio-economic variables used in the study

1.5.1. Occupational class

The following occupational classification used in this study's original tabulations was formulated on the basis of the 21-class categorization of socio-economic status used in the 1970 census:

1. Upper white-collar employees: managers and higher administrative or clerical employees as well as former managers and higher administrative or clerical employees and former employers comparable with them
2. Lower white-collar employees: lower administrative or clerical employees as well as former lower administrative or clerical employees and former employers comparable with them
3. Skilled workers: skilled or specialized workers not including farm and forestry workers as well as former skilled or specialized workers
4. Unskilled workers: unskilled workers and former unskilled workers as well as farm and forestry workers
5. Farmers: farmer employers, own-account farmers and former own-account farmers
6. Self-employed persons: employers with the exception of farmer employers as well as other self-employed persons
7. Others: current and former occupation unknown

In order to obtain a correct picture of differences in mortality, it is important to be able to place the entire population, including economically inactive persons, in occupational classes. The most problematic groups in this respect are pensioners and housewives. In this study pensioners have as far as possible been classified according to their former occupation. Information on former occupation was available for pensioners in the 1970 and 1975 census data. This information was not requested, in the 1980 census, however. For the period 1981-85, information on pensioners' former occupation was obtained primarily from the 1975 census and secondarily from the 1970 census.

The 1975 census lacked data on occupation for some of the economically active population

owing to non-response. In such cases information on occupation in 1970 was used in classifying the person.

With regard to children and other persons lacking a current or former occupation, occupational class was defined according to that of the head of household or a reference person. Most of the adults in this group are housewives. The occupation of the head of household was also used in classifying students and persons who had never had an occupation.

The comparability of information obtained from different censuses is somewhat problematic. The 1970 and 1975 censuses used more or less the same classification according to socio-economic status, but the 1980 census used a different breakdown. The most significant difference from the viewpoint of this study is that the division into skilled and unskilled workers in the former classifications was replaced by a division according to field of industry. In order to avoid a break in time series, persons classified as workers in 1980 were as far as possible divided into skilled and unskilled workers based primarily on the 1975 census and secondarily on the 1970 census.

There are also deficiencies in comparability concerning self-employed persons as well as farm and forestry workers. As a result of these deficiencies, self-employed persons were excluded from the analysis.

1.5.2. Level of education

Kitagawa and Hauser (1973) suggested that the most useful socio-economic variable in mortality studies is level of education. This variable does indeed have advantages compared with occupational class. First of all, level of education can be defined on the same grounds for both the economically active and the economically inactive population. Secondly, level of education does not generally change after youth. It is therefore not influenced by a weakening of health, whereas a person's occupation can change as a result of weakened health. Thirdly, information on education is more comparable than information on occupational class both internationally and over time.

Unfortunately, information on level of education in Finland and Europe in general is not as usable as that obtained by Kitagawa and Hauser in the United States. In contrast with Kitagawa and Hauser's data, most of the population in Europe has up to now received the same level of education prescribed by compulsory schooling. The distribution of education is therefore quite skewed, and meaningful analyses of differences in mortality are difficult owing to the fact that level of education does not vary sufficiently.

The following three-part classification was used in this study, with more detailed categories having been combined:

1. Higher education: at least 13 years in length. Includes persons with institute or university-level certificates or degrees.
2. Secondary education: 10-12 years in length. Includes persons with occupational training as well as persons who have completed an upper-secondary-school certificate but lack further training.
3. Basic education: up to 9 years in length. Also includes persons for whom data on level of education is unknown.

The classification was more or less the same in the 1970, 1975 and 1980 censuses, so data are comparable in this respect.

2. Children¹

2.1. Introduction

This chapter concerns children and young people aged 5 to 14. With the exception of infant mortality, socio-economic differences in mortality among children have not been studied previously on a national basis in Finland. Data on socio-economic aspects of mortality were, however, included in a follow-up study on children born in northern Finland in 1966 (Rantakallio, 1986). This study showed that socio-economic differences in mortality were also visible among children and young people after early infancy.

During the life cycle, the probability of death is lowest between the ages of 4 and 15. Earlier on, mortality is increased by factors related to birth and early infancy as well as congenital malformations. Similarly, mortality from traffic and other accidents, which are common causes of death among persons aged 15 to 24, is still low in the 4-15 age group.

The social and economic circumstances of parents and guardians determine what kind of life

a child will have. Children's social status is therefore measured according to that of their family - most often parents' or guardian's occupation or education. Family structure is another essential gauge: whether the child comes from a single-parent or two-parent family, whether the child lives at home or in an institution, whether the child's parents are alive.

The following sections examine changes in the socio-economic status of children aged 5 to 14 during the period 1971-85 and then mortality trends in general and according to socio-economic status during the same period. Mortality was measured on the basis of life tables, i.e. in terms of the probability of dying between the ages of 5 and 14. The probability of death is expressed as a percentage and was calculated for two five-year age groups. Owing to the small number of cases, mortality is analysed primarily by five-year period.

¹ This chapter was written by Arja Rimpelä with the assistance of Matti Siivola

2.2. Indicators of socio-economic status

Socio-economic differences in mortality were examined with the help of four different indicators: occupational class, father's education, mother's education and family structure.

Children's occupational class was defined according to that of an adult living in the same dwelling, most often the child's father or mother. Families were defined as persons living together permanently. Married couples were classified as two-parent families. Unmarried couples were al-

so classified as two-parent families if they had a common child. Around 3% of children were in neither two-parent nor single-parent families. Information on parents' education was obtained for children living in two-parent and single-parent families. Information was lacking with regard to father's education for around 13% of children and with regard to mother's education for around 5% of children. Educational and family data were obtained for the periods 1976-80 and 1981-85.

2.3. Changes in socio-economic status during the period 1971-81

Between 1971 and 1981 the relative number of children in families in the white-collar employee class rose from 26% to 39%, and within this group the figure for upper white-collar employees rose from 9% to 16%. The relative number of children living in farm families meanwhile decreased from 19% to 8%, while the number in working-class families remained around 45%.

Parents' level of education rose simultaneously with the upward shift to white-collar employee status. The relative number of children whose father had a higher education rose from 10% in 1976 to 13% in 1981, and the corresponding rise for mothers was from 7% to 10%. The percentage of children living in single-parent families increased from 10% to 12%.

2.4. Mortality during the period 1971-85

The probability of dying between the ages of 5 and 14 fell sharply during the first half of the 1970s, but this drop had practically levelled off by the beginning of the 1980s (Figure 2.1). Mortality in this age group was higher for boys than for girls in the early 1970s, nor did the difference between the sexes change substantially during the research period.

During the period 1971-75 the probability of death was 0.5% for boys and 0.3% for girls. This means that five out of every thousand five-

year-old boys and three out of every thousand girls died before their fifteenth birthday. The corresponding figures for the period 1981-85 decreased to three boys and two girls.

The reduction in mortality from accidents explained nearly the entire fall in mortality during the 1970s (Figure 2.1). Traffic deaths showed the greatest drop, but other accidental deaths also declined. Mortality from diseases did not fall in the 1970s but did turn downwards in the early 1980s (Figure 2.1).

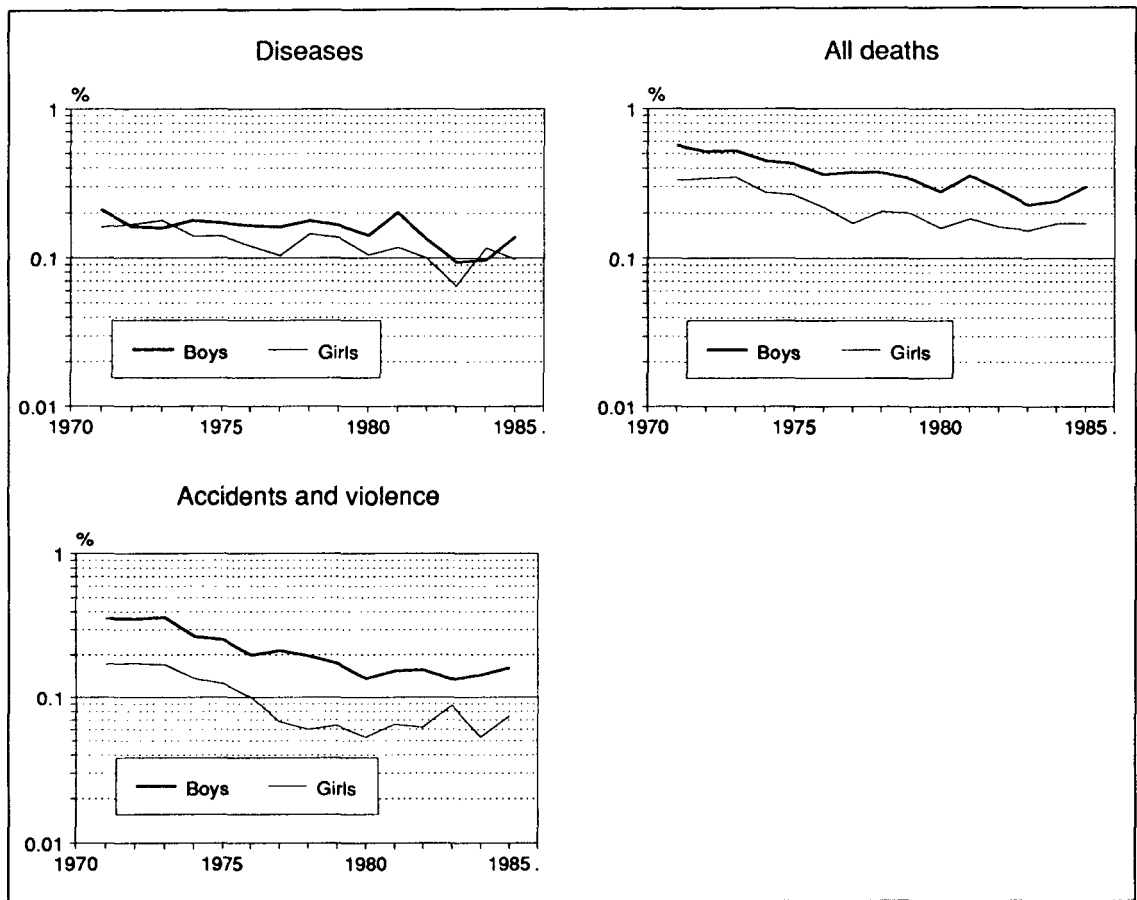


FIGURE 2.1. Probability of dying from all causes, diseases and accidents between the ages of 5 and 14 (%) during the period 1971-85, boys and girls.

2.5. Mortality trends in different population groups

2.5.1. Occupational class

Total mortality

The scale of differences between occupational classes can be illustrated as follows: In the early 1980s two out of every thousand five-year-old boys from families in the white-collar employee class died before the age of 15, while the figure was three among workers' children and four among the farming population. The differences were smaller for girls.

The trend of children's total mortality in different occupational classes during the period 1971-85 can be summarized by five observations (Figure 2.2, Appendix Table 2):

- mortality declined in all occupational classes,
- differences followed a general trend, with mortality being lower among children from higher occupational classes and vice versa, but
- absolute differences between occupational classes were fairly small, since mortality in these age groups was quite low,
- differences were of a similar nature throughout the period and
- differences were more pronounced among boys than among girls.

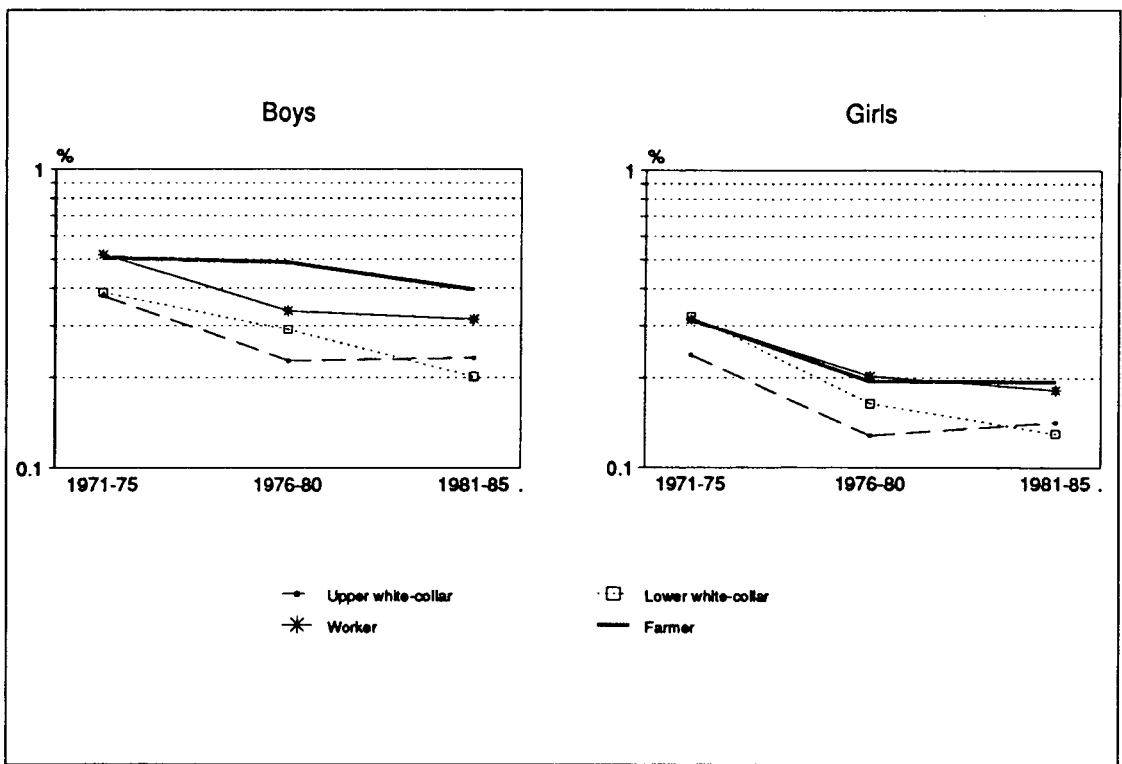


FIGURE 2.2. Probability of dying between the ages of 5 and 14 (%) by family's occupational class during the periods 1971-75, 1976-80 and 1981-85, boys and girls.

Causes of death

Upper and lower white-collar employees were grouped together in the following analysis because of the low number of cases.

Class differences in mortality from diseases were small during each period. As could be expected, boys from families in the white-collar employee class had the lowest mortality and boys from farming families the highest. Small differences were found among girls only during the period 1976-80.

Class differences in mortality from accidents were similar to those found in terms of total mortality for the entire research period, with

boys from farming and working-class families having a slightly higher probability of death than boys from the white-collar employee class (Figure 2.3, Appendix Table 4). Differences in mortality from accidents appeared to widen among boys.

Differences were not observed among girls during the first five-year period, but after this mortality from accidents declined at a faster rate for girls from the white-collar employee class than for other girls. During the period 1981-85 the differences were similar to those found among boys (Figure 2.3). It remains unclear whether this is due to random variation or whether class differences in mortality from accidents are on the rise.

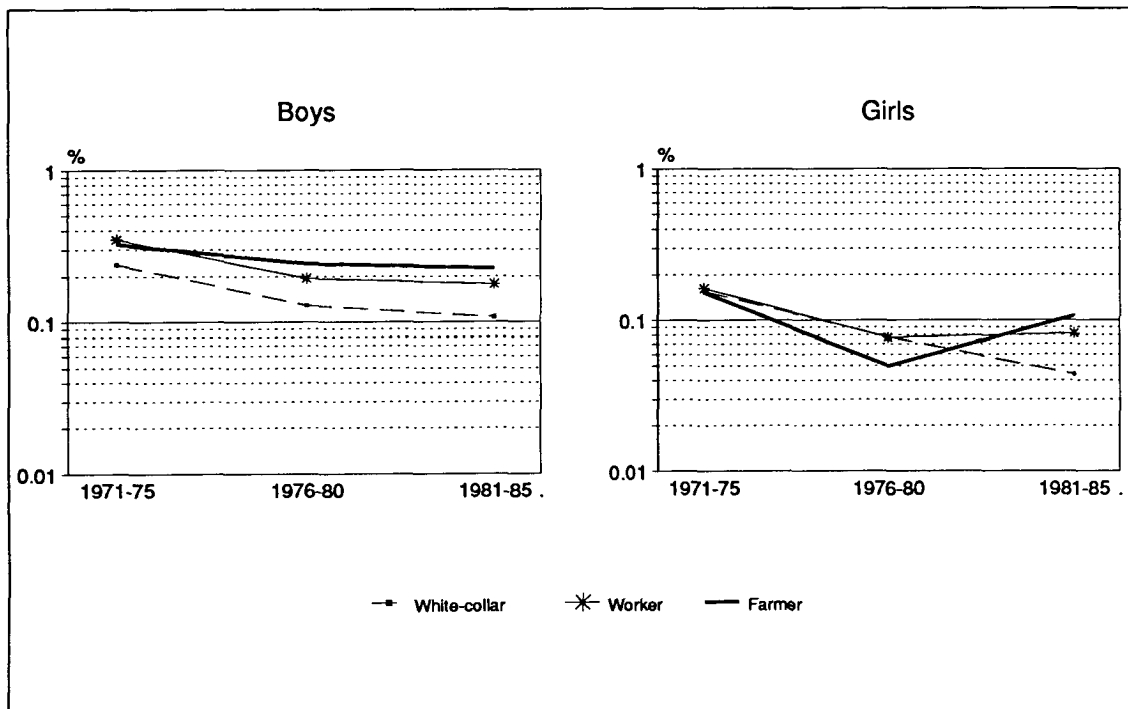


FIGURE 2.3. Probability of dying from accidents between the ages of 5 and 14 (%) by family's occupational class during the periods 1971-85, 1976-80 and 1981-85, boys and girls.

A more detailed analysis of causes of death for the period 1976-85 showed that mortality from neoplasms was not linked to occupational class, while a consistent link existed in the case of ot-

her common causes of death (diseases of the nervous system and sense organs, congenital malformations and traffic accidents), with the lowest mortality being recorded for the white-col-

TABLE 2.1. Probability of dying between the ages of 5 and 14 (%) by cause of death and family's occupational class during the period 1976 - 85.

Cause of death	White-collar employees	Workers	Farmers
Neoplasms			
Probability of death (%)	0.054	0.051	0.058
95% confidence interval	0.04 - 0.06	0.04 - 0.06	0.04 - 0.08
Number of deaths	128	153	36
Diseases of the nervous system and sense organs			
Probability of death (%)	0.012	0.018	0.021
95% confidence interval	0.008 - 0.016	0.013 - 0.023	0.009 - 0.032
Number of deaths	29	53	13
Congenital malformations			
Probability of death (%)	0.015	0.022	0.028
95% confidence interval	0.010 - 0.020	0.017 - 0.027	0.015 - 0.04
Number of deaths	35	65	18
Traffic accidents			
Probability of death (%)	0.049	0.075	0.090
95% confidence interval	0.040 - 0.058	0.065 - 0.085	0.065 - 0.116
Number of deaths	117	226	51



lar employee class and the highest for the farming population (Table 2.1). Differences were statistically significant only in the case of traffic accidents. The results were similar for girls and boys.

2.5.2. Parents' education

Differences in mortality according to father's education remained unchanged from the period 1976-80 to the period 1981-85. Children whose father had a basic education had the greatest probability of death, while children whose father had a higher education were least likely to die before their fifteenth birthday (Appendix Table 2).

The significance of differences in mortality between educational groups can be illustrated as follows: During the period 1981-85 three out of every thousand boys aged five whose fathers had a basic education died before the age of 15, compared with two out of every thousand boys whose fathers had a higher education.

Mortality differences according to mother's education were mainly along similar lines, although

no consistent differences were found among girls during the latter period (Appendix Table 2).

Table 2.2 presents an analysis of the connection between mortality and father's and mother's education in two-parent families. Owing to the small number of cases, the periods 1976-80 and 1981-85 were combined. Within the confidence interval, few differences between educational groups were statistically significant.

Father's education was a better predictor of mortality than mother's education: differences between groups based on father's education remained consistent when controlled for mother's education. Mother's education was not consistently connected with mortality when controlled for father's education.

Differences in mortality from disease according to father's education were small and were not consistent during the latter period (Appendix Table 2). Differences in mortality from accidents were also small but were mainly in line with expectations, with mortality highest among children whose fathers had only a basic education. Differences were not observed among girls during the period 1976-80, but during the period 1981-85 the trend was towards a decline in mortality with a rise in father's level of education.

TABLE 2.2.
Probability of dying between the ages of 5 and 14 (%) by father's and mother's education during the period 1976-85, two-parent families.

Father's education	Mother's education	Number of deaths	Probability of dying	95% confidence interval
Basic	Basic	551	0.27	0.24 - 0.29
	Secondary	168	0.21	0.18 - 0.25
	(Higher)	17	0.28	0.15 - 0.41)
Secondary	Basic	191	0.20	0.17 - 0.23
	Secondary	182	0.19	0.17 - 0.22
	Higher	33	0.23	0.15 - 0.31
Higher	Basic	20	0.19	0.11 - 0.27
	Secondary	53	0.18	0.13 - 0.23
	Higher	54	0.16	0.12 - 0.20

2.5.3. Family structure

Children's probability of death was practically the same for two-parent families and single-parent families during both periods (Appendix Table 2), but mortality among children living outside families ("other") was much higher. Mortality from disease and accidents was also practically the same for children in two-parent and single-parent families (Appendix Tables 3 and 4). The high mortality in the "other" group could not be thoroughly accounted for on the basis of the data, but the fact that institutionalized children were in this group partly explained the observed finding.

2.5.4. Occupational class, family structure and father's education

A combined analysis of occupational class and family structure during the period 1976-85 showed that the relation between occupational class and mortality remained stable when controlled for family structure (Table 2.3). Children from families in the white-collar employee class had a lower probability of death than other children regardless of the type of family in which the child lived. Similarly differences between two-parent

and single-parent families were small regardless of occupational class. On the other hand, the findings imply that coming from a single-parent family slightly increased a child's probability of death among the working class.

Differences between occupational classes remained stable with regard to mortality from disease and accidents when controlled for family structure. The small number of cases made analysis in some classes unreliable.

A combined analysis of father's education and occupational class indicated that mortality is connected primarily to occupational class. In the white-collar employee class, children's probability of death was the same regardless of the father's education. In working-class and farming families where the father had a secondary education, children's mortality was slightly lower than the figure when the father had only a basic education (0.20% vs. 0.25% for workers and 0.29% vs. 0.31% for farmers). The number of persons with a higher education was insufficient in these classes. The above differences were not statistically significant. Mortality from disease and accidents was also linked primarily to occupational class.

TABLE 2.3.
Probability of dying between the ages of 5 and 14 (%) by family structure and occupational class during the period 1976-85.

Family structure	Occupational class	Number of deaths	Probability of dying (%)	95% confidence interval
Two-parent families	White-collar	381	0.18	0.17 - 0.20
	Worker	618	0.23	0.21 - 0.25
	Farmer	167	0.30	0.26 - 0.35
Single-parent families	White-collar	44	0.16	0.12 - 0.21
	Worker	84	0.31	0.24 - 0.38
	(Farmer)	10	0.36	0.11 - 0.60

3. The middle-aged population¹

3.1. Development of total mortality

3.1.1. Development of mortality by age and sex

At the beginning of the research period, in 1971, around 9,500 men and 4,200 women between the ages of 35 and 64 died in Finland. The corresponding figures in 1985 showed a clear drop to 7,700 men and 3,000 women despite the fact that the number of persons in this age group increased 16%. The reduction in the number of deaths is due to a considerable decline in the mortality rates for both sexes in this age group. Mortality fell 23-38% in men's age groups and 23-33% in women's.

With the age-specific mortality rates prevailing in 1971, a 35-year-old man had a 35% probability of dying before the age of 65. Owing to the drop in age-specific mortality rates, this probability of death fell to 27% in 1985. The figures for women were considerably lower: 14% in 1971 and 10% in 1985.

3.1.2. Mortality by level of education

As Table 3.1 shows, the level of education of the middle-aged population improved substantially between 1971 and 1985. In 1971 only 20% of persons aged 35 to 64 had more than a basic education, but by 1985 the percentage doubled. Men had a slightly higher level of education than women throughout this period.

TABLE 3.1.
Person-years by level of education (%),
men and women aged 35 to 64.

Level of education	Men		Women	
	1971	1985	1971	1985
Higher	6	11	5	9
Secondary	16	30	14	29
Basic	78	59	81	62
All	100	100	100	100

Figure 3.1 shows, in agreement with earlier studies, that there are considerable differences in mortality between educational groups. In 1971 a 35-year-old man had a probability of dying before the age of 65 of 36% if he had a basic education, 29% if he had a secondary education and 24% if he had a higher education. Men with a basic education thus had a probability of death 50% higher than men with the best education.

¹ This chapter was written by Tapani Valkonen with the assistance of Anne Koponen, Pekka Martikainen, Raili Tynkkynen and Marie Reijo.

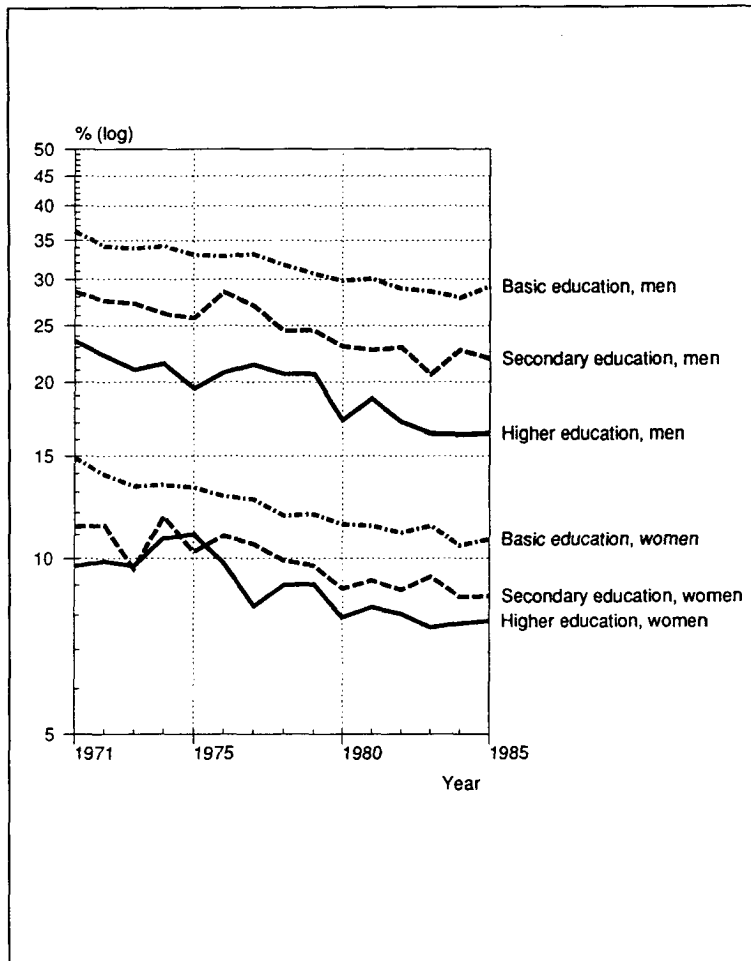


FIGURE 3.1. Probability of death by level of education according to annual life tables for the period 1971-85, men and women aged 35 to 64.

Mortality has declined in all men's educational groups. The change has, however, been all the greater the more education men have received. Mortality among men with a higher education fell 30% between 1971 and 1985, while the drop for men with a basic education was only 20%. Relative differences in mortality between educational groups shrank slightly in and after the mid 1970s, when mortality among the upper educational groups failed to decline. Differences in mortality grew clearly in the 1980s, however.

Figure 3.1 also includes data on women, which show that the relative difference between the top and bottom educational groups was smaller in the early 1970s than in the case of men, nor did

this difference increase during the research period. The relative difference between women with a basic education and those with a secondary education shrank somewhat. The mortality trend among women with a higher education was exceptional during the early 1970s. Mortality in this group temporarily rose up to 1975, when it exceeded the figure for women with a secondary education. During this period differences in mortality by level of education clearly shrank. Since the late 1970s, however, mortality trends have been similar in all educational groups.

TABLE 3.2.
Person-years by occupational class in 1971 and 1985 (%), men and women
aged 35 to 64.

Occupational class	Men		Women	
	1971	1985	1971	1985
Upper white-collar employees	7.9	14.1	6.4	10.4
Lower white-collar employees	13.3	17.2	23.4	36.2
Skilled workers	36.5	40.3	25.1	19.5
Unskilled workers	13.1	9.2	15.0	11.0
Workers, unclassified	-	1.0	-	7.5
Farmers	21.6	11.0	21.9	10.2
Other self-employed persons	6.6	6.1	5.5	4.3
Others	1.0	1.1	2.8	0.9
All	100.0	100.0	100.0	100.0
Person-years (1000)	733	889	835	922

3.1.3. Mortality by occupational class

Table 3.2 shows the breakdown of person-years by occupational class at the beginning and end of the research period. The figures reflect the change which has taken place in the social structure of Finnish society. The relative number of white-collar employees has risen intensely, while the percentage of farmers has fallen by one-half. Specialized workers formed the biggest male group in both years. The biggest occupational class among women was likewise specialized workers in 1971, but in 1985 lower white-collar employees plainly constituted a higher percentage.

Below the classification presented in Table 3.2 is not used as such, but with the following alterations:

1. During the period 1981-85 male workers for whom information is not available concerning specialization have been combined with the class of skilled workers. Mortality among this small group is closer to that of skilled workers than to that of unskilled workers.

2. All female workers have been treated as a single group. This is due, among other things, to the large percentage of unclassified workers during the period 1981-85. According to previous studies (Valkonen, 1983; Marin, 1986), differences in mortality between groups of workers are clearly smaller among women than among men.
3. Self-employed persons outside agriculture have been excluded from the analysis. This is a heterogeneous group, and other deficiencies in forming this class were encountered, as was mentioned in section 1.5.1.
4. The "others" class has been excluded. This class includes persons living in institutions as well as persons for whom information could not be obtained from censuses. Most of these persons are economically inactive, and mortality is considerably higher than for other groups. Owing to the small size of this class, mortality figures display a high degree of random error.

Figure 3.2 presents probabilities of dying between the ages of 35 and 64 for men by occupational class as calculated from annual life tables.

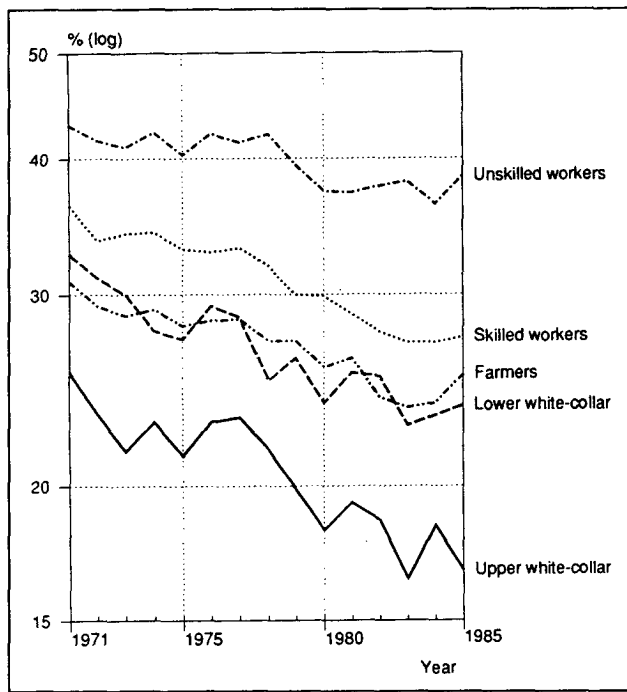


FIGURE 3.2.
Probability of death by occupational class according to annual life tables during the period 1971-85, men aged 35 to 64.

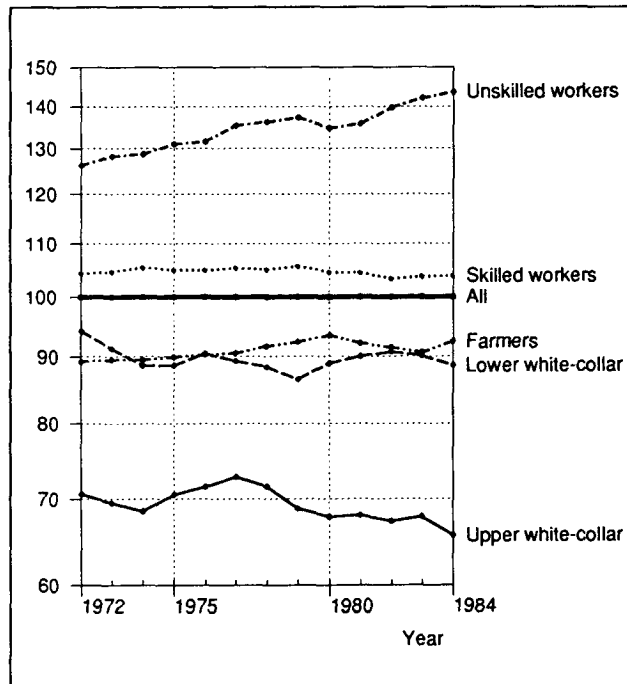


FIGURE 3.3.
Relative probability of death by occupational class (all men = 100), three-year moving averages, men aged 35 to 64.

All the curves slope downwards, but there are large differences between gradients. The probability of dying before the age of 65 remained around 40% for unskilled workers throughout the period, while the figure for upper white-collar employees declined from around 25% to less than 20%. Skilled workers, farmers and lower white-collar employees, who together comprise over 80% of those covered by the data, fall between these two groups.

Figure 3.3 presents data based on three-year moving averages concerning the probability of death among men in different occupational classes in relation to the average for the entire material. The biggest occupational class, skilled workers, had a mortality rate which was slightly above average throughout the entire period. The figures for lower white-collar employees and farmers were more or less steadily about 10% below the average. The gap between upper white-collar employees and other groups widened in the late 1970s and early 1980s despite the considerable increase in the percentage of persons classified as upper white-collar employees. The relative position of unskilled workers worsened all through the period.

Relative differences in mortality between occupational classes are much smaller among women than among men (Figures 3.4 and 3.5). This is partly because mortality among female unskilled workers (who are not treated separately in the figure) is not exceptionally large, as it is among men. The small differences compared to men

are due partly to the fact that female upper white-collar employees vary less from the average than their male counterparts.

Since the number of deaths per year is smaller among women, annual random error is fairly large. Figure 3.5 nevertheless indicates that relative mortality differences between female white-collar employees and workers did not change during the research period. On the other hand, mortality has fallen more slowly among farm women than among women in other groups, as a result of which their relative mortality has risen. The explanation for this may be selectivity, with women who have shifted from agriculture to other occupations apparently having been more healthy than the overall average for farm women.

3.1.4. Simultaneous effect of level of education and occupational class on mortality

Both level of education and occupational class describe a person's socio-economic status, and these two variables are strongly correlated with each other. It can be calculated from Table 3.3 that 88% of male upper white-collar employees and 78% of female upper white-collar employees had at least a secondary education. The corresponding figures for lower white-collar employees were 56% for men and 41% for women.

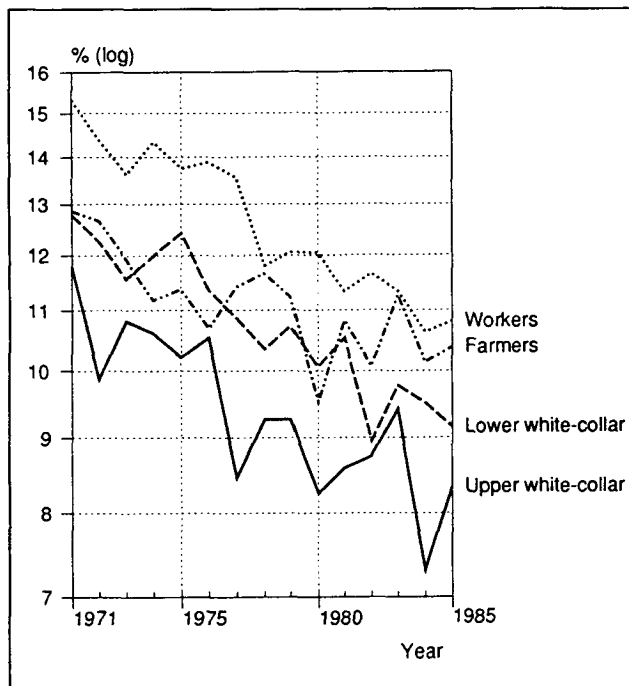


FIGURE 3.4.
Probability of death by occupational class according to annual life tables during the period 1971-85, women aged 35 to 64.

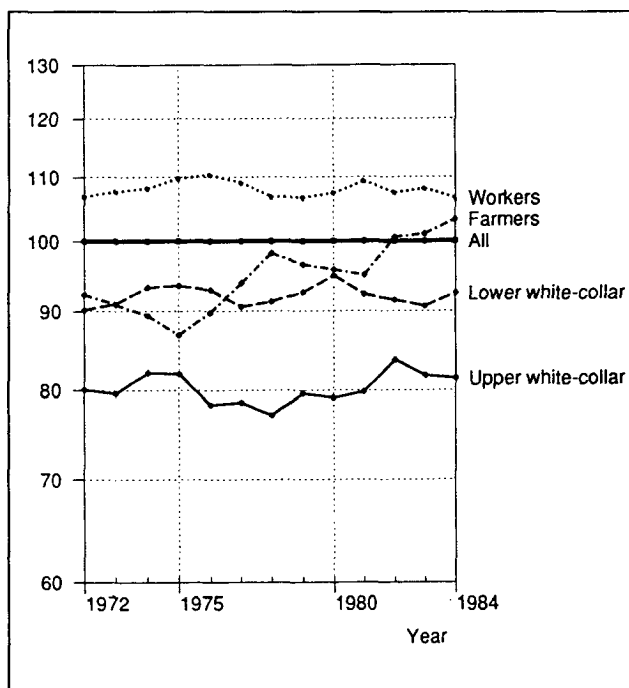


FIGURE 3.5
Relative probability of death by occupational class (all women = 100), three-year moving averages, women aged 35 to 64.

TABLE 3.3.
Person-years during the period 1971-85 by occupational class and level of education as a percentage of all person-years, men and women aged 35 to 64.

Occupational class	Level of education			
	Basic	Secondary	Higher	All
MEN				
Upper white-collar employees	1.5	3.1	7.6	12.3
Lower white-collar employees	7.4	8.4	0.9	16.8
Skilled workers	33.9	7.6	0.1	42.0
Unskilled workers	10.8	0.8	0.0	11.7
Farmers	15.0	2.3	0.1	17.3
All	68.7	22.6	8.7	100.0
WOMEN				
Upper white-collar employees	2.0	2.0	4.6	8.8
Lower white-collar employees	18.9	11.2	1.8	32.0
Workers	36.5	5.1	0.1	41.7
Farmers	15.1	2.3	0.1	17.4
All	72.5	20.7	6.8	100.0

The number of workers and farmers with a higher education is very small, and mortality data on these groups will not be presented in the following analysis.

The top part of Table 3.4 shows how mortality among men is simultaneously dependent on level of education and occupational class throughout the research period on average. The table includes two "all" lines. The lower of these indicates what kind of connection existed throughout the period between level of education and mortality on average, while the upper "all" line indicates dependence between level of education and mortality controlled for occupational

class. The difference in mortality between persons with a higher education and those with a basic education is cut roughly in half if controlled for occupational class. Similarly the columns show that differences in mortality between occupational classes shrink substantially when controlled for level of education. The change is particularly clear in the case of farmers, whose crude mortality rate is higher than that of lower white-collar employees, but smaller when controlled for level of education. Both level of education and occupational class have a clear separate effect on mortality when the other variable is controlled for.

TABLE 3.4
Age-standardized relative mortality by level of education and occupational class during the period 1971-85 (upper white-collar employees with a higher education = 100), (period-standardized in all models, in parentheses figures based on main effects model), men and women aged 35 to 64.

	Higher	Secondary	Basic	All (educ. controlled)	All (educ. not controlled)
MEN					
Upper white-collar employees	100 (100)	117 (115)	148 (141)	100	100
Lower white-collar employees	121 (119)	136 (137)	172 (168)	119	138
Skilled workers	..	163 (154)	190 (189)	134	167
Unskilled workers	..	224 (209)	259 (257)	182	230
Farmers	..	115 (131)	164 (161)	114	142
All (occ. class controlled)	100	115	141	..	..
All (occ. class not controlled)	100	136	183	..	..
WOMEN					
Upper white-collar employees	100 (100)	109 (104)	127 (125)	100	100
Lower white-collar employees	106 (105)	112 (109)	133 (131)	105	115
Workers	..	127 (126)	154 (151)	121	138
Farmers	..	104 (109)	134 (131)	105	119
All (occ. class controlled)	100	104	125	..	..
All (occ. class not controlled)	100	111	141	..	..

The figures "inside" the table indicate the level of mortality in subgroups which have been formed according to level of education and occupational class. Upper white-collar employees with a higher education serve as the reference group. Roughly the same observation can be made regarding these figures as in the case of marginal effects: There are clear differences in mortality between occupational classes at each level of education and clear differences in mortality bet-

ween persons with different levels of education in each occupational class.

The mortality index values which would be obtained if the mortality of each subgroup was determined directly on the basis of the main effects of level of education and occupational class, i.e. without interaction, have been given in parentheses. These figures were obtained by multiplying the indices indicating the standardized ef-

fect of education and occupational class. The observed figures and the figures according to the main effects model are generally extremely close to each other. The only clear exception is farmers with a secondary education, whose mortality rate is clearly lower than would be expected on the basis of marginal effects. A statistical test does not indicate statistically significant interaction between level of education and occupational class, however.

As one would expect, the lowest mortality is found among upper white-collar employees with a higher education, while the greatest mortality is among unskilled workers with a basic education. The difference between these extreme groups is only slightly bigger than that between upper white-collar employees and unskilled workers in general, however. This is understandable since most upper white-collar employees have received a higher education and only a small portion of unskilled workers have more than a basic education. A fairly complete picture of differences in mortality between socio-economic

groups and the development of mortality can therefore be obtained with the help of the occupational-class variable alone.

The dependence of women's mortality on occupational class and level of education is by nature the same as for men. Controlling for education nevertheless has a greater effect on the difference between occupational classes among women than among men. Most of the differences between upper white-collar employees, lower white-collar employees and farmers disappear when controlled for education. Thus mortality among upper- and lower white-collar employees and farmers with a basic education is more or less the same. Mortality is about 20% higher for workers than for other groups at all levels of education, however.

The Finnish version of the study includes analyses of mortality by age group, region and type of activity for each occupational class. A summary of the findings is presented in Chapter 5.

3.2. Causes of death

3.2.1. Mortality differences by cause of death between occupational classes during the period 1971-85

Table 3.5 presents data on causes of death by occupational class for the entire period 1971-85.

The table lists 23 causes of death. Results naturally depend on how detailed a classification is used.

TABLE 3.5.

Relative age-standardized mortality by occupational class and cause of death during the period 1971-85 (upper white-collar employees = 100), (period controlled), men and women aged 35 to 64.

Cause of death	Men					Women			
	Upper white-collar	Lower white-collar	Skilled workers	Un-skilled workers	Farmers	Upper white-collar	Lower white-collar	Workers	Farmers
All causes	100	138	167	230	142	100	115	138	119
All diseases	100	138	160	206	138	100	119	142	126
Neoplasms	100	120	154	178	120	100	102	105	90
– stomach	100	133	167	192	167	100	140	176	182
– large intestine and rectum	100	92	79	70	61	100	88	92	77
– lung	100	170	284	352	189	100	133	160	68
– breast	..	..	..	..	..	100	85	69	60
– cervix uteri	..	..	..	..	..	(100)	260	371	172
– other	100	103	111	121	94	100	104	108	100
Diseases of the circulatory system	100	147	162	204	146	100	149	198	179
– ischaemic heart disease	100	150	163	199	147	100	158	212	182
– – acute myocardial infarction	100	149	157	190	154	100	153	210	192
– – other forms of ischaemic heart disease	100	156	183	233	125	100	173	222	144
– cerebrovascular diseases	100	127	149	199	129	100	132	171	154
– other	100	151	169	242	163	100	160	216	221
Other diseases	100	136	164	272	135	100	120	162	142
– diseases of the respiratory system	100	190	301	574	270	100	112	167	147
– alcohol-associated diseases ¹	100	121	135	220	57	100	105	107	40
– other diseases of the digestive system	100	129	129	183	92	100	98	135	112
– other	100	129	140	212	139	100	133	180	169
Accidents and violence	100	131	203	379	159	100	89	111	75
– traffic accidents	100	114	151	235	123	100	97	131	92
– acc. poisoning by alcohol	100	159	329	751	199	(100)	136	189	(53)
– other	100	132	243	476	153	100	92	129	74
– suicide	100	135	183	330	183	100	79	85	70

() number of deaths < 20.

¹ Alcohol-associated diseases (alcoholic psychosis, alcoholism, cirrhosis of liver and diseases of pancreas)

In agreement with previous studies conducted in Finland and other countries, Table 3.5 allows the main observation that the order of occupational classes for most causes of death is the same as the order for total mortality. Among men there is only one cause of death (cancer of the intestine and rectum) for which mortality is highest among upper white-collar employees. Among women, upper white-collar employees have a higher mortality rate than lower white-collar employees and workers for breast cancer, suicide and cancer of the intestine and rectum. Upper white-collar employees also have a slightly higher mortality rate than lower white-collar employees and workers in the case of traffic accidents and other accidents.

Although the order of occupational classes in terms of mortality from different causes of death is generally similar, differences vary in size. Among men, unskilled workers have at least three times as high a mortality rate compared with upper white-collar employees for the following causes of death (relative mortality in parentheses):

alcohol poisoning	(7.5)
diseases of the respiratory system	(5.7)
"other accidents"	(4.8)
all accidents etc.	(3.8)
lung cancer	(3.5)
suicide	(3.3)

The difference is smaller than average for the following diseases:

cancer of the intestine and rectum	(0.7)
"other neoplasms"	(1.2)
other diseases of the digestive system	(1.8)
stomach cancer	(1.9)
acute myocardial infarction	(1.9)
cerebrovascular diseases	(2.0)

Once again, differences between occupational classes are generally smaller among women than among men in terms of causes of death. Relatively speaking, the biggest difference applies to cancer of the cervix uteri, with workers having nearly four times as high a mortality rate as upper white-collar employees. There were only 17 deaths from this cause among upper white-collar employees during the entire period 1971-85, however, so the relation is quite uncertain statistically.

Mortality differences between female occupational classes are largest for circulatory diseases,

with workers having twice as high a mortality rate as upper white-collar employees. Relative differences are thus quite similar to those found among men.

Farmers' relative position varies more than that of other groups' for different causes of death. In the case of both men and women, the farm population has a slightly higher overall mortality rate than lower white-collar employees. Compared with this general level, mortality due to stomach cancer and diseases of the respiratory system is exceptionally high for both men and women members of the farm population. Most circulatory diseases are also relatively common among women living on farms. On the other hand, cancer of the intestine and rectum, breast cancer and lung cancer are rare in this group. Farmers have a relatively low mortality from alcohol-associated diseases, the main specific cause of death in this category being cirrhosis of the liver. Differences between men and women in the farming population are extremely large in mortality due to alcohol poisoning, suicide and non-traffic accidents. These are common causes of death among male farmers, compared with other occupational classes, while farm women are clearly less likely to die of these causes than women in other groups.

3.2.2. Changes in mortality by occupational class and cause of death during the period 1971-85

Tables 3.6 and 3.7 contain information on changes in mortality by occupational class and cause of death between the periods 1971-75 and 1981-85. These tables are complemented by Figure 3.6, which shows the relative age-standardized mortality of different occupational classes for certain causes of death by period. The figure shows the scale of mortality differences between occupational classes as well as development trends.

As was noted earlier, among men, total mortality has declined most for upper white-collar employees (27%) and least for unskilled workers (13%). The widening of this gap could be due to two reasons:

1. Structural changes in mortality: if mortality decreases most for causes of death in which mortality differences between occupational

classes are smaller than average (e.g. neoplasms), differences in total mortality will increase even if mortality for each cause of death declines equally in all occupational classes and the relative differences between occupational classes remain stable for each cause of death. Similarly a slow decline in mortality for those causes of death in which

differences in mortality are large would lead to growth in differences pertaining to total mortality.

2. Faster decline of mortality in upper than in lower occupational classes from most causes of death.

TABLE 3.6.
Relative change in age-standardized mortality (%) from the period 1971-75 to the period 1981-85 by occupational class and cause of death, men aged 35 to 64.

Cause of death	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All occ. classes	Percentage of all deaths	
							1971 - 75	1981 - 85
All causes	-27	-23	-23	-13	-18	-21	100.0	100.0
All diseases	-26	-25	-25	-12	-18	-22	84.1	82.5
Neoplasms	-7	-8	-20	-1	-13	-14	19.6	21.4
- stomach	(-12)	-16	-31	-39	-38	-31	2.4	2.1
- large intestine and rectum	(-33)	-10	+1	-12	+18	-7	1.0	1.2
- lung	+8	-11	-24	+1	-10	-15	8.1	8.5
- other	-7	-4	-14	+10	-10	-9	8.1	9.6
Diseases of the circulatory system	-34	-30	-27	-15	-20	-25	51.7	48.8
- ischaemic heart disease	-33	-27	-24	-14	-16	-22	37.8	37.0
- - acute myocardial infarction	-37	-32	-28	-19	-21	-27	29.8	27.3
- - other forms of ischaemic heart disease	-16	-8	-9	+4	+8	-5	8.0	9.7
- cerebrovascular diseases	-42	-38	-32	-23	-35	-33	7.3	6.1
- other	-27	-37	-37	-14	-28	-30	6.7	5.8
Other diseases	-42	-14	-27	-19	-17	-24	12.7	12.3
- diseases of the respiratory system	(-21)	-34	-36	-30	-28	-32	4.5	3.7
- alcohol-associated diseases	(+41)	+33	+42	+33	+55	+59	1.6	3.5
- other diseases of the digestive system	(-75)	-64	-53	-48	(-46)	-55	1.8	1.0
- other	-22	-36	-42	-22	-16	-33	4.8	4.1
Accidents and violence	-31	-10	-14	-15	-17	-15	15.9	17.5
- traffic accidents	-54	-52	-53	-51	-53	-52	4.4	2.7
- acc. poisoning by alcohol	(+3)	(+30)	+10	+4	+25	+13	1.6	2.4
- other	-14	+16	-5	-12	-15	-4	5.0	6.2
- suicide	-29	-2	+3	0	+1	-2	4.9	6.2

() number of deaths < 50 at least during one five-year period

TABLE 3.7.
Relative change in age-standardized mortality (%) from the period 1971-75 to the period 1981-85
by occupational class and cause of death, women aged 35 to 64.

Cause of death	Upper white-collar	Lower white-collar	Workers	Farmers	All occ. classes	Percentage of all deaths	
						1971 - 75	1981 - 85
All causes	-22	-23	-23	-14	-21	100.0	100.0
All diseases	-23	-24	-25	-16	-22	90.9	89.1
Neoplasms	-3	-13	-8	+4	-7	32.4	39.2
- stomach	(16)	-20	-24	-24	-22	3.3	3.2
- large intestine and rectum	(+9)	-15	-5	+5	-4	2.4	3.0
- lung	..	+15	+52	(+61)	+39	1.5	2.9
- breast	+3	-15	0	+7	-5	7.1	9.0
- cervix uteri	..	(-54)	-62	..	-56	1.7	1.0
- other	-12	-10	-7	+9	-6	16.4	20.1
Diseases of the circulatory system	-40	-37	-33	-31	-34	42.3	34.5
- ischaemic heart disease	-46	-34	-26	-17	-27	19.3	17.5
- acute myocardial infarction	-48	-37	-28	-21	-30	15.2	13.3
- other forms of ischaemic heart disease	(-38)	-25	-18	-2	-18	4.1	4.2
- cerebrovascular diseases	-29	-37	-35	-43	-37	13.1	10.4
- other	(-48)	-44	-47	-39	-44	9.9	6.7
Other diseases	-42	-14	-33	-9	-22	16.2	15.4
- diseases of the respiratory system	(-37)	-28	-28	-13	-24	3.5	3.1
- alcohol-associated diseases	..	(+93)	+45	..	+48	0.7	1.5
- other diseases of the digestive system	..	-36	-51	(-41)	-43	2.6	1.8
- other	-45	-15	-36	+1	-20	9.3	9.0
Accidents and violence	-17	-14	-13	+14	-10	9.1	10.9
- traffic accidents	(-52)	-52	-41	(-36)	-45	2.9	2.2
- acc. poisoning by alcohol	..	..	(+63)	..	+90	0.3	0.8
- other	(-3)	+25	+1	+44	+11	2.4	3.5
- suicide	-11	-12	-6	+34	-4	3.4	4.5

.. not given, number of deaths < 20 at least during one five-year period
 () number of deaths < 50 at least during one five-year period

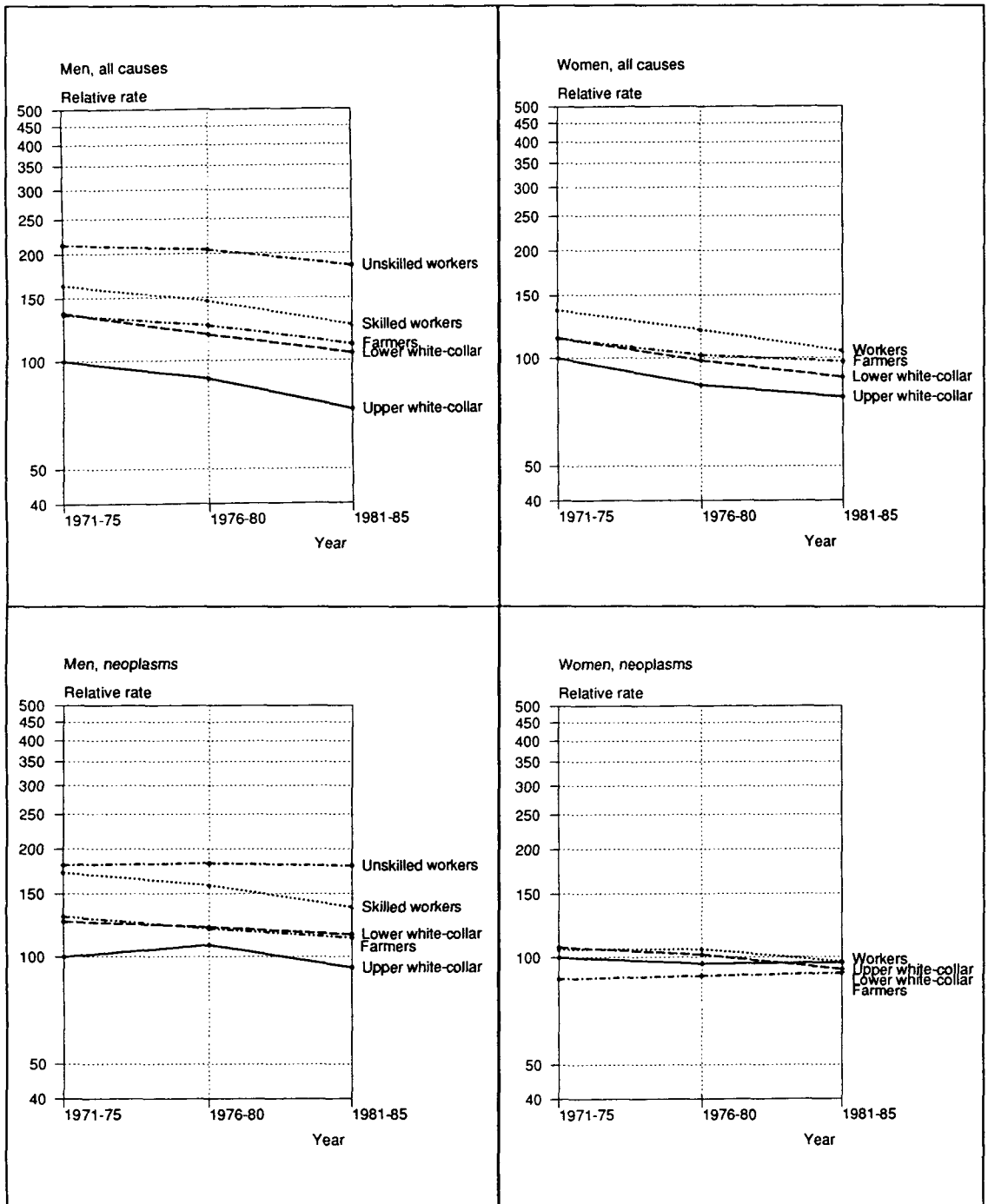
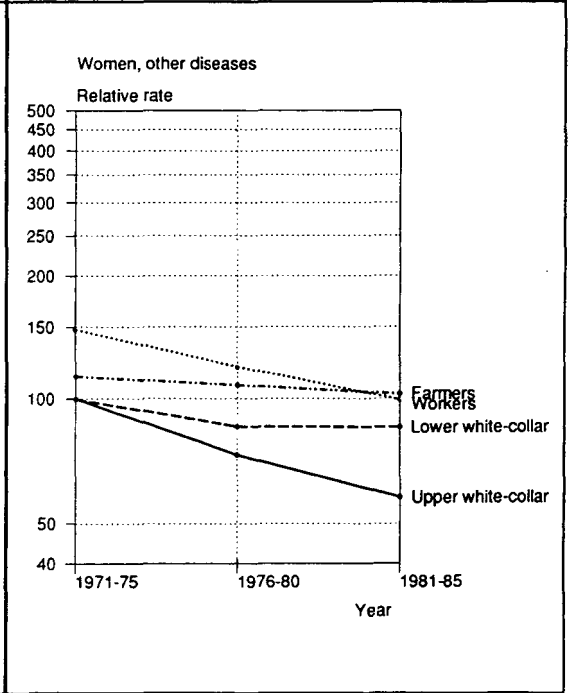
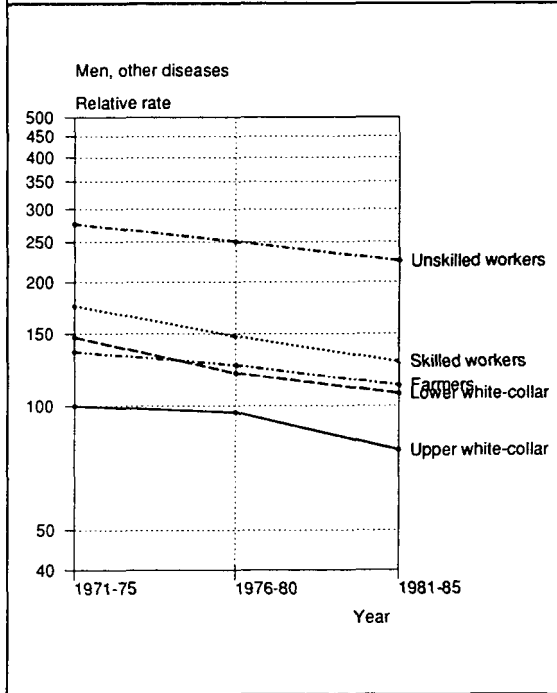
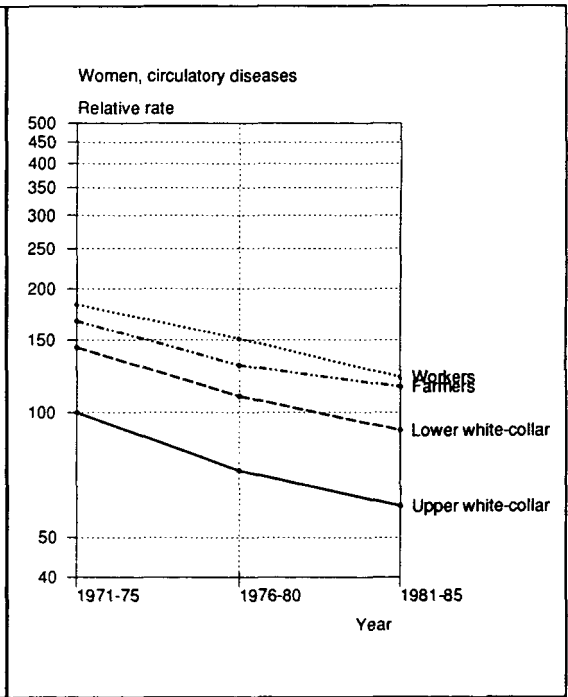
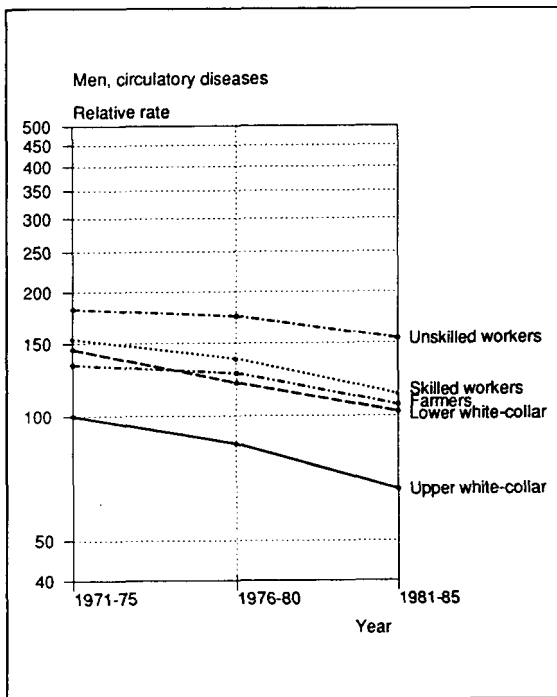
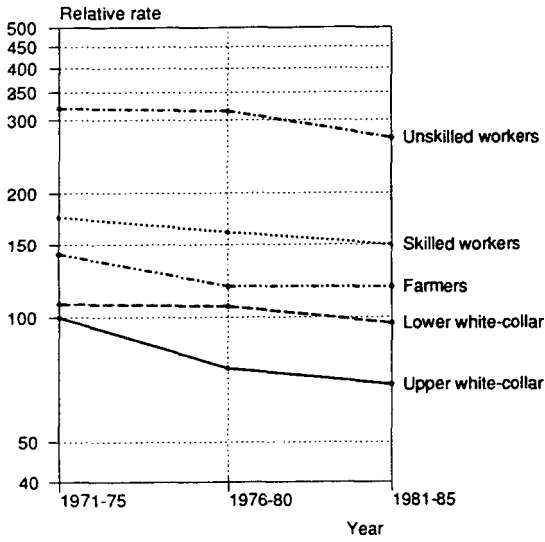


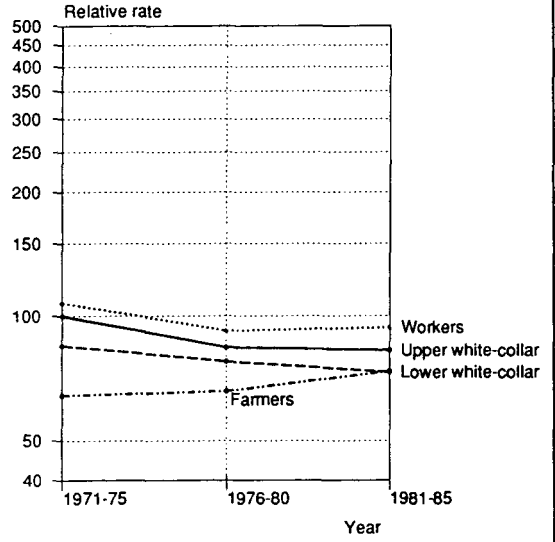
FIGURE 3.6. Relative age-standardized mortality by period and occupational class for certain causes of death (upper white-collar employees during the period 1971-75 = 100), men and women aged 35 to 64.



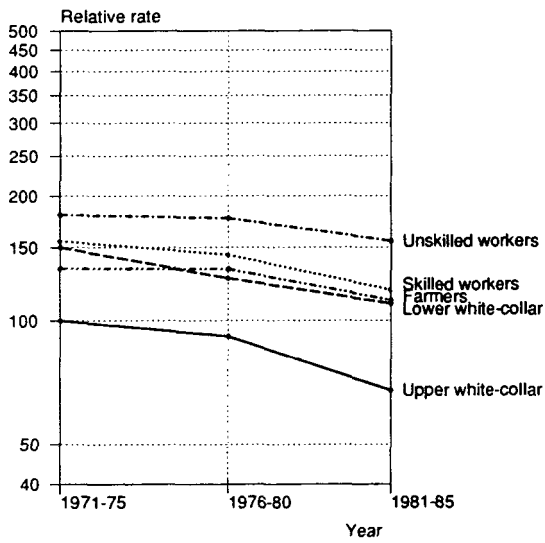
Men, accidents and violence



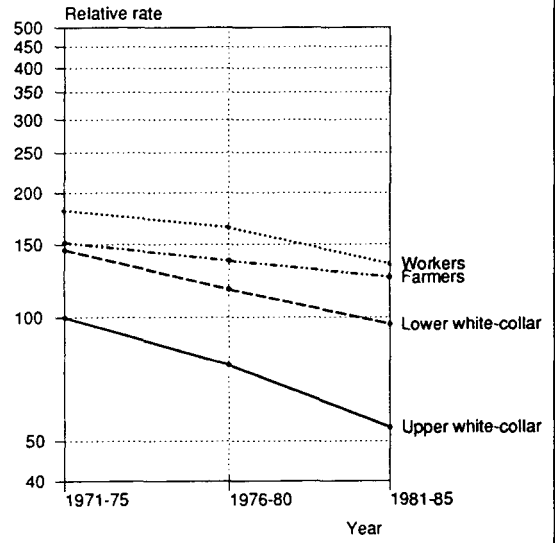
Women, accidents and violence

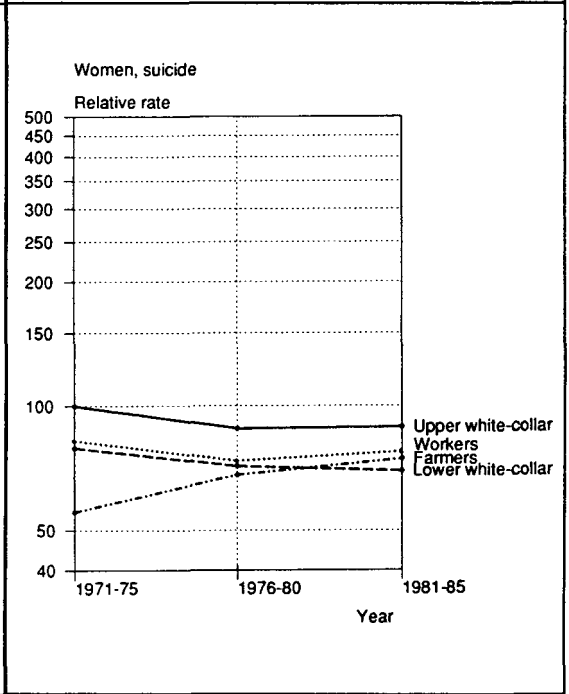
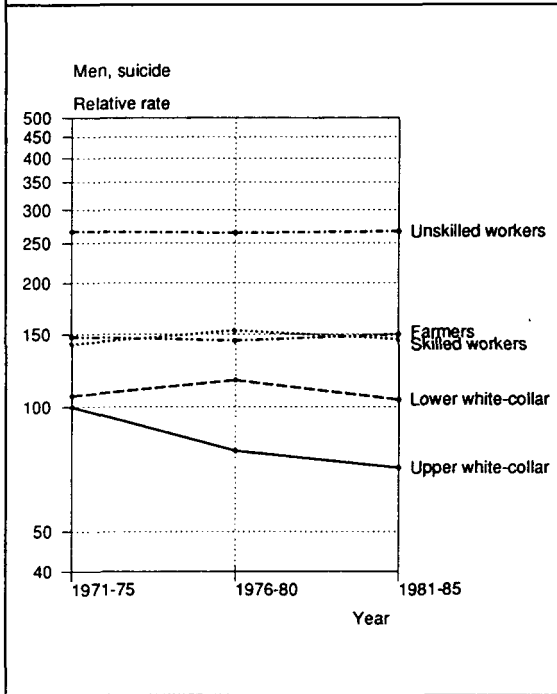
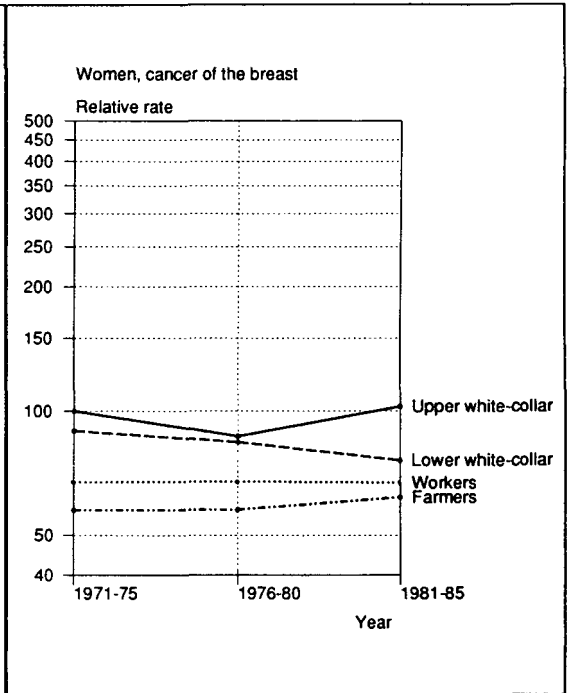
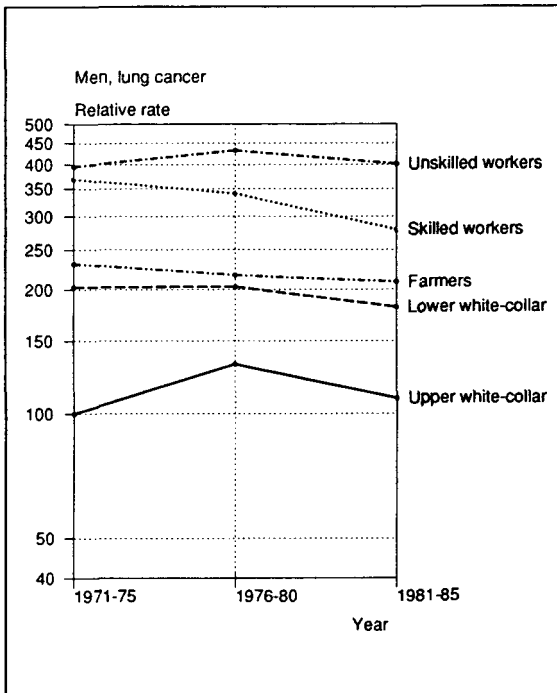


Men, ischaemic heart diseases



Women, ischaemic heart diseases





One can deduct from Table 3.6 that the growth in mortality differences among men is not due to structural change regarding causes of death, since the reduction in mortality from neoplasms has, for example, been slower than in the case of other causes of death. Instead, mortality from several causes of death has fallen at a clearly faster rate in the upper occupational classes. The most important category of causes of death in this respect is circulatory diseases, with mortality declining over twice as much among upper white-collar employees as among unskilled workers. It should nevertheless be pointed out that mortality has also declined quite rapidly among lower white-collar employees and skilled workers.

Mortality from chronic ischaemic heart disease has declined much more slowly than mortality from acute myocardial infarction. According to Table 3.6, mortality from chronic ischaemic heart disease has even increased among unskilled workers and farmers. This may be connected with changes or differences in diagnostic practice, but the change may also be real.

Mortality from neoplasms has declined faster among skilled workers than among other groups, mainly thanks to a drop in stomach and lung cancer. Among unskilled workers mortality from neoplasms has hardly fallen at all, which means the gap between this group and other occupational classes has widened.

Stomach cancer, which is associated with a low standard of living, has declined among both classes of workers as well as farmers. On the other hand, cancer of the intestine and rectum, which is associated with a high standard of living, has declined fastest among white-collar employees and increased among farmers. Socio-economic differences in mortality have thus been reduced for both these types of cancer.

Turning to other types of illness besides cancer and circulatory diseases, mortality among upper white-collar employees fell over 40%, while the change for other occupational classes was much smaller. The main reason appears to be that other diseases of the digestive system (not alcohol-associated) have decreased 75% among upper white-collar employees.

The gap between upper white-collar employees and other groups has widened with regard to deaths caused by accidents and violence. This is due to the fact that suicides have decreased nearly 30% among upper white-collar employees while remaining at roughly the same level in other occupational classes. Traffic safety improved considerably during the 1970s, and male mortality from traffic accidents fell more than

50%. The decline was more or less the same among all occupational classes, nor did it have an effect on the size of differences in mortality from traffic accidents.

Female mortality fell the same amount for both groups of white-collar employees as well as workers from the period 1971-75 to the period 1981-85, but the change was not the same size for all causes of death. Differences between occupational classes have grown quite significantly in the case of ischaemic heart disease, which has fallen 46% for upper white-collar employees but only 28% for workers and 18% for farm women.

The change in mortality from the "other diseases" category does not depend systematically on occupational class: mortality has shown the biggest decline among upper white-collar employees and the next biggest drop among workers, while lower white-collar employees have fallen considerably behind.

Mortality has fallen faster among female upper white-collar employees than among other occupational classes in the case of circulatory diseases, "other diseases" and deaths due to accidents and violence. In spite of this, total mortality has not declined more than in other groups, with the exception of farm women. This is partly due to the fact that mortality from neoplasms has declined less among upper white-collar employees than among women as a whole. This in turn is due to an increase in mortality from breast cancer and cancer of the intestine and rectum in this particular group.

Another factor which has prevented the growth of differences in mortality among women is a change in the structure of causes of death. Mortality differences between occupational classes are greatest in the case of circulatory diseases and "other diseases", and their share of all deaths has shrunk from 58% to 50%. In the meantime deaths due to cancer, in which hardly any mortality differences appear, have risen from 32% to 39% of total deaths.

The development of mortality among farm women has been less favourable compared with other groups in terms of most causes of death and cause-of-death categories. This supports the interpretation presented above that mortality in this class has been influenced negatively by selectivity at work in the shift from agriculture to other occupations. Attention is drawn to certain individual causes of death in which development has been particularly poor among farm women in comparison with women in general: neoplasms, other diseases, ischaemic heart disease and suicide.

4. The elderly population¹

4.1. Trend of socio-economic differences in total mortality

4.1.1. Trend of mortality by age and sex

This study uses the term "elderly" to refer to persons aged 60 and above. Since treating everyone in this category as a single entity would give too rough a picture of mortality among the elderly population - which is furthermore dominated by "young elderly persons", i.e. those aged 60 to 74 - analyses have been made mainly by age group. In addition to life expectancy at the age of 60, probability of death between the ages of 60 and 74 and between the ages of 75 and 89 has also been used in describing differences according to education or occupational class on the basis of life tables, and analyses based on log-linear models have mainly been performed separately for persons in the age groups 60-74, 75-89 and 90 or above. This report mostly covers the entire elderly population, however; results concerning different age groups are presented in more detail in the Finnish version of the study.

Mortality declined clearly in every age group among the elderly population during the research period, although the rate of decline was slightly lower in the older age groups. With the exception of the oldest age group, female mortality fell faster than male mortality, resulting in a widening of the gap between the sexes. In 1985 mortality among men aged 60 to 64 was nearly three times the figure for women in the same age group, and even among persons between the

ages of 90 and 94, men had a 20% higher mortality rate.

From 1971 to 1985, life expectancy at 60 rose about three years for women and about two years for men. At the end of the period a 60-year-old woman had a life expectancy of 21.5 years and a 60-year-old man 16.3 years; over the 15-year time span the difference between the sexes increased from four years to five.

A 60-year-old's probability of dying before the age of 75 fell about ten percentage points for both sexes during the research period. The probability of dying between the ages of 75 and 89 also fell about ten percentage points for women but showed a smaller decline for men.

4.1.2. Mortality by level of education

The same classification regarding level of education has been used as in the case of the middle-aged population, i.e. the first category includes persons with at least 13 years of schooling (higher education), the second category those with 10-12 years (secondary education) and the third those with up to 9 years (basic education). The educational breakdown is quite skewed among persons aged 60 and above (Table 4.1), since over 80% had only a basic education as recently as 1985.

¹ This chapter was written by Tuija Martelin.

TABLE 4.1.
Person-years by level of education in 1971 and 1985 (%), men and women
aged 60 and above.

MEN								
Level of education	Age group							
	60+		60 – 74		75 – 89		90+	
	1971	1985	1971	1985	1971	1985	1971	1985
Higher	4	6	4	6	4	5	4	5
Secondary	9	14	9	15	7	10	4	9
Basic	87	80	87	79	89	84	91	86
All	100	100	100	100	100	100	100	100
Person-years (1000)	263	322	221	246	41	74	1	2

WOMEN								
Level of education	Age group							
	60+		60 – 74		75 – 89		90+	
	1971	1985	1971	1985	1971	1985	1971	1985
Higher	3	4	3	4	3	4	3	4
Secondary	7	12	7	14	6	8	4	8
Basic	90	84	89	83	92	88	93	89
All	100	100	100	100	100	100	100	100
Person-years (1000)	407	538	321	366	84	164	2	7

Figure 4.1 presents the relative mortality rates of persons with a basic and secondary education throughout the period 1971-85 by sex and age, compared with those having a higher education. Mortality differences between educational groups were quite consistent for both sexes among persons aged 60 and above. Relative differences in mortality were smallest among the

older age groups, but the mortality rate for women with a basic education was still about 20% higher than the figure for women with a higher education even among persons in the 85-89 group. The mortality rate for women with a higher education was consistently lowest up to the age of 80-84.

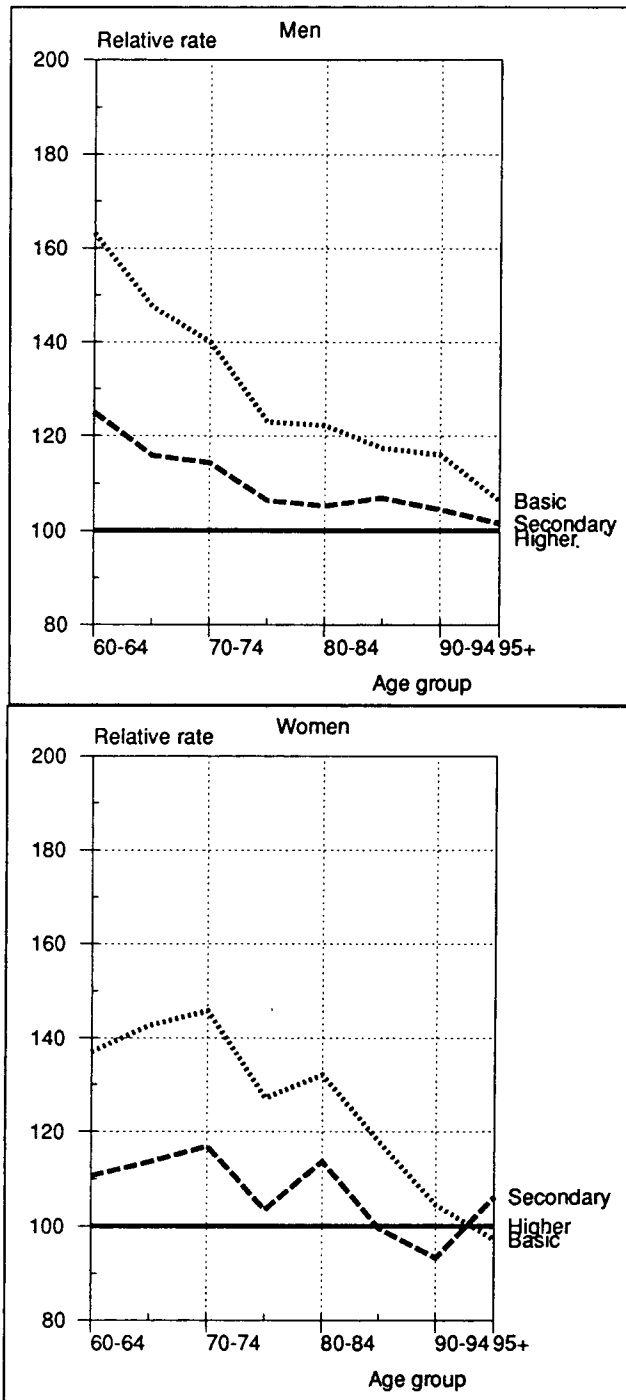


FIGURE 4.1.
 Relative mortality rates by level of education and age group during the period 1971-85 (higher education = 100), men and women aged 60 and above.

Differences between educational groups were even more regular among men than women. Men with a basic education varied most clearly from the other two categories, but there was also a consistent difference between those with a secondary education and those with a higher education in all age groups. Relative mortality differences tended to decrease with age more clearly than among women, however. Whereas in the 60-64 group the mortality rate was as much as 60% higher for men with a basic education than the figure for men with a higher education, the difference shrank to less than 20% among men over 85.

Life expectancy at 60 rose in all educational groups for both sexes (Figure 4.2). Differences between groups nevertheless remained more or less the same, with both male and female life expectancy being about two years higher for persons with a secondary education than for persons with a basic education. Among women the difference between the top two groups (higher education vs. secondary education) varied during the research period, but in the last five-year period life expectancy was consistently highest for

the top educational group. The corresponding difference for men in these two categories, on the other hand, was about one year throughout. In the early 1980s, women with a basic education achieved the level enjoyed by women with a higher education ten years earlier. Around the same time men with a basic education attained the same life expectancy reached by those with a secondary education in the early 1970s. Regarding mortality differences between the sexes, it is interesting to note that women with a basic education had a life expectancy over two years longer than men with a higher education during the research period.

Appendix Table 5 shows time series based on annual life tables regarding the probability of dying between the ages of 60 and 74 and between the ages of 75 and 89. During both age intervals the probability of death declined in all educational groups for both men and women. Particularly during the 60-74 age interval, differences were clear for both sexes throughout the entire period. Among men the difference between the top and bottom groups even increased.

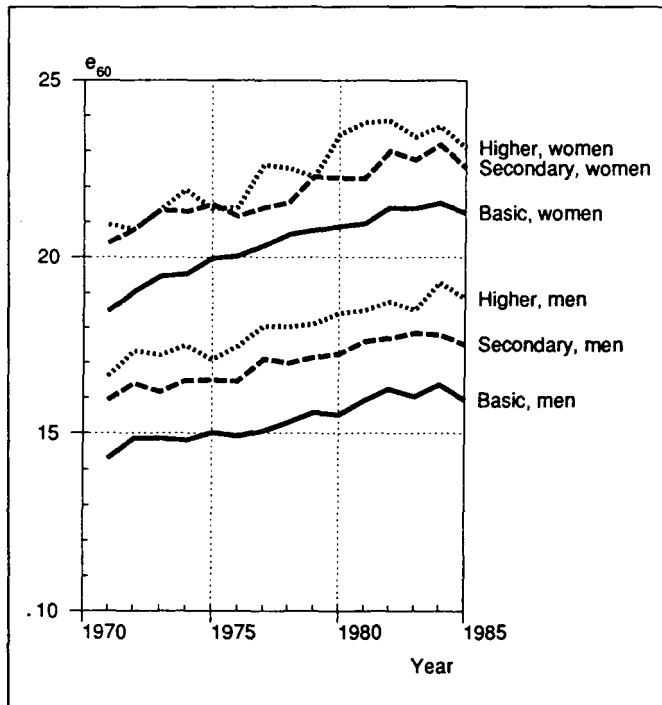


FIGURE 4.2.
Life expectancy at the age of 60 by level of education during the period 1971-85, men and women.

4.1.3. Mortality by occupational class

Since most persons over 60 are retired, occupational class for this age group was mainly determined on the basis of a person's (or spouse's) previous occupation. The last five-year period is

problematic because the 1980 census did not provide information on pensioners' previous occupation. Consequently the occupational class in 1981-85 of persons who were retired in 1980 was obtained from the 1975 population and housing census or the 1970 census. The occupational breakdown by sex and age in 1971 and 1985 is presented in Table 4.2.

TABLE 4.2.
Person-years by occupational class in 1971 and 1985 (%), men and women aged 60 and above.

MEN

Occupational class	Age group							
	60+		60 - 74		75 - 89		90+	
	1971	1985	1971	1985	1971	1985	1971	1985
Upper white-collar employees	6	8	6	9	6	7	6	7
Lower white-collar employees	11	15	11	16	11	15	10	12
Skilled workers	29	33	30	35	22	28	18	21
Unskilled workers	15	11	15	11	14	12	12	12
Workers, unclassified	0	0	0	0	0	0	0	0
Farmers	35	27	33	24	44	36	52	46
Other self-employed persons	3	3	4	4	1	1	0	0
Others, unknown	2	1	1	1	2	2	2	2
All	100	100	100	100	100	100	100	100

WOMEN

Occupational class	Age group							
	60+		60 - 74		75 - 89		90+	
	1971	1985	1971	1985	1971	1985	1971	1985
Upper white-collar employees	5	6	5	6	5	5	5	6
Lower white-collar employees	15	22	15	23	13	18	11	16
Skilled workers	24	23	25	23	20	24	18	20
Unskilled workers	17	16	17	17	15	16	15	13
Workers, unclassified	0	3	0	4	0	0	0	0
Farmers	27	24	27	22	28	28	28	28
Other self-employed persons	2	2	2	2	0	0	0	0
Others, unknown	11	5	9	3	19	8	23	17
All	100	100	100	100	100	100	100	100

The structure of the elderly population changed during the research period. In the early 1970s farmers formed the biggest group for both sexes and all age groups. Farmers' relative share clearly declined during the period, especially among men, with skilled workers becoming the biggest group under the age of 75 by the end of the period. In older age categories farmers still comprised the biggest group even at the end of the period, among both men and women. The percentage of unskilled workers also fell, while the relative number of lower white-collar employees rose. The percentage of upper white-collar employees likewise rose, though only slightly.

The following alterations were made in the original classification presented in Table 4.2 :

1. The group "workers, no information on specialization" was combined with skilled workers for both sexes. This group was quite small among the elderly population, since it could only include persons who were not retired at the time of the 1980 census. In this respect the occupational classification for elderly women thus differs from that

used for middle-aged women (cf. section 3.1.3.).

2. Self-employed persons outside agriculture were excluded from the analysis. This group shows a high level of selection in that most of the persons in this category were still economically active and thus healthier on average than other members of their age group.
3. The group "others, unknown" has likewise been excluded. The percentage of institutionalized persons was higher than average in this group.

Both self-employed persons outside agriculture and those in the "others" group were, however, included in the data when analyses were performed, so they did influence figures describing all occupational classes as a whole.

Differences in mortality between occupational classes by age for the entire research period are analyzed in Figure 4.3. With the exception of the over-94 group, mortality was greater among

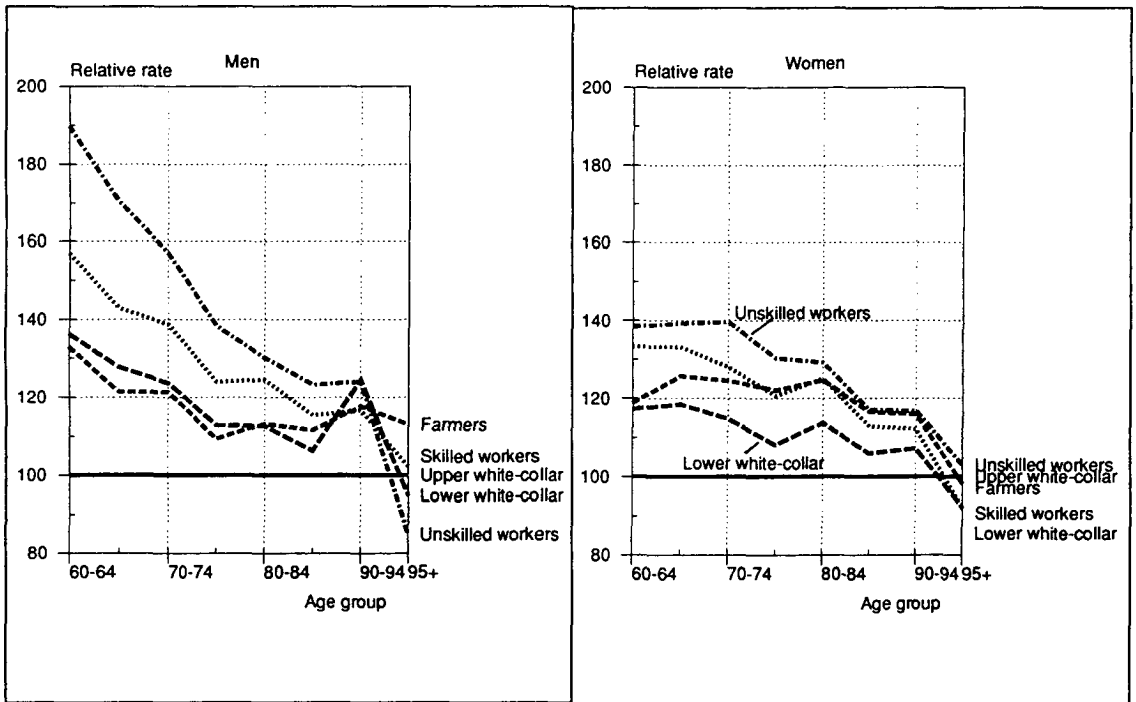


FIGURE 4.3. Relative mortality rates by occupational class and age group during the period 1971-85 (upper white-collar employees = 100), men and women aged 60 and above.

workers, farmers and lower white-collar employees than among upper white-collar employees for both sexes. Differences between occupational classes were greater for men than for women regardless of age group but were otherwise similar in nature. Among the farming population, however, men enjoyed a slightly better relative position than women, having a mortality rate closer to that of male lower white-collar employees while their female counterparts had more in common with skilled workers.

According to Figure 4.4, life expectancy at 60 rose for all groups of women over the course of

the research period. Differences remained consistent and roughly the same throughout, however. Upper white-collar employees stood out most sharply, having a life expectancy as much as one year higher than persons in the nearest group, i.e. lower white-collar employees, and over two years higher than unskilled workers. Towards the end of the 1970s the last group achieved roughly the same life expectancy which had been reached by upper white-collar employees in the beginning of the decade. The relative position of the female farming population compared with workers improved during the research period.

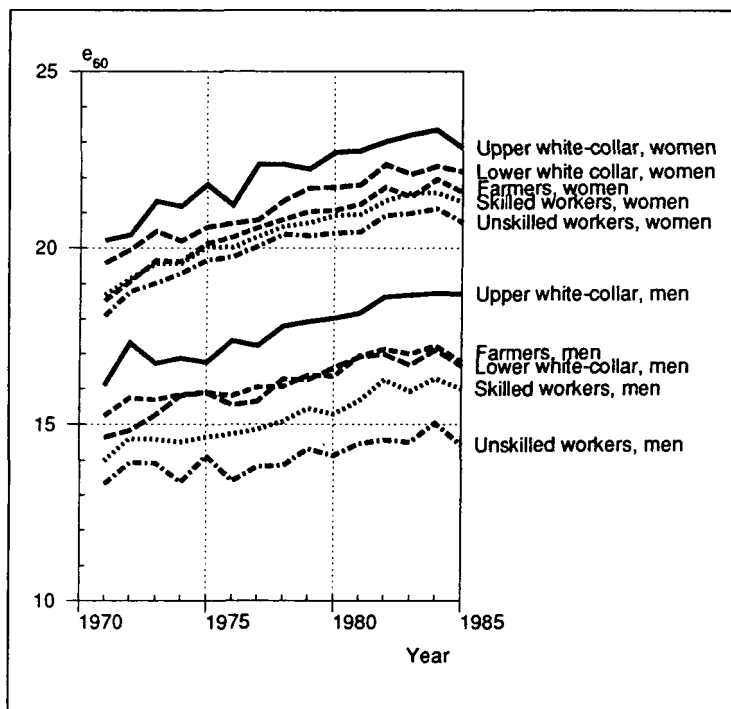


FIGURE 4.4.
Life expectancy at the age of 60 by occupational class during the period 1971-85, men and women.

Differences in life expectancy at 60 were greater among men than among women. For instance, in 1985 the life expectancy of upper white-collar employees was over four years longer than that of unskilled workers, who even at the end of the research period had not achieved the same level reached by upper white-collar employees in 1970. Furthermore, differences grew somewhat during the research period. Mortality declined at a slower rate among unskilled workers in particular. Life expectancy was more or less the same for male lower white-collar employees and farmers, nor did changes take place in this respect during the research period.

The development of differences in mortality between occupational classes was also investigated with the help of probabilities of death and mortality ratios. Appendix Table 6 shows probabilities of dying between the ages of 60 and 74 and between the ages of 75 and 89.

A look at mortality ratios also shows that, with the exception of farm women, female mortality fell about the same amount in all occupational classes, the average decline being 24% between 1971-75 and 1981-85 (Table 4.3). Farm women enjoyed a greater decline than other groups, and the improvement in their relative position was particularly clear among women aged 75 to 89. Mortality also declined among all occupational classes in the over-90 age group, with lower white-collar employees and farm women showing the biggest drop.

A widening gap between male occupational classes can be observed in both the 60-74 and 75-89 age groups, with mortality dropping fastest for upper white-collar employees and slowest for unskilled workers. In the over-90 group, however, mortality rose slightly among upper white-collar employees between 1971-75 and 1981-85. This may of course be a random variation. In other occupational classes mortality declined.

TABLE 4.3
Relative decline (%) in age-standardized mortality from the period 1971 - 75 to the period 1981 - 85 by age group and occupational class, men and women aged 60 and above.

Occupational class	Men				Women			
	60+	60 - 74	75 - 89	90+	60+	60 - 74	75 - 89	90+
Upper white-collar employees	20	23	19	-3 ¹	23	24	25	18
Lower white-collar employees	17	19	15	16	23	23	22	25
Skilled workers	18	19	15	19	23	22	24	17
Unskilled workers	13	10	13	27	22	22	23	16
Farmers	15	15	14	22	26	24	28	23
All (only these five groups)	16	17	15	20	24	23	25	21
All (self-employed and "others" included)	16	17	15	20	23	24	25	20

¹ Mortality increased 3 %.

4.1.4. Simultaneous effect of level of education and occupational class

As among the middle-aged, level of education and occupational class are also closely correlated among the elderly population, as Table 4.4 demonstrates. The correlation was weaker for women than for men, partly due to the fact that occupational class for some women was defined according to husband's occupation. Owing to this strong correlation between level of education and occupational class, some of the combinations of the categories of these variables are quite rare; both person-years and deaths are small in number, which makes the corresponding mortality rates unreliable. Such groups include men and women from the working class and farm population who have a higher education. Because of the excessive influence of random variation, findings regarding these groups have not been included in the following tables. In this analysis, the simultaneous effect of level of education and occupational class on mortality

has been examined only with regard to the whole population aged 60 and above. Results are presented with the help of relative mortality rates obtained using a log-linear model.

Table 4.5 shows age- and period-standardized relative mortality rates simultaneously according to level of education and occupational class. It also shows differences in mortality separately for each variable both when only age and period have been controlled for with the help of the model and also when the effect of the other measure of socio-economic status has been controlled for. Age- and period-standardized relative mortality rates in different educational and occupational groups summarize the findings in sections 4.1.2 and 4.1.3 concerning group differences. Differences are reduced when the other variable is controlled for, but they nevertheless remain clear with regard to both variables. After controlling for occupational class, it is in fact mainly the basic-education group which stands out, the difference in mortality between the secondary-education and higher-education groups being fairly small for both sexes.

TABLE 4.4.
Person-years by level of education and occupational class during the period 1971-85 (as a percentage of all person-years), men and women aged 60 and above.

Occupational class	Men				Women			
	Higher	Secondary	Basic	All	Higher	Secondary	Basic	All
Upper white-collar employees	4.2	1.6	1.5	7.3	2.6	1.1	2.1	5.8
Lower white-collar employees	0.6	4.6	8.7	13.9	0.8	4.6	14.3	19.7
Skilled workers	0.1	2.4	29.9	32.4	0.0	1.4	25.7	27.2
Unskilled workers	0.0	0.3	13.4	13.8	0.0	0.7	17.8	18.5
Farmers	0.1	2.3	30.3	32.7	0.1	1.8	26.9	28.9
All	5.0	11.2	83.8	100.0	3.5	9.6	86.8	100.0

TABLE 4.5.

Age- and period-standardized relative mortality rates by occupational class and level of education during the period 1971-85 (upper white-collar employees with a higher education = 100¹; rates based on main effects model in parentheses), men and women aged 60 and above.

MEN

Occupational class	Level of education			All (educ. controlled)	All (educ. not controlled)
	Higher	Secondary	Basic		
Upper white-collar employees	100 (100)	104 (104)	122 (121)	100	100
Lower white-collar employees	112 (111)	117 (115)	134 (134)	111	121
Skilled workers	..	126 (123)	144 (143)	119	135
Unskilled workers	..	136 (139)	163 (162)	134	154
Farmers	..	104 (109)	128 (127)	105	119
All (occ. class controlled)	100	104	121		
All (occ. class not controlled)	100	112	137		

WOMEN

Occupational class	Level of education			All (educ. controlled)	All (educ. not controlled)
	Higher	Secondary	Basic		
Upper white-collar employees	100 (100)	94 (102)	112 (118)	100	100
Lower white-collar employees	92 (105)	106 (107)	120 (124)	105	112
Skilled workers	..	115 (115)	128 (133)	113	123
Unskilled workers	..	116 (121)	135 (140)	119	130
Farmers	..	106 (114)	127 (131)	112	122
All (occ. class controlled)	100	102	118		
All (occ. class not controlled)	100	108	131		

.. : relative rate not given owing to the small number of persons in this group

1 Persons with higher education/upper white-collar employees are applied as a reference group in rows/columns demonstrating the marginal effects of education/occupational class.

Indications of interaction between education and occupational class were observable among women. In contrast with what one would expect on the basis of marginal effects, female upper white-collar employees with a higher education did not enjoy a particularly favourable position in terms of mortality. Instead they had a slightly higher mortality rate than lower white-collar employees with the same level of education and also other upper white-collar employees with only a secondary education. At other educational levels, differences between occupational classes were of the same type as revealed by examining the marginal effect of occupational class alone. This observation is difficult to interpret since it is not known to what extent information on women's occupational class is based on their own current or former occupation and to what extent it is based on husband's occupational class. Among men, however, mortality was lowest for upper white-collar employees regardless of level of education.

For both sexes mortality was highest among unskilled workers with only a basic education. The lowest mortality was found among lower white-collar employees with at least 13 years of education among women and upper white-collar employees with a similar level of education among men. Mortality differences between the groups with the highest and lowest rates amounted to around 47% for women and a full 63% for men.

The Finnish version of this report examines differences between occupational classes regarding both mortality rates and changes in mortality according to region (Helsinki metropolitan area, western Finland, eastern and northern Finland) and "type of activity" (economically active, pensioners and family members, inmates of institutions). A summary of the results of these analyses is presented in Chapter 5.

4.2. Causes of death

4.2.1. Differences in mortality between occupational classes by cause of death during the period 1971-85

In order to elucidate the findings on total mortality, this section investigates socio-economic differences in mortality and related trends according to cause of death. Occupational class is used as the only measure of socio-economic status in the following analyses. Attention was focused on 23 causes of death or cause-of-death categories for women and 21 for men. The criteria for selecting causes of death included frequency, how well risk factors are known and to what extent mortality has been observed to fluctuate according to socio-economic status in previous studies (e.g. neoplasms, alcohol-associated diseases). A few relatively rare causes of death were also chosen because they are interesting from the viewpoint of current health-policy discussion (dementia, suicide).

Separate analyses by cause of death were performed for persons in the age groups 60-74, 75-89 and 90 or above. In reporting findings, the focus is nevertheless on the entire population aged 60 and above. Caution should be taken particularly when it comes to interpreting the findings for the oldest age group, owing to difficulties in determining the cause of death as well as random variation resulting from the low number of cases. Relative mortality rates for different occupational classes compared with upper white-collar employees by cause of death are presented in Table 4.6 for all persons aged 60 and above, while the corresponding tables for different age groups are presented in Appendix Tables 8.1-8.3. Figures are based on log-linear models controlled for both age and period.

The finding with regard to total mortality was repeated in most causes of death: Mortality was lowest for upper white-collar employees and highest for unskilled workers. Among women

the gradients were especially sharp in the case of infectious diseases, stomach cancer, cancer of the cervix uteri, other heart diseases besides ischaemic heart disease, diseases of the respiratory system and diabetes. An opposite gradient, with upper white-collar employees showing a higher mortality rate than other women, was observed for lung and breast cancer, cancer of the corpus uteri, suicide and deaths due to accidental falls.

Total mortality among farm women and female skilled workers was roughly equivalent, but the relative positions of these two classes varied according to cause of death. With the exception of stomach cancer, mortality from neoplasms and particularly lung and breast cancer was low among farm women, and deaths due to dementia, alcohol-associated diseases, accidents and violence were also rare. On the other hand, mortality from most circulatory diseases was about the same as for skilled workers, while mortality from diseases of the respiratory system, diabetes and kidney infections was higher for farm women compared with the same group.

Men showed larger differences than women. Causes of death which were clearly associated with low socio-economic status among elderly men included infectious diseases, stomach and lung cancer, other heart diseases besides ischaemic heart disease, diseases of the respiratory system, kidney infections and deaths due to accidents and violence, particularly suicides and the category "other accidents". In these causes of death, the mortality rate for unskilled workers was about twice as high as the rate for upper white-collar employees or even higher. Of all the causes of death selected for this analysis, only cancer of the prostate and dementia were more common among white-collar employees than among workers.

Farmers' relative position compared with other occupational classes was more favourable than that of farm women in terms of total mortality, with the mortality rate being about the same as

TABLE 4.6.
Relative age- and period-standardized mortality rates by occupational class and cause of death during the period 1971-85 (upper white-collar employees = 100), men and women aged 60 and above.

Cause of death	Men					Women				
	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers
All causes	100	121	135	153	119	100	112	123	130	122
All diseases	100	122	135	152	119	100	112	124	131	123
Infective and parasitic diseases	100	172	236	291	159	100	120	140	179	155
Neoplasms	100	116	139	151	109	100	103	103	104	94
– stomach	100	139	166	190	166	100	120	137	152	152
– lung	100	155	239	277	155	100	95	95	92	53
– prostate	100	97	91	81	84	-	-	-	-	-
– breast	-	-	-	-	-	100	88	72	64	58
– cervix uteri	-	-	-	-	-	(100)	201	241	279	156
– corpus uteri	-	-	-	-	-	100	84	101	84	86
– other	100	99	101	106	85	100	105	105	106	99
Diseases of the circulatory system	100	123	129	139	118	100	117	133	141	134
– ischaemic heart disease	100	126	129	134	115	100	119	134	134	122
– – acute myocardial infarction	100	129	131	138	127	100	122	144	143	137
– – other forms of ischaemic heart disease	100	117	126	126	86	100	111	113	115	89
– other forms of heart disease	100	151	178	246	207	100	127	161	196	218
– cerebrovascular diseases	100	112	115	126	108	100	113	126	133	126
– other	100	115	127	133	105	100	111	125	135	128
Diseases of the respiratory system	100	141	196	288	191	100	115	133	159	153
– pneumonia	100	127	150	211	151	100	111	129	159	157
– other	100	158	254	383	239	100	125	145	161	145
Other diseases	100	107	105	124	93	100	102	113	120	106
– diabetes mellitus	100	130	116	102	104	100	124	160	182	179
– senile and presenile dementia	100	109	82	92	57	100	116	104	107	51
– infections of kidney	100	114	127	225	159	100	98	129	142	158
– alcohol-associated diseases	100	121	117	147	30	..	(85)	86	(106)	..
– other	100	101	104	124	96	100	95	103	106	96
Accidents and violence	100	116	148	204	126	100	92	95	102	85
– traffic accidents	100	102	123	159	133	100	99	117	136	102
– accidental falls	100	111	127	149	96	100	92	91	94	87
– suicide	100	153	196	249	153	100	88	89	86	62
– other	100	105	162	285	131	100	88	93	115	85

.. : number of deaths < 20

() : 20 <= number of deaths < 50

that for lower white-collar employees. Farmers' low mortality was observable not only in neoplasms (with the exception of stomach cancer), but also in most circulatory diseases, dementia and alcohol-associated diseases. Mortality from diseases of the respiratory system and kidney infections was around the same as for workers, however, and deaths due to accidents and violence were also more common among farmers than among lower white-collar employees.

Differences between occupational classes were larger among the 60-74 age group than older groups but were still clear among those aged 75 to 89 (Appendix Tables 8.1-8.3). For those in the over-90 group, mortality rates by cause of death were again based on very low numbers, thus weakening their reliability.

4.2.2. Changes in mortality by occupational class and cause of death

Relative changes in mortality between 1971-75 and 1981-85 by occupational class and cause of death are presented in Tables 4.7 and 4.8 for all persons aged 60 and above, while the corresponding figures for different age groups are provided in Appendix Tables 9.1-9.6. The tables also show the relative shares of different causes of death during the periods 1971-75 and 1981-85. The development of mortality differences during the research period is also illustrated for certain causes of death in Figure 4.5, which describes relative mortality in different occupational classes and periods compared with mortality for upper white-collar employees during the period 1971-75. Findings are limited to the whole population aged 60 and above.

As has already been noted, differences between occupational classes remained roughly the same among elderly women, although the relative position of women in the farming population improved slightly (Figure 4.5). Female mortality declined for practically every cause of death. The most important exception to this rule was neoplasms. Mortality from lung cancer in-

creased a full 44%, but the rising trend of breast cancer and other neoplasms was even more significant for the development of this group of diseases. Although mortality from stomach cancer fell sharply and deaths due to cancer of the cervix uteri and corpus uteri were also reduced, the overall decline in mortality from neoplasms was quite modest among women in all occupational classes. Mortality from neoplasms actually increased among upper white-collar employees, owing to a slower than average decline in mortality from stomach cancer and an increase in mortality from breast and lung cancer and "other neoplasms" for this group.

Mortality from breast cancer increased most among unskilled workers and farm women, though it still remained lower than in other groups throughout the research period. The development of mortality from breast cancer during the research period in fact led to a slight narrowing of differences between occupational classes, although these differences were clear and followed similar gradients during each period (Figure 4.5). In the case of all neoplasms as a whole, differences between workers and white-collar employees disappeared entirely during the research period, but farm women's favourable position compared with other groups became even more pronounced (Figure 4.5). The reduction in mortality from stomach cancer and "other neoplasms" had greater weight among farm women than the increase in lung and breast cancer, which are rare in this group.

Neoplasms' share of total mortality increased among all women aged 60 and above during the research period. Since differences between occupational classes were fairly small in this disease category throughout the research period, this growth could in principle have narrowed the gap in total mortality between occupational classes. An opposite effect was exerted by the trend of mortality from circulatory diseases, however, with mortality from this cause declining faster among white-collar employees and the farming population than among workers, thereby increasing occupational-class differences (Figure 4.5).

TABLE 4.7.
Relative change (%) in age-standardized mortality from the period 1971-75 to the period 1981-85 by occupational class and cause of death, men aged 60 and above.

Cause of death	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	Percentage of all deaths	
							1971 - 75	1981 - 85
All causes	-20	-17	-18	-13	-15	-16	100.0	100.0
All diseases	-20	-18	-18	-13	-14	-16	95.6	96.1
Infective and parasitic diseases	-30	-44	-48	-48	-26	-42	1.1	0.8
Neoplasms	-6	-5	-10	-3	-3	-6	21.2	23.1
- stomach	-38	-30	-34	-30	-40	-35	3.3	2.5
- lung	0	0	-9	1	5	-2	7.7	8.3
- prostate	-4	2	-1	30	8	6	1.9	2.7
- other	-3	-2	-2	-1	4	0	8.3	9.7
Diseases of the circulatory system	-22	-20	-18	-11	-16	-17	56.5	56.2
- ischaemic heart disease	-17	-12	-9	-3	-2	-7	33.0	35.5
- acute myocardial infarction	-16	-13	-10	-5	-4	-8	25.0	26.2
- other forms of ischaemic heart disease	-20	-9	-6	5	6	-2	8.0	9.4
- other forms of heart disease	-45	-50	-51	-43	-49	-49	6.6	4.4
- cerebrovascular diseases	-27	-29	-25	-12	-26	-24	11.1	10.6
- other	-21	-25	-22	-17	-20	-21	5.8	5.8
Diseases of the respiratory system	-29	-24	-29	-31	-24	-27	10.2	9.5
- pneumonia	-31	-22	-33	-30	-22	-27	4.4	4.3
- other	-26	-26	-26	-31	-25	-26	5.8	5.1
Other diseases	-31	-22	-23	-12	-16	-20	6.6	6.4
- diabetes mellitus	(-58)	-37	-45	-41	-44	-44	0.9	0.6
- senile and presenile dementia	..	(130)	134	(262)	251	174	0.3	1.0
- infections of kidney	..	(-62)	-50	-22	-30	-40	0.5	0.4
- alcohol-associated diseases	..	(127)	(204)	(211)	..	147	0.2	0.4
- other	-43	-35	-34	-26	-22	-30	4.7	4.0
Accidents and violence	-24	-15	-19	-18	-22	-19	4.4	3.9
- traffic accidents	(-44)	-47	-50	-49	-46	-47	1.4	0.8
- accidental falls	(-3)	14	2	16	-2	2	0.8	1.1
- suicide	(-15)	1	-13	-8	-23	-14	1.1	1.0
- other	(-32)	-16	-3	-17	-3	-7	1.1	1.1

.. : number of deaths < 20 at least during one period
 () : 20 <= number of deaths < 50 at least during one period

TABLE 4.8.
Relative change (%) in age-standardized mortality from the period 1971-75 to the period 1981-85 by occupational class and cause of death, women aged 60 and above.

Cause of death	Upper white-collar	Lower white-collar	Skilled workers	Un-skilled workers	Farmers	All	Percentage of all deaths	
							1971 - 75	1981 - 85
All causes	-23	-23	-23	-22	-26	-23	100.0	100.0
All diseases	-23	-23	-23	-22	-26	-23	97.2	97.2
Infective and parasitic diseases	(2)	-36	-22	-26	-19	-21	0.9	0.9
Neoplasms	1	-4	-1	-2	-4	-3	16.0	18.6
– stomach	-16	-32	-36	-35	-31	-32	2.6	2.1
– lung	(66)	18	50	90	23	44	0.7	1.1
– breast	1	-1	7	17	10	6	1.9	2.3
– cervix uteri	..	-22	-28	2	-7	-15	0.4	0.4
– corpus uteri	(-45)	-33	-16	-39	-2	-21	0.6	0.6
– other	4	3	5	0	-1	1	9.9	12.1
Diseases of the circulatory system	-29	-27	-26	-24	-29	-26	61.7	60.1
– ischaemic heart disease	-13	-14	-10	-6	-5	-8	24.4	28.8
– – acute myocardial infarction	-6	-15	-6	-3	-2	-4	17.7	21.2
– – other forms of ischaemic heart disease	-27	-11	-20	-12	-13	-16	6.7	7.5
– other forms of heart disease	-55	-53	-54	-54	-55	-54	10.9	7.2
– cerebrovascular diseases	-34	-29	-27	-24	-34	-28	17.0	16.2
– other	-37	-39	-40	-38	-39	-39	9.5	7.9
Diseases of the respiratory system	-37	-32	-39	-44	-39	-39	7.6	6.7
– pneumonia	-35	-28	-36	-42	-35	-35	5.3	5.0
– other	-40	-39	-47	-48	-50	-46	2.4	1.7
Other diseases	-24	-24	-24	-23	-27	-23	11.0	10.9
– diabetes mellitus	-66	-58	-44	-55	-52	-52	2.7	1.6
– senile and presenile dementia	(101)	74	100	127	260	130	0.7	2.5
– infections of kidney	(-52)	-45	-45	-41	-42	-43	1.6	1.2
– alcohol-associated diseases	..	..	..	..	..	(203)	0.0	0.1
– other	..	-26	-31	-32	-28	-25	-27	6.0
Accidents and violence	-21	-8	-19	-20	-30	-22	2.8	2.8
– traffic accidents	..	-25	-36	-37	-33	-34	0.6	0.4
– accidental falls	-26	-12	-20	-20	-33	-25	1.4	1.6
– suicide	..	(32)	7	-9	-7	4	0.3	0.4
– other	..	-9	-16	-2	-23	-17	0.5	0.4

.. : number of deaths < 20 at least during one period
 () : 20 <= number of deaths < 50 at least during one period

The faster than average decline in female mortality from circulatory diseases was influenced more by other specific causes besides ischaemic heart disease, since mortality from acute myocardial infarction in particular fell only slightly. Class differences in mortality from ischaemic heart disease widened, with mortality declining less among farm women and unskilled workers and most among white-collar employees (Figure 4.5). An improvement in the relative position of farm women can be observed in the case of cerebrovascular diseases; the decline in mortality equalled that of upper white-collar employees, shifting farm women from the highest to the third lowest group in this respect. On the other hand, mortality from cerebrovascular diseases declined more slowly among workers, as a result of which differences between female occupational classes for this cause of death widened (Figure 4.5).

Mortality from diseases of the respiratory system fell rapidly among elderly women, and differences between occupational classes also shrank to some extent (Figure 4.5). The fall in mortality was particularly sharp among workers and farm women. Differences have not disappeared, however. Even during the period 1981-85, female mortality remained lowest for upper white-collar employees and highest for farm women and unskilled workers.

Relatively speaking, the greatest rise in female mortality involved alcohol-associated diseases, but as a result of the small number of cases, this phenomenon has only minor significance from the viewpoint of total mortality and the figures for different occupational classes are not reliable. Female mortality from this cause increased most among unskilled workers. Similarly, the growth in mortality from dementia and suicide has fairly little significance. The rise in mortality from dementia mainly involved the final phase of the research period and was particularly sharp among farm women. The rise nevertheless seems to reflect a change in the procedure used in selecting the basic cause of death. The rise in mortality from suicide also took place mainly during the final part of the research period and applied to white-collar employees and skilled workers (Figure 4.5). Mortality from other accidents and violence meanwhile fell among women in all occupational classes, with traffic deaths in particular declining considerably.

Among men the decline in total mortality was fastest for upper white-collar employees and slo-

west for unskilled workers, thus increasing the gap between occupational classes (Figure 4.5). Although the drop in total mortality was clearly less for men than for women, men had a slightly greater decrease in mortality from neoplasms. Differences have not shrunk significantly, however (Figure 4.5). The decline in male mortality from neoplasms was greatest for skilled workers, mainly owing to a favourable trend in mortality from lung cancer compared with other occupational classes (Figure 4.5). Mortality from stomach cancer fell clearly in all occupational classes, as it did among women.

The better than average development of mortality among male upper white-collar employees in comparison with other occupational classes is in large part connected with circulatory diseases and especially ischaemic heart disease. Farmers and unskilled workers had the lowest decline in mortality from this cause of death. Differences between occupational classes thus increased, with upper white-collar employees in particular drawing farther away from other groups (Figure 4.5). In the case of cerebrovascular diseases, the decrease was slightly smaller for workers than for white-collar employees, and particularly the relative position of unskilled workers weakened further (Figure 4.5).

If one examines the intense fall in male mortality from diseases of the respiratory system, consistent variations in the rate of decline cannot be observed between occupational classes, and differences between groups remained quite clear throughout the research period (Figure 4.5). The trend with regard to alcohol-associated diseases was similar to that found among women, with mortality from this cause of death following a gradient rising least among upper white-collar employees and most among unskilled workers. The figures are highly unreliable, however, owing to random variation. Among men as well as women, the rapid increase in mortality from dementia was focused on the end of the research period.

Mortality from accidents and violence showed the greatest decline among upper white-collar employees. Deaths due to traffic accidents fell around 50% in all male occupational classes, which means the drop was even sharper than for women. Suicides also declined in all occupational classes with the exception of lower white-collar employees, but differences remained clear (Figure 4.5).

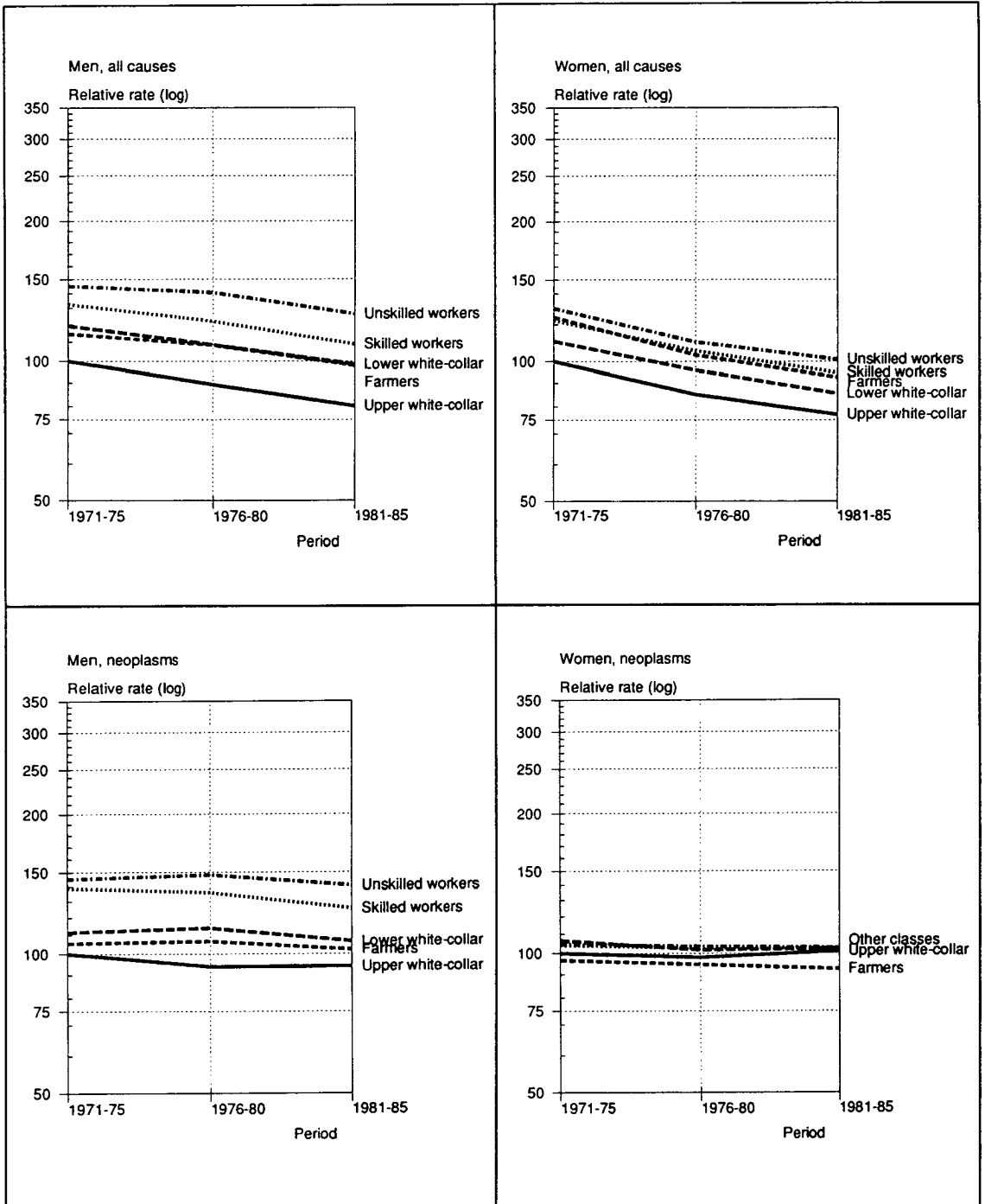
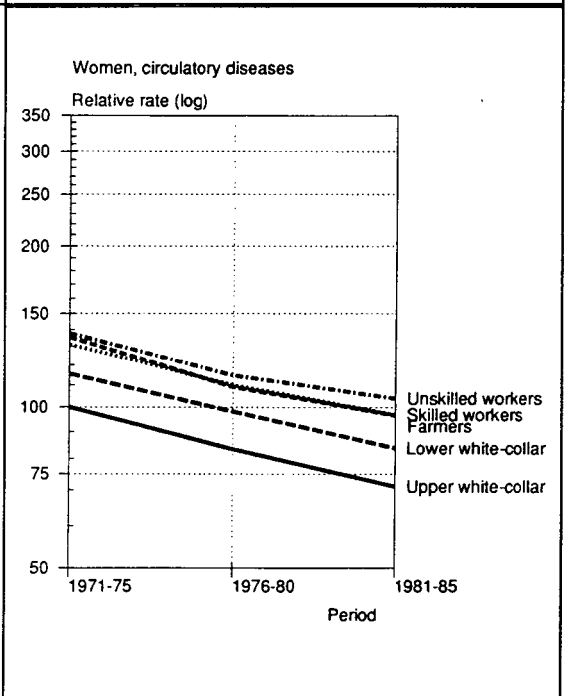
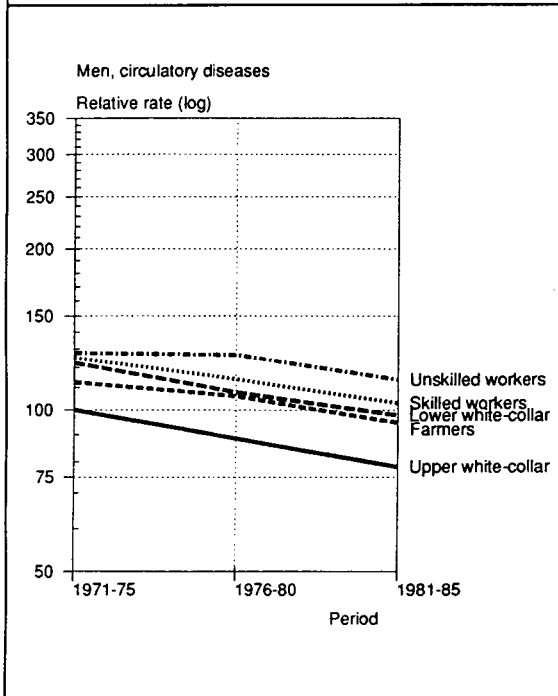
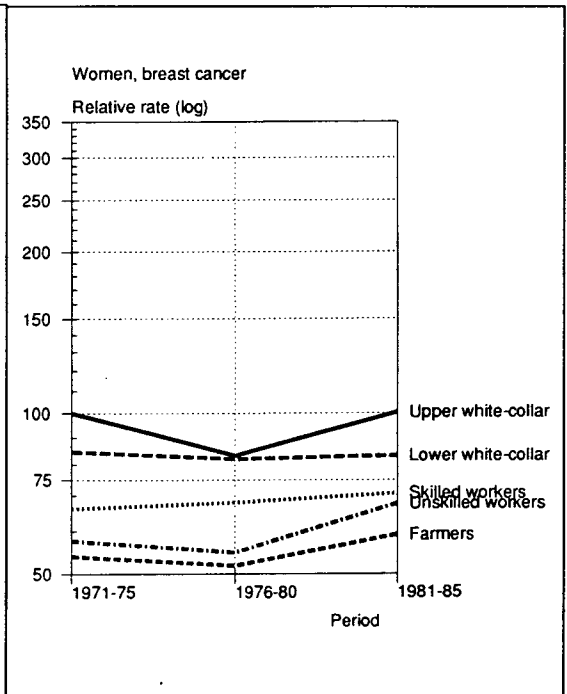
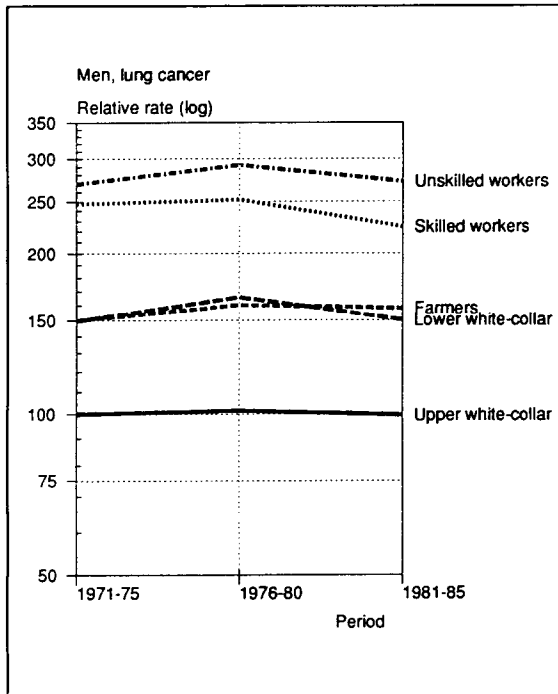
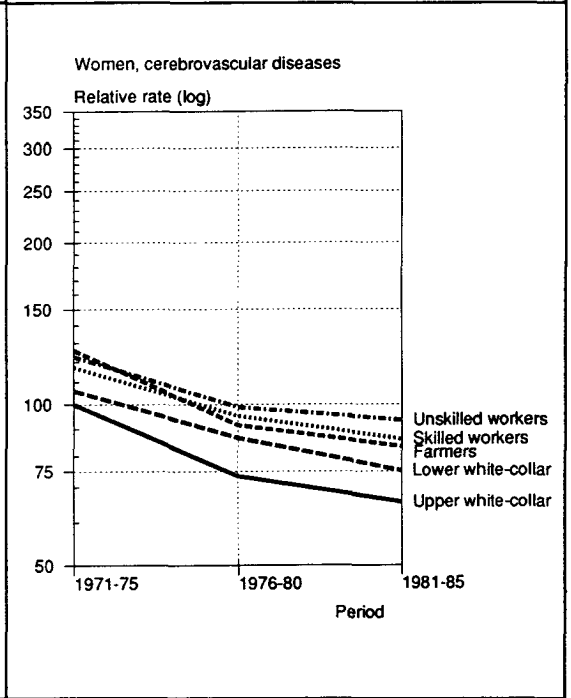
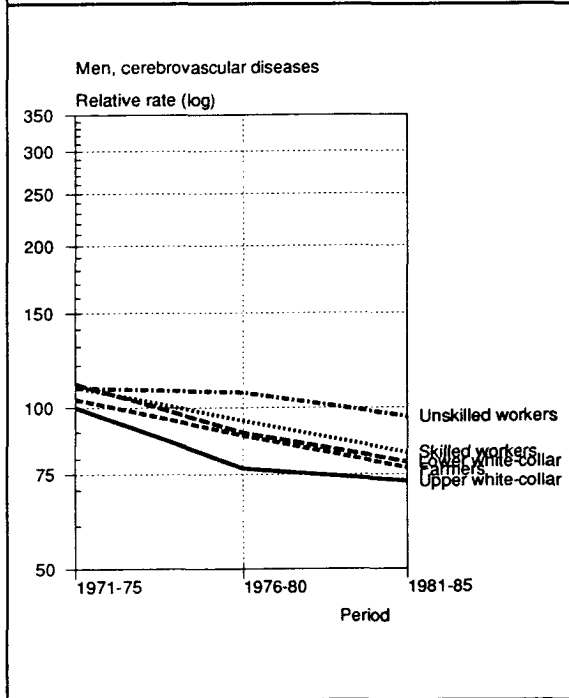
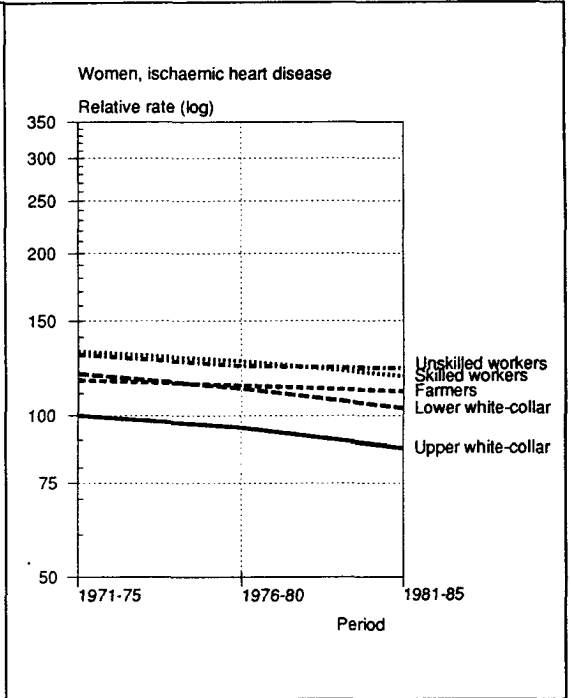
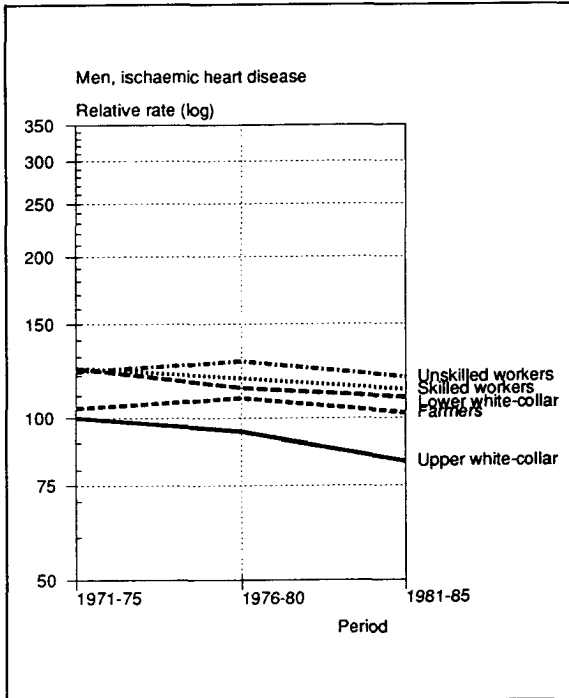
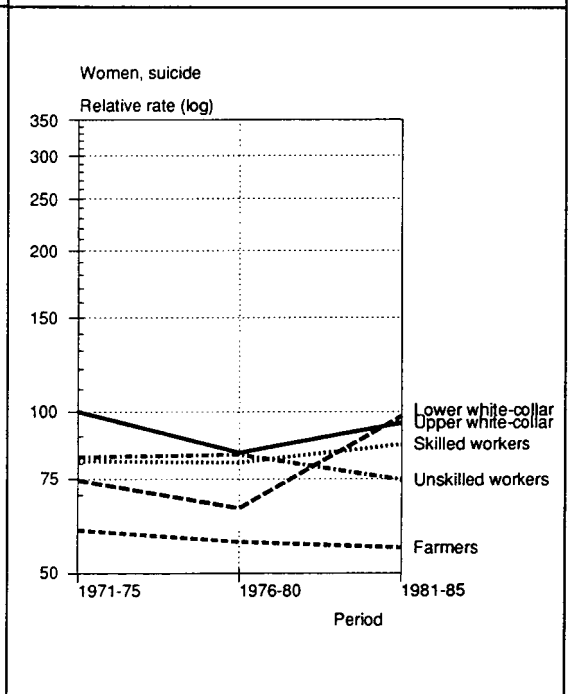
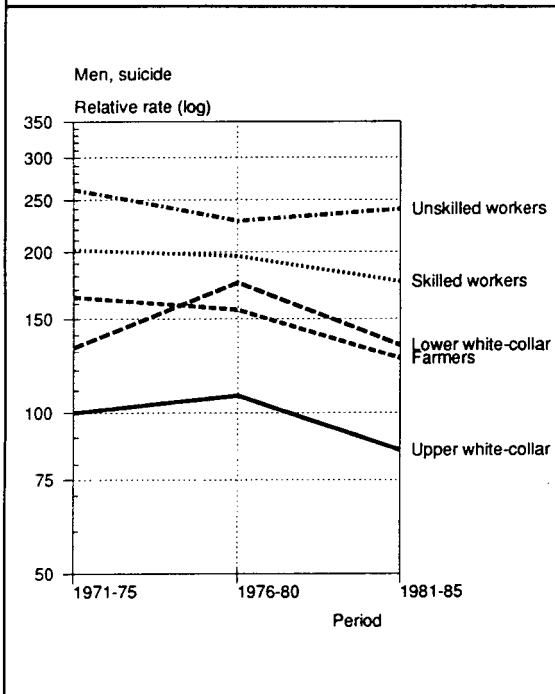
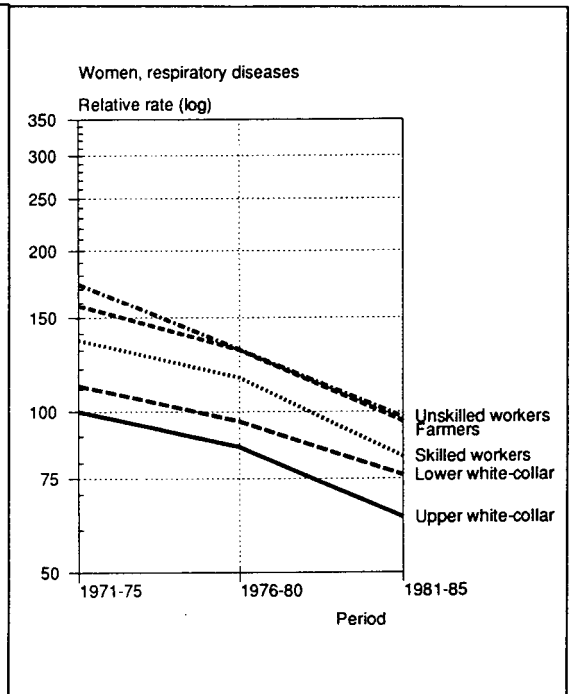
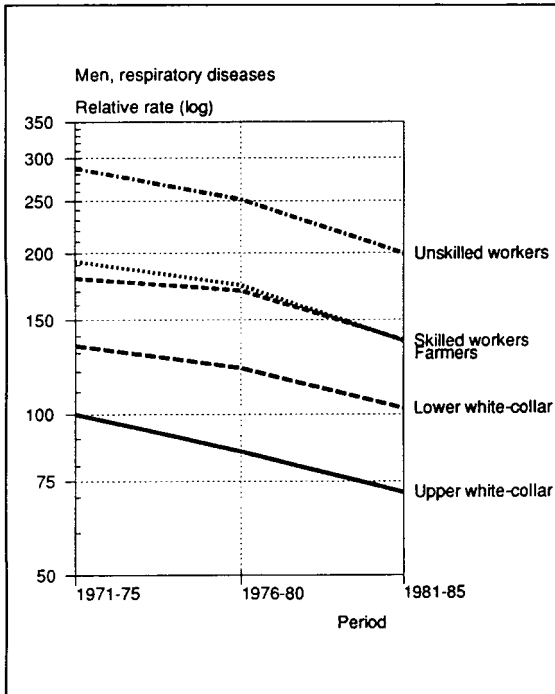


FIGURE 4.5. Relative age-standardized mortality for certain causes of death by occupational class and period (upper white-collar employees during the period 1971-75 = 100), men and women aged 60 and above.







5. Summary and discussion of findings

5.1. Purpose of study and data

The purpose of this study, which was conducted jointly by the Central Statistical Office of Finland and the Department of Sociology at the University of Helsinki, was to describe socio-economic differences in mortality and related changes in Finland during the period 1971-85. Two socio-economic variables were used side by side in the study, namely occupational class and level of education, together with family structure in the case of children.

Since the breakdown of causes of death and the method of forming occupational classes vary in different age groups, the study covers three age groups separately. Chapter 2 deals with children (aged 5 to 14), Chapter 3 concerns the "middle-aged population" (35 to 64), and Chapter 4 examines the "elderly population" (60 and above). Information on people aged 60 to 64 is therefore included in both Chapters 3 and 4. Each chapter presents data on total mortality and major causes of death. The Finnish version of the study also includes analyses of mortality among the middle-aged and elderly population by age group, region and type of activity. Summaries of the findings of these analyses are presented in sections 5.3.1. and 5.4.1.

Owing to the way in which the data were compiled, mortality among children aged 0 to 4 could not be dealt with. Furthermore, findings regarding mortality among persons aged 15 to 34 were excluded from the study. Occupation and educational level change rapidly during this age span, making it difficult to obtain reliable socio-economic data on mortality in view of the five-year interval used in the collection of information.

Research involved three sets of data, each covering a five-year period. The data set for the period 1971-75 was based on the 1970 population and housing census. Using personal identification numbers, information on the date and cause of death was added for each person who died during the period 1971-75. The data for the period 1976-80 were obtained from information obtained for the Central Statistical Office's study "Occupational Mortality 1971-80" (see Marin, 1986), which is in turn based on the 1975 population and housing census. The data for the period 1981-85 were formulated for this study and its follow-ups. Population data were obtained from the 1980 population and housing census.

5.2. Children

Chapter 2 examines trends in mortality among children aged 5 to 14 during the period 1971-85 in general and then by population groups during the periods 1971-75, 1976-80 and 1981-85. Population groups were formed according to family's occupational class, father's education, mother's education and family structure. Information on the last three categories was only available for the periods 1976-80 and 1981-85.

Mortality among children in this age group declined between 1971 and 85. Whereas the probability of dying before the age of 15 was 0.5% for boys and 0.3% for girls in 1971-75, the corresponding figures in 1981-85 were 0.3% for boys and 0.2% for girls. Mortality showed a clear downturn after 1973, particularly in the case of traffic deaths. In the 1980s mortality from disease also fell somewhat. Both sexes showed similar decreases in mortality rates, but mortality

was higher for boys than for girls throughout the research period.

Differences in mortality by occupational class were similar to those found among the adult population. Children from the lower classes had a probability of death about 2.5 times greater than children from the upper classes. Children in farming families had the highest mortality. Socio-economic differences in mortality were clearer among boys than among girls. The significance of these differences is illustrated by the fact that in the early 1980s, two out of every thousand boys from families in the white-collar employee class died before the age of 15, while the corresponding figure was three for boys from working-class homes and four among boys in the farming population.

Occupational-class differences in mortality from disease were found primarily among boys. Differences in mortality from accidents were observed among both sexes, but only for the period 1981-85 for girls. Mortality differences between occupational classes grew slightly from the early 1970s to the early 1980s. Deaths due to neoplasms were not linked to occupational class. The probabilities of death from three other causes (congenital malformations, diseases of the nervous system and sense organs, traffic accidents) were, however, smaller for the children of white-collar employees and greater for farmers' children, with working-class children falling in between these two groups.

Children's probability of death was inversely related to father's level of education in both periods. Three out of every thousand boys at the age of five whose fathers had a basic education died before the age of 15, compared with two out of every thousand boys whose fathers had a higher education. Differences were greater among boys than among girls. The link between father's education and child mortality practically disappeared when controlled for occupational class. Mother's education was not consistently linked to child mortality when controlled for father's education.

Child mortality did not differ to any essential degree between two-parent and single-parent fa-

milies in either period, but the mortality rate among children living outside families (about 3%) was much higher, with differences being attributable primarily to congenital malformations and diseases of the nervous system and sense organs and to a lesser extent traffic accidents. Mortality in this group remained high even though institutionalized persons were excluded as far as possible. This finding calls for further study, one key question being whether some sick, disabled or disturbed children (who have a higher probability of death) end up separated from their families through some selection process.

With the exception of infant mortality, relatively little information is available on socio-economic differences in mortality among children. Reliable data on changes over time do not exist. In the past only infants have been studied on a national basis in Finland. Data on socio-economic aspects of mortality included in a follow-up study on children born in northern Finland in 1966 (Rantakallio, 1986) were in line with the present findings, however.

Comparison with studies conducted in other countries shows similar connections between occupational class and mortality in both Sweden (Vägerö & Östberg, 1989) and England and Wales (OPCS, 1978; West, 1988). The Swedish findings are based on the 1960 census, with mortality being monitored up to 1979. The findings for England and Wales, on the other hand, are based on occupational-mortality statistics which display a greater degree of bias than is present in Nordic research.

The above studies came to the same conclusion not only in the general observation that low socio-economic status predicts higher mortality, but also in many details. Socio-economic differences were clearer among boys than among girls, differences in mortality from accidents were stronger than differences in mortality from disease, and differences were visible for most individual causes of death or groups of causes, although they were smaller than average in the case of mortality from neoplasms.

5.3. The middle-aged population

5.3.1. Total mortality

In 1971, at the beginning of the research period, the probability that a 35-year-old man would die before the age of 65 was 36% if he had a basic education, 29% if he had a secondary education (10-12 years of schooling) and 24% if he had a higher education (at least 13 years of schooling). Those in the bottom educational category thus had a probability of death 50% higher than those in the top group.

Male mortality declined in all educational groups during the period 1971-85. Relatively speaking, those with the most education enjoyed the biggest improvement, having a 30% drop in mortality. Mortality fell 23% among men with a secondary education and 20% among men with a basic education. The gap between these groups thus widened between 1971 and 1985.

Differences in women's mortality according to education were similar to those found among men in 1971. A woman with a basic education had a 15% probability of dying between the ages of 35 and 64, compared with 10% for women with a higher education. Female mortality fell roughly the same amount in all educational groups during the research period. The relative difference between the top and bottom educational groups thus remained unchanged.

An analysis of male mortality by occupational class showed that mortality for lower white-collar employees and farmers was around 10% lower than the average for all men, while the mortality rate of skilled workers was about 5% above average. These three groups comprised a majority of middle-aged men (about 70% in 1985). In comparison with other groups, unskilled workers and upper white-collar employees formed clearly separate groups. At the beginning of the research period, unskilled workers had a mortality rate nearly 30% higher than average. Since the decline in mortality was slowest among this group, the figure climbed to over 40% by the end of the period.

The mortality rate for male upper white-collar employees remained about 30% below average until the late 1970s. Owing to a rapid decline beginning in 1978, the gap continued to widen up to 1985.

Differences in mortality between occupational classes were smaller among women than among

men, nor did differences increase during the research period. The relative position of farm women weakened in comparison with other groups.

Education and occupational class have independent effects on mortality among men: Differences in mortality between occupational classes remained clear at each level of education, while in each occupational class mortality varied consistently between educational groups.

Among women, education appeared to be a more important factor than occupational class: Most of the differences between upper white-collar employees, lower white-collar employees and farm women disappeared when controlled for education.

The Finnish version of the study also includes analyses concerning differences in mortality by age group, region and type of activity. Only a summary of the findings is presented here.

Differences in mortality between occupational classes were considerably greater among men aged 35 to 49 than among men aged 50 to 64. No such discrepancy was found among women.

For both men and women, mortality differences between occupational classes were greater in the Helsinki area than in other parts of Finland. This was partly due to the fact that workers' mortality was particularly high in the Helsinki area. Differences in mortality also grew more in this area than in other parts of the country.

Mortality differences were clearly smaller among economically active men and women than among the whole population. For example, the difference between upper white-collar employees and both skilled and unskilled workers was around a third smaller for economically active men than for all men. This was due to two factors: Mortality among pensioners of working age was about three times as high as that of economically active persons, and pensioners constituted a larger percentage of those classified as workers compared with those classified as upper white-collar employees. This finding indicates that studies based solely on data concerning the economically active population reveal smaller socio-economic differences in mortality than actually exist.

5.3.2. Mortality by cause of death

The relative order of occupational classes was the same for most causes of death as for total mortality. Of the 16 causes of death investigated among men, only one showed a different gradient from the norm, with mortality being highest for upper white-collar employees in this exceptional case.

Although the relative order of occupational classes for different causes of death was generally the same, differences varied in size. Male unskilled workers were much more likely to die of alcohol poisoning, diseases of the respiratory system, accidents, lung cancer and suicide than other men.

Once again, differences in mortality between occupational classes were generally smaller for women than for men in terms of cause of death. The greatest difference between occupational classes concerned cancer of the cervix uteri. Differences were greater than average for circulatory diseases, with female workers having twice as high a mortality rate as upper white-collar employees.

The widening of mortality differences among men was due to a faster decline for most causes of death in the upper occupational classes. The most important category in this respect was circulatory diseases, with the mortality rate falling twice as much among upper white-collar employees as among unskilled workers.

The gap between upper white-collar employees and other groups also expanded with regard to accidents and violent deaths. This was due to the fact that suicides declined nearly 30% among upper white-collar employees while remaining roughly the same in other occupational classes. Traffic safety improved considerably in the 1970s, and male mortality from traffic accidents fell over 50%. Traffic deaths declined at similar rates in every occupational class, nor did this fall influence differences in mortality from this cause.

Among women, class differences grew considerably in the case of mortality from ischaemic heart disease, which declined 46% for upper white-collar employees compared with 28% for workers and 18% for farm women. In spite of this, total mortality did not fall any faster for upper white-collar employees than for other occupational classes. This was partly due to a slower than average decline in upper white-collar em-

ployees' mortality from neoplasms. Another factor preventing the widening of differences among women was a change in the structure of causes of death. The greatest differences in female mortality involved circulatory diseases and "other diseases", and these causes' share of total deaths fell from 58% to 50%. Meanwhile mortality from neoplasms, in which differences did not exist, increased from 32% to 39% of all deaths.

5.3.3. Comparisons with other studies

Differences in mortality between occupational classes among men were somewhat larger in Finland in the 1970s than in the other Nordic countries and were of about the same order as in Britain and Hungary. Differences were greater in France than in Finland. Mortality differences between occupational classes did not increase in Finland and the other Nordic countries during the 1970s, whereas they did increase in England, Hungary and France (Valkonen, 1987).

Compared with earlier findings, the most important result of the present study with regard to men is that differences between occupational classes increased in Finland from the 1970s to the 1980s.

Class differences in mortality were smaller for women than for men. This was due largely to the fact that socio-economic mortality differences were small for neoplasms, a common cause of death among middle-aged women. In other countries besides Finland, socio-economic mortality differences are also smaller among women than among men. Making international comparisons of changes in socio-economic differences in mortality for women is problematic since data are both deficient and hard to compare. Differences appear to have remained unchanged in the Nordic countries, with the possible exception of Denmark in the 1970s (Valkonen, 1987). Information on other countries besides Finland is not available regarding the 1980s.

A comparison of the strength of the relation between level of education and mortality in different countries in the 1970s yielded a conclusion which was in conflict with the data presented above. If data according to occupational class are compared, differences were greater in Finland than in Norway and Denmark and apparently Sweden as well (Valkonen, 1989). Using le-

vel of education as a gauge, differences were nevertheless the same size as in the other countries. This contradiction is apparently due to the fact that unskilled workers differ from other occupational classes more in Finland than in the other Nordic countries. The high level of morta-

lity from alcohol-associated diseases among unskilled Finnish workers no doubt serves as a partial explanation. This group's high mortality is not visible in any analysis according to level of education, since it comprises less than 20% of all persons with a basic education.

5.4. The elderly population

5.4.1. Total mortality

The term "elderly" as used in this study refers to persons aged 60 and above. Mortality in this portion of the population fell rapidly during the research period. From 1971 to 1985 life expectancy at 60 rose about three years for women and two years for men, reaching 21.5 years for women and 16.3 years for men at the end of the research period. Over the 15-year time span the difference between the sexes increased from four years to five.

Differences in mortality according to education and occupational class were similar to those found among the middle-aged population. Mortality was highest for elderly persons with little education and (former) unskilled workers and was lowest for the best educated and upper white-collar employees. Relative differences in mortality shrank with age, but for both sexes mortality among persons with a basic education still exceeded that of persons with a higher education by around 20% even among those aged 85-89. Correspondingly, mortality for both sexes among workers, farmers and lower white-collar employees was higher than that of upper white-collar employees up to the 90-94 age group. The differences were also similar for men and women, although farm women were only on a level with skilled workers while their male counterparts had a mortality rate on the same level as lower white-collar employees.

Mortality among the elderly population fell in all educational groups and occupational classes during the research period. Group differences did not change to any essential degree among women, although mortality fell more among farm women than among other groups, thereby improving their relative position. In this respect the findings differ from the observations made regarding the middle-aged population, in which farm women's relative position worsened during the period. Differences between men's occupational classes grew in the same way as for the middle-aged population, with upper white-collar

employees having the greatest decline in mortality and unskilled workers the lowest.

The Finnish version of the study also includes analyses concerning differences in mortality by region (Helsinki metropolitan area, western Finland, eastern and northern Finland) and "type of activity" (economically active, pensioners and family members, inmates of institutions). Controlling for region did not change differences between occupational classes, although gradients varied in different regions. For both sexes mortality differences followed the slightest gradient in western Finland, while the biggest differences in male mortality were found in the Helsinki area, where differences also continued to grow at the fastest rate during the research period. The findings are thus similar to those for the middle-aged population.

The percentage of persons who were economically active, pensioners or inmates of institutions varied considerably in different occupational classes. Inmates of institutions were found most frequently among former unskilled workers and least frequently among those classified as upper white-collar employees. Since institutionalization can be regarded as one measure of health, this finding supports the picture of inequality provided by differences in mortality. It should be pointed out, however, that many other factors such as marital status and housing conditions also have a bearing on institutionalization.

Differences in mortality according to type of activity were naturally quite clear. Compared with the rate for economically active persons, mortality was nearly twice as high for pensioners and family members and nearly four times as high for inmates of institutions. In comparison with the economically active, being institutionalized increased mortality more for women than for men and more for upper white-collar employees than for other occupational classes. This may imply that declining health may be more strongly linked to the shift to institutionalized care among women and among el-

derly persons with a high socio-economic status than among other groups. Mortality differences between occupational classes were smaller for the economically active and inmates of institutions than for pensioners and family members but were mainly similar in nature.

5.4.2. Mortality by cause of death

Differences in mortality between occupational classes were also repeated for most of the causes of death examined. Particularly sharp differences were found in both male and female mortality from infectious diseases, stomach cancer, other heart diseases besides ischaemic heart disease and diseases of the respiratory system. Furthermore, differences were also large among women for cancer of the cervix uteri and diabetes and among men for lung cancer, kidney infections and the category accidents and violence. Only a few diseases appeared to be more frequent among the upper occupational classes in the elderly population. These included lung and breast cancer, cancer of the corpus uteri, suicide and falls among women and cancer of the prostate and dementia among men.

During the research period mortality declined for practically every cause of death examined. Dementia and alcohol-associated diseases formed an exception among both men and women, but their significance from the viewpoint of total mortality is minor. Female mortality also rose in the case of lung and breast cancer, "other neoplasms" and suicide, while male mortality rose in the case of cancer of the prostate and accidental falls. Differences in mortality from circulatory diseases grew among both sexes. Among women the effect of this trend on differences in mortality between occupational classes was lessened by an increase in the share of mortality from neoplasms, in which class differences were small, combined with a reduction of differences in mortality from diseases of the respiratory system.

Analyses of mortality by cause of death among the elderly population were also made by age group, though all individual causes of death were not dealt with among persons aged 90 and above, owing to the small number of deaths. In interpreting the findings by age group, it should be remembered that information on cause of death involves many problems in the oldest age groups. Since elderly people often have more than one disease and autopsies are not often conducted, especially on very old people, the choice of a basic cause of death is influenced by many

factors linked to time and place (e.g. Haavisto, Mattila & Rajala, 1984). The whole significance of cause of death can be questioned in the highest age groups. In a study concerning deaths among persons aged 85 or above, for example, Kohn (1982) showed that in 30% of deaths, an autopsy could reveal no other actual cause of death besides old age. Consequently, the findings for persons over 90 should be treated with particular caution.

Differences between occupational classes were clearer among persons aged 60 to 74 than in the older age groups, as one would expect, but remained on similar lines for persons aged 75 to 89. Differences were inconsistent among persons aged 90 and above, but workers and farmers still had higher mortality rates from infectious diseases and diseases of the respiratory system than white-collar employees.

5.4.3. Comparisons with other studies

Relatively little previous research information is available on socio-economic differences in mortality among elderly persons, since most studies regarding socio-economic differences in mortality have been limited to the working-age population. This study's findings are along similar lines with earlier observations, however.

A study conducted in the United States in 1960 (Kitagawa and Hauser, 1973) investigated differences in education and income among the elderly population as well as other groups. The researchers did not find differences in mortality by level of education for men, but female life expectancy at 65 was six years longer for the best-educated group than for those with the least schooling. On the other hand, household income and mortality were inversely correlated to a slight degree among men. Differences among women were inconsistent in this respect, although there was a fairly clear correlation between personal income and mortality for women over 65 living alone.

Very clear differences in mortality were observed in a study concerning England and Wales (Fox, Goldblatt and Jones, 1985), where mortality was found to be nearly 60% higher among men over 75 in the bottom occupational class compared with those in the top class. The differences, though somewhat greater in scale, thus pointed in the same direction as the present study's findings.

5.5. Reliability of findings and sources of error

The research data provided a very good basis for studying differences in mortality and related changes, by international standards. Since information on occupational class and education for both the general population and deceased persons came from the same source, i.e. censuses, the findings do not contain numerator/denominator bias, which weakens the reliability of the mortality studies performed in connection with British censuses, for example. The linking of census and mortality data proved quite successful. The number of deaths which could not be linked to census data is so small as not to weaken the reliability of results.

Information on education in 1970 was obtained from the census and thereafter from the national register of examinations and degrees. The classification system remained unchanged for the entire research period, and the data for each five-year period are comparable.

Although the data on mortality by level of education are apparently quite reliable, one weakness is the skewing found in the distribution. Throughout the research period, some 70% of persons aged 35 to 64 were classified as having a basic education. Skewing was even greater among elderly persons, over 80% of whom had only a basic education even in the final five-year period. Data on education thus allow an analysis of how mortality has developed among the upper social strata compared with the majority of the population but do not shed light on trends in other social strata.

A more detailed description of socio-economic differences in mortality can be obtained using occupational class rather than level of education. Compared with research in the other Nordic countries, the data used in the present study have the benefit of allowing economically inactive persons and children to be classified according to former occupation or the occupation of the head of household or reference person. Some problems were encountered in formulating this variable, however, as was mentioned in the introduction. Because of these problems and the probable bias they contain, data on self-employed persons other than farmers have been excluded from this report.

It is difficult to evaluate precisely what kind of effect weaknesses in the occupational-class variable have had on this study's main findings. If

the data in different censuses were not comparable, sudden changes would have been observed in mortality figures shifting from one five-year period to the next. No noteworthy discontinuities were observed in any group besides "other self-employed persons" and the small "others" group, which mainly have been excluded from the analysis. A third socio-economic indicator which was originally included in the study, standard of housing, was in fact left out because suspiciously large sudden changes were observed in mortality at the junction of five-year periods when this variable was used.

In the light of the consistency displayed by findings as well as information on the weaknesses of the occupational-class variable, the conclusion can be drawn that the data provide a correct picture of the size of class differences in total mortality and mortality by cause of death. The finding that male mortality has declined faster among upper white-collar employees than among other classes is also apparently correct, since a similar result was obtained for men with a higher education. The significance of this finding is augmented by the fact that the percentage of men classified as upper white-collar employees increased during the research period in both the middle-aged and elderly populations.

The most problematic group from the viewpoint of reliability is unskilled workers. During the final five-year period, a reliable differentiation into skilled and unskilled workers could not be made for middle-aged women or children, so these categories were treated as a single occupational class in these two cases. The findings for middle-aged women and men are therefore not comparable in this respect.

It was observed that male mortality declined least among unskilled workers in both the middle-aged and elderly populations. This finding may be due to a change in the structure of the data: The relative number of unskilled workers has fallen and it is therefore possible that this group has become more divergent from the average level. It is also possible that the slower decline in mortality found among unskilled workers was influenced by inconsistencies in the classification of workers in agriculture and forestry. The change in unskilled workers' mortality should indeed be analysed in greater detail than has been possible here.



5.6. Are health-policy goals being achieved?

The most important stimulus for this study was provided by international and Finnish discussion on inequalities in health. The Health for All by the Year 2000 programmes covering Europe and Finland set the goal of reducing differences in mortality between socio-economic groups. The European programme even stipulates that mortality differences should be reduced by at least 25%.

According to this study's findings, the development of socio-economic differences in mortality during the period 1971-85 was not in line with health-policy goals. Differences have remained unchanged or even widened in every age group. One positive finding, however, is that child mortality in single-parent families no longer differs from child mortality in two-parent families.

Finland has one of the lowest child mortality rates in the world among the age groups covered by this study (children and young people aged 5 to 14), with only two out of every thousand five-year-olds dying before their fifteenth birthday. Differences in mortality were also found in this age category, but as a result of the low mortality level their significance in saved years of life, for example, is minor. Mortality differences in this age group are important from the viewpoint of inequality, however, since children themselves have only limited possibilities to influence living conditions and the factors determining these conditions. The suggestion that selection mechanisms are responsible for the fact that children with a high probability of death often end up separated from their families points to possible deficiencies in the health and social-service system.

The middle-aged population is of crucial importance with regard to mortality and health policy, since most premature deaths take place in this age group. Premature deaths are also a reflection of morbidity among the working-age population, as the similarity of data concerning mortality and retirement on disability pensions indicates.

The widening gap observed between male occupational classes since 1978 is due partly to a faster than average decline in mortality among upper white-collar employees. This should not of course be regarded as a negative phenomenon. The rapid decline of mortality from circulatory diseases in particular has probably resulted from health-promoting changes in eating, smoking and other habits, which have been greatest

among the top occupational class and those with the highest level of education.

The growth of differences in mortality among middle-aged men is not due entirely to the especially favourable development enjoyed by upper white-collar employees, however. At the same time mortality among unskilled workers has fallen at a slower rate than the average for all men. As was mentioned in the section regarding international comparisons, male mortality shows a greater divergence from the average among unskilled workers in Finland than in the other Nordic countries. In Finland male unskilled workers appear to form a particular risk group having high mortality. In the light of findings presented by Mannila (1990) and Martikainen (1990), it would seem that a large portion of this group consists of persons who lack steady work and lead a marginal type of life characterized by temporary jobs and intermittent unemployment. Unskilled workers and occupational groups with obsolete skills who are thrown out of work by changes in the labour market constitute a key category from the viewpoint of health-policy and other social-policy goals aimed at promoting equality, and special attention should be focused on their welfare and health problems.

As the elderly population expands in both relative and absolute terms, the question of this segment's level of welfare and socio-economic differences in this respect will take on increasing importance. It is also possible to speak of premature deaths among elderly persons. This is supported by the steady rise which has taken place and will no doubt continue to take place in the life expectancy of the aged as well as the scale of mortality differences which still exist even in the older age groups.

The most important observation which this study makes with regard to mortality among the elderly population is the similarity of differences compared with children and middle-aged persons. Age does not entirely eliminate the inequality created earlier in life, but health-worsening factors involved in work, living conditions and living habits continue to be reflected even at an advanced age. This observation underlines the importance of health-policy measures aimed at removing health differences in earlier stages of life. Health-policy planning would also benefit from investigations on the relation between concrete living conditions such as income, housing and the supply and use of health services

and elderly persons' health, which in turn affects the need for institutional care.

With regard to falling mortality and socio-economic differences among the elderly population, one cannot avoid questions concerning the quality of extended life. Consider, for example, the four additional years which a 60-year-old male upper white-collar employee can expect to have in front of him compared with an unskilled worker of the same age. What type of life do these years represent for the individual and society? Cautious conclusions can no doubt be

drawn on the basis of class differences in the percentage of institutionalized persons: In every age group among the elderly population, the relative number of institutionalized persons was highest for unskilled workers and lowest for upper white-collar employees. This finding implies that differences in health and functional ability between occupational classes in the elderly population are likely to be along the same lines as in the case of mortality. Adding more years to life should also mean adding more life to years.

5.7. Need for further research

In Finland and elsewhere, health-policy goals regarding the reduction of health inequalities and socio-economic differences in mortality have been based on arbitrary and deficient data on the scale of differences and particularly development trends. This study was able to describe the development of socio-economic differences in mortality more thoroughly and reliably than previous research. Only this level of data makes it possible to consider what the goal of reducing mortality differences by 25% which is included in the WHO's Health for All in the Year 2000 programme for Europe signifies for different sex and age groups.

Two different lines are necessary in the further planning of data collection based on linked registers and statistics: the continuous production of statistics and more thorough research.

The year-by-year description of trends in socio-economic differences in mortality contained in this study should be made a part of continuous statistics production. Judging from experience gained in the study, it would be useful to have continuously produced cause-of-death statistics by level of education. This could be arranged best by linking the information in the examination register with individual data on deceased persons. The skewed breakdown observed in level of education constituted a weakness in the data for this study, but with the rise in the population's level of education, differentiating ability will improve steadily. It is also likely that level

of education will become more and more important as a determinant of social status. As annual register data on persons' occupations improve, annual cause-of-death statistics could also be prepared according to occupational class.

There is a need for more thorough analyses of mortality differences between population groups, the reasons for these differences and numerous special problems on the basis of the data included in registers and statistics. The research information which can be obtained in this way is only a part of the knowledge required to reduce health inequalities, however.

The register data available in Finland proved to be quite suitable for this study and are in many respects unique. Obtaining the best possible health-promoting information from these data nevertheless requires links with the research community. Finland's own Health for All by the Year 2000 programme in fact stresses the need for closer connections between research and practical work.

From the viewpoint of health promotion and a fruitful health policy, it is important for statistical authorities, health-care administrators and researchers to cooperate effectively. This cooperation should also improve the usefulness of research work. In the light of the experience gained in conducting this study, good possibilities exist for this type of cooperation.

APPENDIX 1: Causes of death

APPENDIX 1.1. Causes of death among children aged 5 to 14.

Cause of death	ICD-codes
All causes	000-999
All diseases	000-799
Neoplasms	140-239
Diseases of the nervous system and sense organs	340-354, 356-398, 744
Congenital malformations	750-759, 325, 733
Accidents and violence	E800-E999
– traffic accidents	E800-E845

APPENDIX 1.2. Causes of death among persons aged 35 to 64.

Cause of death	ICD-codes
All causes	000-999
All diseases	000-799
Neoplasms	140-239
– stomach	151
– large intestine and rectum	153-154
– lung	162
– breast	174
– cervix uteri	180
– other	
Diseases of the circulatory system	390-458
– ischaemic heart disease	410-414
– – acute myocardial infarction	410
– – other forms of ischaemic heart disease	411-414
– cerebrovascular diseases	430-438
– other	
Other diseases	460-519
– diseases of the respiratory system	460-519
– alcohol-associated diseases (alcoholic psychosis, alcoholism, cirrhosis of liver and diseases of pancreas)	291, 303, 571, 577
– other diseases of the digestive system	520-570, 572-576
– other	
Accidents and violence	E800-E999
– traffic accidents	E800-E845
– acc. poisoning by alcohol	E860
– suicide	E950-E959

APPENDIX 1.3. Causes of death among persons aged 60 and above.

Cause of death	ICD-codes
All causes	000-999
All diseases	000-799
Infective and parasitic diseases	000-136
Neoplasms	140-239
– stomach	151
– lung	162
– breast	174
– cervix uteri	180
– corpus uteri	181,182
– prostate	185
– other	
Diseases of the circulatory system	390-458
– ischaemic heart disease	410-414
– – acute myocardial infarction	410
– – other forms of ischaemic heart disease	411-414
– other forms of heart disease	420-429
– cerebrovascular diseases	430-438
– other	
Diseases of the respiratory system	460-519
– pneumonia	480-486
– other	
Other diseases	240-389,520-789
– diabetes mellitus	250
– senile and presenile dementia	290
– infections of kidney	590
– alcohol-associated diseases (alcoholic psychosis, alcoholism, cirrhosis of liver and diseases of pancreas)	291,303,5710
– other	
Accidents and violence	E800-E999
– traffic accidents	E800-E845
– accidental falls	E880-E887
– suicide	E950-E959
– other	

APPENDIX 2: Appendix Tables

APPENDIX TABLE 1.**Person-years (10³) by population group during the periods 1971 – 75, 1976 – 80 and 1981 – 1985, by sex, 5 – 14-years**

Population group	1971 – 75		1976 – 80		1981 – 85	
	Boys	Girls	Boys	Girls	Boys	Girls
Occupational class						
Upper white-collar employees	188	183	237	227	273	260
Lower white-collar employees	330	318	336	325	372	353
Workers	913	880	814	783	724	694
Farmers	326	312	201	192	110	104
Other self-employed persons	127	120	105	99	83	81
Students	4	4	10	10	7	7
Other	30	27	39	36	37	34
Father's education						
Higher	–	–	165	159	203	195
Secondary	–	–	470	452	576	551
Basic	–	–	900	859	630	599
No father or unknown	–	–	207	202	195	188
Mother's education						
Higher	–	–	122	116	167	160
Secondary	–	–	478	459	646	616
Basic	–	–	1 055	1 017	724	679
Not mother or unknown	–	–	87	80	68	60
Family structure						
Two-parent family	–	–	1 514	1 453	1 392	1 330
Single-parent family	–	–	181	155	163	156
Other	–	–	67	63	50	46
Total	1 918	1 844	1 742	1 672	1 605	1 533

APPENDIX TABLE 2.**Probabilities of dying (%) by population group during the periods 1971 – 75, 1976 – 80 and 1981 – 85, by sex, 5 – 14-years.**

Population group	1971 – 75		1976 – 80		1981 – 85	
	Boys	Girls	Boys	Girls	Boys	Girls
Occupational class						
Upper white-collar employees	0.38	0.24	0.23	0.13	0.24	0.14
Lower white-collar employees	0.39	0.32	0.29	0.16	0.20	0.13
Workers	0.52	0.32	0.34	0.20	0.31	0.18
Farmers	0.51	0.31	0.49	0.19	0.40	0.19
Father's education						
Higher	–	–	0.21	0.14	0.21	0.14
Secondary	–	–	0.28	0.16	0.24	0.13
Basic	–	–	0.35	0.18	0.29	0.17
Mother's education						
Higher	–	–	0.24	0.12	0.20	0.18
Secondary	–	–	0.29	0.14	0.25	0.13
Basic	–	–	0.32	0.18	0.29	0.17
Family structure						
Two-parent family	–	–	0.31	0.17	0.26	0.15
Single-parent family	–	–	0.32	0.16	0.31	0.15
Other	–	–	1.34	0.80	0.96	0.67



APPENDIX TABLE 3.
Probabilities of dying from diseases (%) by population group during the periods 1971 – 75, 1976 – 80 and 1981 – 85, by sex, 5 – 14-years.

Population group	1971 – 75		1976 – 80		1981 – 85	
	Boys	Girls	Boys	Girls	Boys	Girls
Occupational class						
White-collar employees	0.15	0.14	0.12	0.09	0.11	0.09
Workers	0.17	0.15	0.14	0.11	0.14	0.10
Farmers	0.18	0.16	0.22	0.12	0.17	0.09
Father's education						
Higher	–	–	0.07	0.07	0.11	0.12
Secondary	–	–	0.14	0.09	0.10	0.08
Basic	–	–	0.14	0.12	0.12	0.08
Mother's education						
Higher	–	–	0.14	0.05	0.09	0.13
Secondary	–	–	0.14	0.09	0.12	0.07
Basic	–	–	0.12	0.11	0.12	0.09
Family structure						
Two-parent family	–	–	0.13	0.10	0.11	0.09
Single-parent family	–	–	0.12	0.08	0.15	0.06
Other	–	–	1.02	0.68	0.71	0.57

APPENDIX TABLE 4.
Probabilities of dying from accidents (%) by population group during the periods 1971 – 75, 1976 – 80 and 1981 – 85, by sex, 5 – 14-years.

Population group	1971 – 75		1976 – 80		1981 – 85	
	Boys	Girls	Boys	Girls	Boys	Girls
Occupational class						
White-collar employees	0.24	0.16	0.12	0.05	0.11	0.04
Workers	0.35	0.16	0.19	0.18	0.18	0.08
Farmers	0.33	0.15	0.24	0.23	0.23	0.11
Father's education						
Higher	–	–	0.14	0.07	0.09	0.02
Secondary	–	–	0.14	0.07	0.14	0.05
Basic	–	–	0.21	0.07	0.17	0.09
Mother's education						
Higher	–	–	0.11	0.07	0.16	0.06
Secondary	–	–	0.14	0.05	0.13	0.06
Basic	–	–	0.20	0.07	0.17	0.08
Family structure						
Two-parent family	–	–	0.18	0.07	0.15	0.06
Single-parent family	–	–	0.20	0.08	0.16	0.09
Other	–	–	0.33	0.13	0.26	0.11

APPENDIX TABLE 5.
Probabilities of dying (%) between the ages 35 to 64, 60 to 74 and 75 to 89, by sex and level of education in 1971 – 85.

Year	Men				Women			
	Higher	Secondary	Basic	All	Higher	Secondary	Basic	All
35 – 64-years								
1971	23.5	28.6	36.3	34.7	9.7	11.4	14.9	14.3
1972	22.2	27.6	34.2	32.6	9.9	11.4	14.0	13.5
1973	21.0	27.3	33.9	32.3	9.7	9.6	13.3	12.7
1974	21.5	26.2	34.3	32.4	10.8	11.8	13.4	13.1
1975	19.6	25.8	33.1	31.3	11.0	10.3	13.3	12.8
1976	20.8	28.5	32.8	31.5	9.8	10.9	12.8	12.4
1977	21.4	27.0	33.1	31.4	8.3	10.6	12.6	12.1
1978	20.7	24.5	31.8	30.0	9.0	9.9	11.8	11.4
1979	20.7	25.5	30.7	29.0	9.0	9.7	11.9	11.4
1980	17.2	23.1	29.8	27.8	7.9	8.9	11.4	10.8
1981	18.7	22.7	30.0	27.9	8.3	9.2	11.4	10.8
1982	17.1	22.9	28.9	26.9	8.0	8.9	11.1	10.5
1983	16.4	20.7	28.6	26.1	7.6	9.3	11.4	10.7
1984	16.3	22.7	27.9	25.9	7.7	8.6	10.5	9.6
1985	16.4	21.9	29.2	26.6	5.8	8.6	10.8	10.1
60 – 74-years								
1971	42.2	47.0	54.9	53.8	25.7	26.5	33.5	32.8
1972	40.5	45.2	52.1	51.1	23.7	25.1	31.1	30.5
1973	42.7	46.8	52.2	51.3	22.0	25.5	29.7	29.2
1974	40.0	45.0	52.4	51.2	20.5	23.1	28.6	28.0
1975	40.4	44.9	51.3	50.2	22.5	22.8	27.9	27.3
1976	39.9	42.8	51.6	50.3	21.8	24.6	27.9	27.4
1977	36.8	41.5	51.2	49.7	18.2	22.2	27.1	26.4
1978	35.2	42.8	50.3	48.8	18.8	22.6	26.0	25.4
1979	37.2	40.9	49.4	48.0	20.3	21.6	25.8	25.2
1980	36.8	41.3	49.0	47.6	17.0	20.1	25.1	24.5
1981	34.1	40.3	47.3	45.8	17.7	21.3	25.2	24.6
1982	34.1	38.8	46.5	44.9	15.2	19.1	24.1	23.2
1983	35.8	39.2	46.8	45.3	17.8	20.1	23.8	23.2
1984	33.5	39.4	45.8	44.3	16.7	18.6	23.8	22.9
1985	34.1	39.6	47.0	45.3	18.0	19.6	23.9	23.1
75 – 89-years								
1971	89.7	89.0	93.4	93.0	82.7	80.8	88.7	88.3
1972	84.3	88.9	92.1	91.7	84.5	80.4	87.2	86.8
1973	84.5	87.7	91.3	90.8	83.1	78.3	85.6	85.2
1974	88.2	88.7	92.0	91.7	73.5	78.7	86.1	85.5
1975	90.3	88.5	91.0	90.8	77.0	74.4	83.7	83.1
1976	82.0	90.0	91.6	91.1	78.6	78.3	83.2	82.8
1977	82.5	83.0	90.8	90.1	76.3	77.5	81.5	81.1
1978	87.2	87.0	89.8	89.5	74.3	77.7	80.8	80.5
1979	85.3	87.2	88.5	88.3	72.8	74.4	79.4	78.9
1980	83.6	88.0	90.1	89.7	70.1	73.7	80.6	79.9
1981	85.2	84.2	87.8	87.4	65.4	73.1	79.4	78.6
1982	85.1	83.5	86.5	86.2	68.0	69.9	76.5	75.8
1983	83.7	84.8	88.1	87.6	69.4	74.2	76.9	76.5
1984	79.6	83.2	86.3	85.8	70.0	69.2	76.2	75.5
1985	83.1	86.9	89.5	89.0	72.6	75.1	78.4	77.9

APPENDIX TABLE 6.
Probabilities of dying (%) between the ages 35 to 64, 60 to 74 and 75 to 89, by sex and occupational class in 1971 - 85.

Year	Men						Women					
	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	Upper white-collar	Lower white-collar	Workers	Farmers	All	
35 - 64-years												
1971	25.5	32.7	36.2	43.0	30.9	34.7	11.8	12.8	15.3	12.9	14.3	
1972	23.3	31.1	33.6	41.6	29.3	32.6	9.9	12.2	14.4	12.7	13.5	
1973	21.5	30.0	34.1	41.0	28.7	32.3	10.8	11.6	13.6	11.9	12.7	
1974	22.9	27.8	34.2	42.3	29.1	32.4	10.6	12.0	14.3	11.2	13.1	
1975	21.3	27.3	33.0	40.3	28.1	31.3	10.2	12.4	13.8	11.4	12.8	
1976	22.9	29.3	32.8	42.2	28.4	31.5	10.5	11.4	13.9	10.7	12.4	
1977	23.1	28.6	33.1	41.4	28.5	31.4	8.5	10.9	13.5	11.4	12.1	
1978	21.6	25.0	31.9	42.1	27.2	30.0	9.3	10.4	11.8	11.7	11.4	
1979	19.9	26.2	30.0	39.5	27.2	29.0	9.3	10.7	12.1	11.3	11.4	
1980	18.2	23.8	29.9	37.3	25.7	27.8	8.2	10.1	12.0	9.5	10.8	
1981	19.3	25.4	28.8	37.2	26.2	27.9	8.6	10.5	11.3	10.8	10.8	
1982	18.6	25.2	27.7	37.7	24.1	26.9	8.7	9.0	11.7	10.1	10.5	
1983	16.4	22.7	27.1	38.1	23.6	26.1	9.4	9.8	11.4	11.3	10.7	
1984	18.4	23.2	27.1	36.3	23.8	25.9	7.3	9.5	10.6	10.1	10.0	
1985	16.7	23.7	27.4	38.5	25.3	26.6	8.3	9.1	10.8	10.4	10.1	
60 - 74-years												
1971	46.4	53.9	56.1	59.1	50.3	53.8	27.0	29.9	31.6	35.3	32.7	32.8
1972	40.6	51.4	53.6	57.0	47.6	51.1	25.4	27.9	30.8	31.8	30.6	30.5
1973	43.8	50.9	53.6	57.7	47.7	51.3	22.0	26.5	30.0	31.4	28.5	29.2
1974	43.3	48.3	53.5	59.8	47.4	51.2	24.3	26.9	28.1	30.2	27.1	28.0
1975	42.0	47.7	53.0	55.8	47.0	50.2	21.6	25.9	27.6	29.8	26.4	27.3
1976	40.2	48.7	53.1	59.0	46.2	50.3	23.5	25.5	28.2	29.0	26.7	27.4
1977	40.3	48.4	52.2	57.5	46.4	49.7	20.8	25.4	27.2	29.2	25.4	26.4
1978	37.2	45.1	51.0	57.2	47.1	48.8	20.1	23.0	26.2	27.0	25.2	25.4
1979	38.2	44.6	50.2	55.4	45.7	48.0	21.4	23.6	26.1	26.8	24.3	25.2
1980	37.2	44.4	49.9	55.9	44.9	47.6	19.9	21.5	25.1	27.0	24.1	24.5
1981	36.2	42.9	48.2	54.9	42.5	45.8	19.7	22.4	25.3	27.3	23.6	24.6
1982	35.7	43.0	45.9	54.4	42.7	44.9	18.2	21.2	24.4	25.2	22.3	23.2
1983	34.3	43.9	46.8	54.7	42.8	45.3	18.9	22.4	23.5	24.6	23.3	23.2
1984	34.5	42.8	46.3	51.5	41.7	44.3	17.3	21.5	23.9	25.3	21.9	22.9
1985	35.2	43.4	46.9	54.3	43.0	45.3	19.3	20.9	23.6	25.5	22.7	23.1
75 - 89-years												
1971	89.2	92.3	93.9	95.7	92.1	93.0	83.7	82.9	88.4	89.5	90.3	88.3
1972	86.1	92.2	92.4	93.7	90.9	91.7	86.4	83.8	86.9	88.2	87.5	86.8
1973	88.5	89.4	92.0	91.0	90.6	90.8	81.6	82.4	85.1	86.5	85.9	85.2
1974	87.6	90.7	92.9	93.7	90.9	91.7	76.5	82.8	85.6	86.4	87.7	85.5
1975	90.2	89.3	92.0	92.8	89.9	90.8	74.0	79.9	83.8	83.7	84.2	83.1
1976	86.4	89.2	90.9	94.2	91.1	91.1	78.2	81.8	82.3	83.8	83.5	82.8
1977	86.3	88.6	91.1	92.1	89.5	90.1	72.5	80.3	81.4	80.7	81.2	81.1
1978	86.7	89.2	90.9	92.4	88.2	89.5	74.6	79.0	81.3	81.7	80.6	80.5
1979	84.2	89.3	88.7	91.7	87.2	88.3	72.6	75.4	77.9	82.3	81.0	78.9
1980	86.8	87.1	90.6	92.7	89.1	89.7	73.0	77.5	80.7	81.1	80.6	79.9
1981	85.6	84.8	89.2	90.9	85.9	87.4	72.3	76.6	79.0	80.3	78.9	78.6
1982	82.5	84.4	87.4	89.8	84.8	86.2	71.7	73.5	76.2	78.3	76.1	75.8
1983	82.8	86.8	89.2	87.8	87.2	87.6	69.7	74.4	76.1	78.9	77.0	76.5
1984	81.8	84.1	86.9	89.1	85.0	85.8	72.0	72.3	75.8	76.2	75.0	75.5
1985	83.2	87.5	89.6	91.9	88.7	89.0	74.6	75.5	78.2	80.1	77.6	77.9

Appendix Tables 7.1 – 7.12:

Method for calculating standardized mortality ratios (SMRs)

The age-standardized mortality ratio for occupational class i during period k or SMR_{ik} is calculated as

$$SMR_{ik} = 100 * d_{ik} / E(d_{ik}),$$

where d_{ik} refers to the observed number of deaths in occupational class i during period k and $E(d_{ik})$ is the respective expected number of deaths assuming that the level of mortality would be equal in each occupational class. In this report, the expected number of deaths has been derived by fitting the following exponential model:

$$m_{jk} = m_{11} * r(\text{AGE}_j \times \text{PER}_k),$$

where m_{jk} refers to mortality rate in age group j during period k and $r(\text{AGE}_j \times \text{PER}_k)$ refers to the relative mortality rate in age group j during period k as compared to the mortality rate in the youngest age group during the first period (see Chapter 1.4.2 for the exponential model). This procedure allows changes in the effect of age on mortality from one period to another.

The indirectly age-standardized mortality rate for occupational class i during period k (vm_{ik}) has been obtained as follows:

$$vm_{ik} = SMR_{ik} * m_k,$$

where m_k refers to the mortality rate of the total (male or female) population or d_k/V_k (V_k = the number of person-years lived during period k).

In these calculations, other self-employed persons than farmers as well as the "others" group have been excluded.

APPENDIX TABLE 7.1.

Age-standardized mortality ratios (SMR) and indirectly age-standardized mortality rates by occupational class and cause of death during the period 1971 – 75 (per 100 000 persons), men aged 35 to 64.

Cause of death	Standardized mortality ratio (SMR)						Age-standardized mortality						
	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	Number of deaths	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All
All causes	65	88	106	137	88	100	40 515	769	1 047	1 257	1 633	1 042	1 189
All diseases	66	93	106	129	88	100	34 061	660	932	1 064	1 285	884	1 000
Neoplasms	67	84	115	120	87	100	7 991	156	196	269	282	203	234
– stomach	53)	77	102	122	109	100	988	15)	22	30	36	32	29
– large intestine and rectum	162)	124	100	94	73	100	387	18)	14	11	11	8	11
– lung	34	69	126	136	79	100	3 334	33	68	123	133	78	98
– other	91	95	109	107	89	100	3 281	87	91	105	103	86	96
Diseases of the circulatory system	67	98	104	124	91	100	21 022	416	607	642	764	563	617
– ischaemic heart disease	67	101	104	122	91	100	15 400	302	455	472	550	411	452
– – acute myocardial infarction	67	101	102	118	96	100	12 145	240	358	363	420	344	356
– – other forms of ischaemic heart disease	65	102	113	136	71	100	3 255	62	97	108	130	67	96
– cerebrovascular diseases	79	93	103	130	89	100	2 928	68	80	88	111	77	86
– other	58	91	104	130	95	100	2 694	46	72	82	103	75	79
Other diseases	59	87	103	162	79	100	5 048	88	129	153	240	117	148
– diseases of the respiratory system	29)	64	101	188	87	100	1 841	16)	34	55	101	47	54
– alcohol-associated diseases	80)	104	106	189	41	100	611	14)	19	19	34	7	18
– other diseases of the digestive system	100	112	103	138	68	100	698	21	23	21	28	14	20
– other	64	93	105	137	87	100	1 898	36	52	58	76	48	56
Accidents and violence	59	63	102	187	83	100	6 454	111	120	194	354	157	189
– traffic accidents	69	78	104	155	85	100	1 764	36	40	54	80	44	52
– acc. poisoning by alcohol	36)	44)	107	245	61	100	660	7)	9)	21	48	12	19
– others	49	49	107	208	75	100	2 033	29	29	64	124	45	60
– suicide	67	71	95	175	96	100	1 997	39	42	55	103	57	59
Person-years (1000)	309	511	1 374	465	748	3 407							

) Number of deaths < 50

APPENDIX TABLE 7.2.

Age-standardized mortality ratios (SMR) and indirectly age-standardized mortality rates by occupational class and cause of death during the period 1976 – 80 (per 100 000 persons), men aged 35 to 64.

Cause of death	Standardized mortality ratio (SMR)							Age-standardized mortality					
	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	Number of deaths	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All
All causes	65	86	106	147	90	100	36 694	672	889	1 100	1 529	933	1 039
All diseases	68	89	106	137	92	100	30 777	594	773	922	1 191	798	871
Neoplasms	76	86	112	129	85	100	7 514	162	182	238	274	180	213
– stomach	66	79	109	124	100	100	849	16	19	26	30	24	24
– large intestine and rectum	124	118	102	95	77	100	426	15	14	12	11	9	12
– lung	47	72	121	153	77	100	3 172	42	65	109	138	69	90
– other	101	96	104	109	90	100	3 063	87	83	91	94	78	87
Diseases of the circulatory system	65	91	104	132	96	100	18 882	349	488	558	706	512	535
– ischaemic heart disease	67	92	105	128	96	100	14 358	271	373	426	521	392	407
– – acute myocardial infarction	68	94	102	124	102	100	10 927	211	290	315	383	314	309
– – other forms of ischaemic heart disease	62	86	114	142	80	100	3 431	60	83	110	138	78	97
– cerebrovascular diseases	63	87	106	144	92	100	2 417	43	59	69	98	63	68
– other	58	93	101	146	96	100	2 107	35	55	60	87	58	60
Other diseases	67	83	102	170	85	100	4 381	77	103	126	211	106	124
– diseases of the respiratory system	36	64	104	193	92	100	1 437	15	26	42	79	38	41
– alcohol-associated diseases	96	95	107	177	44	100	870	24	23	26	44	11	25
– other diseases of the digestive system	79)	101	100	152	79	100	459	10)	13	13	20	10	13
– other	72	87	97	151	100	100	1 615	33	40	44	69	46	46
Accidents and violence	50	70	106	207	78	100	5 917	84	118	178	347	130	168
– traffic accidents	72	79	104	172	82	100	1 155	24	26	34	56	27	33
– acc. poisoning by alcohol	30)	53	110	262	62	100	706	6)	11	22	52	12	20
– others	41	63	109	238	63	100	2 017	24	1	62	136	36	57
– suicide	53	78	103	177	97	100	2 039	31	45	60	102	56	58
Person-years (1000)	444	603	1 468	403	615	3 533							

) Number of deaths < 50



APPENDIX TABLE 7.3.
Age-standardized mortality ratios (SMR) and indirectly age-standardized mortality rates by occupational class and cause of death during the period 1981 – 85 (per 100 000 persons), men aged 35 to 64.

Cause of death	Standardized mortality ratio (SMR)							Age-standardized mortality						
	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	Number of deaths	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	
All causes	62	88	105	153	91	100	34 365	543	771	920	1 340	797	876	
All diseases	64	91	104	145	92	100	28 475	465	661	755	1 053	668	726	
Neoplasms	73	89	107	139	87	100	7 420	138	168	202	263	164	189	
– stomach	70	97	105	112	101	100	713	13	17	19	20	18	18	
– large intestine and rectum	112	113	102	82	88	100	418	12	12	11	9	10	11	
– lung	45	74	114	163	84	100	2 993	34	56	87	124	64	76	
– other	91	99	101	129	86	100	3 294	76	83	85	108	72	84	
Diseases of the circulatory system	62	94	104	140	96	100	16 914	267	405	448	603	414	431	
– ischaemic heart disease	60	97	104	135	96	100	12 834	196	317	340	441	314	327	
– acute myocardial infarction	61	96	103	130	102	100	9 466	147	231	248	313	246	241	
– other forms of ischaemic heart disease	58	98	108	148	79	100	3 368	50	84	93	127	68	86	
– cerebrovascular diseases	70	87	106	150	87	100	2 117	38	47	57	81	47	54	
– other	63	86	98	165	101	100	1 963	32	43	49	83	51	50	
Other diseases	62	85	101	177	88	100	4 141	66	90	107	188	93	106	
– diseases of the respiratory system	37	67	102	205	96	100	1 260	12	21	33	66	31	32	
– alcohol-associated diseases	71	96	111	167	52	100	1 146	21	28	32	48	15	29	
– other diseases of the digestive system	57)	91	109	158	78)	100	344	5)	8	10	14	7)	9	
– other	75	89	91	162	111	100	1 391	26	31	32	57	39	35	
Accidents and violence	51	71	110	196	85	100	5 890	77	107	165	294	128	150	
– traffic accidents	69	82	106	165	87	100	921	16	19	24	38	20	23	
– acc. poisoning by alcohol	36)	60	112	238	74	100	796	7)	12	22	48	15	20	
– others	49	67	116	201	68	100	2 046	25	35	60	105	35	52	
– suicide	51	75	104	189	106	100	2 127	28	41	56	102	57	54	
Person-years (1000)	578	712	1 718	400	515	3 923								

) Number of deaths < 50

APPENDIX TABLE 7.4.

Age-standardized mortality ratios (SMR) and indirectly age-standardized mortality rates by occupational class and cause of death during the period 1971 – 75 (per 100 000 persons), women aged 35 to 64.

Cause of death	Standardized mortality ratio (SMR)						Age-standardized mortality				
	Upper white-collar	Lower white-collar	Workers	Farmers	All	Number of deaths	Upper white-collar	Lower white-collar	Workers	Farmers	All
All causes	82	93	111	92	100	17 340	369	421	500	416	452
All diseases	78	93	110	94	100	15 772	322	382	452	387	411
Neoplasms	99	105	105	87	100	5 730	148	157	157	130	149
– stomach	61)	84	108	110	100	586	9)	13	16	17	15
– large intestine and rectum	109)	106	106	83	100	425	12)	12	12	9	11
– lung	(80)	112	124	54)	100	269	(6)	8	9	4)	7
– breast	139	124	93	80	100	1 238	45	40	30	26	32
– cervix uteri	(16)	94	142	53)	100	299	(1)	7	11	4)	8
– other	98	102	104	92	100	2 913	75	78	79	70	76
Diseases of the circulatory system	61	87	111	101	100	7 322	116	167	211	192	191
– ischaemic heart disease	62	90	113	94	100	3 338	54	79	98	82	87
– – acute myocardial infarction	62	88	112	98	100	2 646	43	61	77	67	69
– – other forms of ischaemic heart disease	62)	100	116	81	100	692	11)	18	21	15	18
– cerebrovascular diseases	65	86	108	105	100	2 292	39	52	66	63	60
– other	52	83	110	108	100	1 692	23	36	49	48	44
Other diseases	81	81	118	90	100	2 720	57	57	84	63	70
– diseases of the respiratory system	73)	82	115	96	100	564	11)	12	17	14	15
– alcohol-associated diseases	(136)	102)	120	(53)	100	125	(4)	3)	4	(2)	3
– other diseases of the digestive system	100)	74	118	91	100	461	12)	9	14	10	11
– other	73	80	119	90	100	1 590	30	33	49	37	41
Accidents and violence	111	94	118	70	100	1 568	45	39	48	29	41
– traffic accidents	97)	91	117	80	100	521	13)	12	16	11	14
– acc. poisoning by alcohol	(50)	(108)	145	(23)	100	56	(1)	(2)	2	(0)	1
– others	106)	80	131	63	100	400	11)	8	14	7	10
– suicide	133	105	107	71	100	591	20	16	16	16	15
Person-years (1000)	279	1 035	1 649	873	3 836						

() Number of deaths < 20
) Number of deaths < 50

APPENDIX TABLE 7.5.

Age-standardized mortality ratios (SMR) and indirectly age-standardized mortality rates by occupational class and cause of death during the period 1976 – 80 (per 100 000 persons), women aged 35 to 64.

Cause of death	Standardized mortality ratio (SMR)						Age-standardized mortality				
	Upper white-collar	Lower white-collar	Workers	Farmers	All	Number of deaths	Upper white-collar	Lower white-collar	Workers	Farmers	All
All causes	78	92	111	94	100	15 269	306	358	434	367	390
All diseases	76	92	111	95	100	13 828	267	324	392	336	353
Neoplasms	96	102	105	89	100	5 752	141	150	155	130	147
– stomach	57)	89	108	112	100	536	8)	12	15	15	14
– large intestine and rectum	105)	100	103	92	100	438	12)	11	12	10	11
– lung	86)	118	120	48)	100	361	8)	11	11	4)	9
– breast	121	117	95	81	100	1 243	39	37	30	26	32
– cervix uteri	(31)	90	130	75)	100	227	(2)	5	8	4)	6
– other	98	97	106	93	100	2 947	73	73	80	70	75
Diseases of the circulatory system	56	85	116	99	100	5 783	82	125	171	147	148
– ischaemic heart disease	54	83	117	97	100	2 914	41	62	87	72	74
– – acute myocardial infarction	54	81	113	107	100	2 266	31	47	66	62	58
– – other forms of ischaemic heart disease	56)	93	131	63	100	648	9)	15	22	10	17
– cerebrovascular diseases	60	88	117	94	100	1 735	26	39	51	41	44
– other	53)	82	111	113	100	1 134	15)	24	32	33	29
Other diseases	71	83	114	101	100	2 293	41	49	67	59	58
– diseases of the respiratory system	77)	77	120	95	100	468	9)	9	14	11	12
– alcohol-associated diseases	(105)	108	117	(50)	100	157	(4)	4	5	(2)	4
– other diseases of the digestive system	(77)	89	112	96	100	286	(6)	6	8	7	7
– other	64	82	112	110	100	1 382	22	29	40	39	35
Accidents and violence	101	94	113	82	100	1 441	37	34	42	30	37
– traffic accidents	87)	91	116	85	100	339	7)	8	10	7	9
– acc. poisoning by alcohol	(72)	92)	144)	(27)	100	81	(1)	2)	3)	(1)	2
– others	96)	95	119	69	100	446	11)	11	14	8	11
– suicide	117	95	102	97	100	575	18	14	15	15	15
Person-years (1000)	335	1 252	1 618	714	3 919						

() Number of deaths < 20
) Number of deaths < 50

APPENDIX TABLE 7.6.
Age-standardized mortality ratios (SMR) and indirectly age-standardized mortality rates by occupational class and cause of death during the period 1981 – 85 (per 100 000 persons), women aged 35 to 64.

Cause of death	Standardized mortality ratio (SMR)						Age-standardized mortality				
	Upper white-collar	Lower white-collar	Workers	Farmers	All	Number of deaths	Upper white-collar	Lower white-collar	Workers	Farmers	All
All causes	81	92	109	101	100	14 328	277	314	369	343	340
All diseases	79	93	108	102	100	12 776	238	281	327	310	303
Neoplasms	103	98	103	95	100	5 692	139	133	138	128	135
– stomach	68)	88	110	112	100	464	7)	10	12	12	11
– large intestine and rectum	125)	94	104	88	100	435	13)	9	10	9	10
– lung	71)	89	128	58)	100	415	7)	9	13	6)	10
– breast	141	105	93	86	100	1 315	44	33	29	27	31
– cervix uteri	(74)	98	121	(62)	100	141	(2)	3	4	(2)	3
– other	93	99	101	104	100	2 922	64	68	70	72	69
Diseases of the circulatory system	56	86	114	108	100	4 958	66	100	134	126	118
– ischaemic heart disease	47	84	116	107	100	2 515	28	50	69	64	60
– – acute myocardial infarction	47	82	116	110	100	1 919	21	37	53	50	45
– – other forms of ischaemic heart disease	47)	91	117	97	100	596	7)	13	16	14	14
– cerebrovascular diseases	74	88	114	98	100	1 493	26	31	40	34	35
– other	51)	85	110	124	100	950	11)	19	25	28	23
Other diseases	64	94	108	110	100	2 126	32	47	54	54	50
– diseases of the respiratory system	64)	81	114	114	100	430	6)	8	11	11	10
– alcohol-associated diseases	(94)	117	112	(27)	100	212	(5)	6	6	(1)	5
– other diseases of the digestive system	(78)	94	109	98)	100	245	(5)	5	6	6)	6
– other	56	94	104	123	100	1 239	16	28	31	36	29
Accidents and violence	101	89	113	88	100	1 552	37	33	42	32	37
– traffic accidents	87)	80	122	89)	100	313	6)	6	9	7	7
– acc. poisoning by alcohol	(78)	95)	121	(62)	100	116	(2)	3)	3	(2)	3
– others	(90)	87	118	83	100	489	(10)	10	14	10	12
– suicide	120	93	102	96	100	634	18	14	15	14	15
Person-years (1000)	444	1 542	1 722	511	4 219						

() Number of deaths < 20
) Number of deaths < 50

APPENDIX TABLE 7.7.
Age-standardized mortality ratios (SMR) and indirectly age-standardized mortality rates by occupational class and cause of death during the period 1971 – 75 (per 100 000 persons), men aged 60 and above.

Cause of death	Standardized mortality ratio (SMR)							Age-standardized mortality (per 100 000 persons)						
	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	Number of deaths	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	
All causes	81	96	107	117	93	100	75 772	4 708	5 614	6 230	6 828	5 396	5 833	
All diseases	81	97	107	116	93	100	72 476	4 521	5 424	5 968	6 462	5 164	5 579	
Infective and parasitic diseases	46	84	126	153	73	100	834	30	54	81	98	47	64	
Neoplasms	82	92	113	119	87	100	16 078	1 020	1 134	1 402	1 472	1 082	1 238	
– stomach	64	83	102	113	104	100	2 478	122	158	195	216	200	191	
– lung	51	77	126	138	78	100	5 894	233	348	570	625	354	454	
– prostate	122	114	106	78	97	100	1 487	140	130	121	88	110	114	
– other	109	104	107	113	87	100	6 219	524	499	512	540	415	479	
Diseases of the circulatory system	84	103	106	108	95	100	42 854	2 771	3 399	3 483	3 552	3 120	3 299	
– ischaemic heart disease	87	108	108	106	91	100	24 998	1 674	2 073	2 070	2 044	1 756	1 924	
– – acute myocardial infarction	81	105	104	104	97	100	18 897	1 184	1 525	1 515	1 514	1 406	1 455	
– – other forms of ischaemic heart disease	105	117	118	113	75	100	6 101	491	549	557	532	353	470	
– other forms of heart disease	48	78	96	123	109	100	5 006	187	299	368	472	419	385	
– cerebrovascular diseases	94	104	102	102	98	100	8 459	611	676	665	666	635	651	
– other	89	103	111	110	90	100	4 391	301	347	375	371	304	338	
Diseases of the respiratory system	53	71	102	152	96	100	7 782	317	424	609	908	572	599	
– pneumonia	71	81	101	137	96	100	3 343	181	207	260	353	247	257	
– other	39	64	102	162	95	100	4 439	134	218	349	554	325	342	
Other diseases	101	109	102	115	90	100	4 928	384	413	388	435	340	379	
– diabetes mellitus	104)	113	103	92	96	100	699	56	61	56	50	52	54	
– senile and presenile dementia	(106)	171)	128	97	66	100	193	16	26	19	15	10	15	
– infections of kidney	(74)	102)	90	135	97	100	408	23	32	28	42	30	31	
– alcohol-associated diseases	(127)	156)	107	138	50	100	113	11	14	10	12	4	9	
– other	103	104	102	117	90	100	3 515	279	282	277	318	244	271	
Accidents and violence	74	75	103	144	91	100	3 296	187	190	263	365	232	254	
– traffic accidents	74)	78	100	119	103	100	1 027	58	61	79	94	82	79	
– accidental falls	98)	86	110	129	87	100	625	47	41	53	62	42	48	
– suicide	54)	72	109	142	91	100	798	33	44	66	86	55	61	
– other	72)	65	98	187	80	100	846	47	42	64	121	52	65	
Person-years (1000)	81	153	400	204	461	1 299								

) : number of deaths < 20

() : 20 <= number of deaths < 50

APPENDIX TABLE 7.8.

Age-standardized mortality ratios (SMR) and indirectly age-standardized mortality rates by occupational class and cause of death during the period 1976 – 80 (per 100 000 persons), men aged 60 and above.

Cause of death	Standardized mortality ratio (SMR)							Age-standardized mortality (per 100 000 persons)						
	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	Number of deaths	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	
All causes	77	94	106	122	94	100	79 810	4 475	5 439	6 119	7 046	5 434	5 789	
All diseases	78	94	106	121	94	100	76 650	4 315	5 231	5 878	6 719	5 230	5 560	
Infective and parasitic diseases	50	95	116	147	81	100	767	28	53	65	82	45	56	
Neoplasms	77	94	112	122	88	100	17 914	1 005	1 221	1 457	1 586	1 141	1 299	
– stomach	61	84	102	119	104	100	2 180	96	133	161	188	165	158	
– lung	50	81	124	143	79	100	6 753	244	399	606	702	385	490	
– prostate	113	109	105	100	92	100	1 941	159	153	148	141	129	141	
– other	100	105	106	109	90	100	7 040	509	538	540	555	461	511	
Diseases of the circulatory system	80	98	103	115	96	100	44 946	2 615	3 186	3 371	3 753	3 138	3 260	
– ischaemic heart disease	83	100	104	112	96	100	27 660	1 658	2 001	2 085	2 244	1 918	2 006	
– – acute myocardial infarction	80	99	100	111	101	100	20 693	1 196	1 489	1 495	1 663	1 510	1 501	
– – other forms of ischaemic heart disease	91	101	117	115	81	100	6 967	461	512	591	580	410	505	
– other forms of heart disease	57	84	94	132	107	100	4 124	170	251	280	395	318	299	
– cerebrovascular diseases	83	97	102	116	97	100	8 450	511	596	627	710	592	613	
– other	81	98	110	119	90	100	4 712	276	336	376	406	307	342	
Diseases of the respiratory system	50	72	103	148	100	100	8 189	298	426	611	878	592	594	
– pneumonia	60	81	100	143	99	100	3 458	150	204	250	358	249	251	
– other	43	65	105	152	100	100	4 731	148	223	360	520	344	343	
Other diseases	105	97	106	120	88	100	4 834	368	342	372	421	310	351	
– diabetes mellitus	88)	113	110	91	93	100	704	45	57	56	47	47	51	
– senile and presenile dementia	192)	139)	108	133	57	100	224	31	22	17	21	9	16	
– infections of kidney	(58)	64)	89	143	112	100	375	16	17	24	39	30	27	
– alcohol-associated diseases	136	115)	135	165	21	100	259	26	22	26	31	4	19	
– other	105	94	104	119	91	100	3 272	249	222	246	283	216	237	
Accidents and violence	70	91	105	143	89	100	3 160	161	209	241	327	203	229	
– traffic accidents	82)	83	90	141	104	100	770	46	47	50	79	58	56	
– accidental falls	74)	113	117	115	84	100	712	39	59	61	60	44	52	
– suicide	61)	99	111	128	87	100	825	36	59	66	77	52	60	
– other	66)	74	105	181	80	100	853	41	46	65	112	50	62	
Person-years (1000)	100	187	445	186	460	1 379								

) : number of deaths < 20
 () : 20 <= number of deaths < 50

APPENDIX TABLE 7.9.

Age-standardized mortality ratios (SMR) and indirectly age-standardized mortality rates by occupational class and cause of death during the period 1981-85 (per 100 000 persons), men aged 60 and above.

Cause of death	Standardized mortality ratio (SMR)						Age-standardized mortality (per 100 000 persons)						
	Upper white-collar	Lower white-collar	Skilled workers	Un-skilled workers	Farm-ers	All	Number of deaths	Upper white-collar	Lower white-collar	Skilled workers	Un-skilled workers	Farm-ers	All
All causes	78	95	105	122	94	100	82 469	4 284	5 249	5 810	6 745	5 215	5 523
All diseases	78	96	105	121	95	100	79 299	4 135	5 077	5 581	6 427	5 025	5 311
Infective and parasitic diseases	56	82	115	137	91	100	630	24	35	48	57	38	42
Neoplasms	82	93	110	123	89	100	19 059	1 049	1 190	1 403	1 567	1 135	1 276
– stomach	62	91	106	124	98	100	2 019	83	123	143	168	133	135
– lung	53	80	120	145	83	100	6 841	243	366	548	663	382	458
– prostate	109	109	100	95	96	100	2 233	164	163	149	142	145	150
– other	106	101	105	111	89	100	7 966	564	540	560	594	473	533
Diseases of the circulatory system	79	99	104	115	96	100	46 450	2 467	3 074	3 242	3 578	2 981	3 111
– ischaemic heart disease	78	102	106	111	95	100	29 311	1 526	2 000	2 073	2 179	1 860	1 963
– – acute myocardial infarction	75	100	103	108	100	100	21 578	1 088	1 447	1 489	1 559	1 442	1 445
– – other forms of ischaemic heart disease	85	107	113	120	81	100	7 733	438	553	584	619	419	518
– other forms of heart disease	53	78	93	138	112	100	3 604	128	187	223	333	269	241
– cerebrovascular diseases	90	98	102	119	95	100	8 764	529	574	600	697	555	587
– other	89	97	108	115	92	100	4 771	284	310	345	369	294	320
Diseases of the respiratory system	53	76	102	148	102	100	7 795	277	398	531	773	531	522
– pneumonia	68	88	96	135	103	100	3 571	161	211	228	322	246	239
– other	41	67	106	159	101	100	4 224	117	189	301	450	285	283
Other diseases	87	105	98	126	93	100	5 365	313	377	352	451	335	359
– diabetes mellitus	78)	127	100	95	94	100	528	27	44	35	33	33	35
– senile and presenile dementia	115	131	99	118	80	100	854	65	75	56	67	45	57
– infections of kidney	(69)	66)	77	178	111	100	358	17	16	18	43	27	24
– alcohol-associated diseases	81)	131	121	158	36	100	334	18	29	27	35	8	22
– other	84	96	97	123	99	100	3 291	186	212	214	271	218	220
Accidents and violence	71	81	108	150	89	100	3 170	150	172	229	319	189	212
– traffic accidents	82)	81	100	117	108	100	629	34	34	42	49	45	42
– accidental falls	92	94	108	145	82	100	919	57	58	67	90	51	62
– suicide	55)	87	114	155	81	100	781	29	45	59	81	42	52
– other	56)	63	108	177	91	100	841	31	35	60	99	51	56
Person-years (1000)	122	239	505	184	442	1 493							

) : number of deaths < 20
() : 20 <= number of deaths < 50

APPENDIX TABLE 7.10.

Age-standardized mortality ratios (SMR) and indirectly age-standardized mortality rates by occupational class and cause of death during the period 1971-75 (per 100 000 persons), women aged 60 and above.

Cause of death	Standardized mortality ratio (SMR)							Age-standardized mortality (per 100 000 persons)					
	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	Number of deaths	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All
All causes	82	91	101	107	103	100	70 252	3 084	3 415	3 781	4 016	3 834	3 740
All diseases	82	91	101	107	103	100	68 303	2 971	3 322	3 677	3 902	3 733	3 637
Infective and parasitic diseases	58)	89	95	125	103	100	635	20	30	32	43	35	34
Neoplasms	98	104	102	103	95	100	11 447	597	636	621	626	576	609
- stomach	59	87	101	111	107	100	1 820	57	84	98	107	104	97
- lung	106)	136	110	98	71	100	504	29	37	30	27	19	27
- breast	152	128	100	87	82	100	1 352	109	92	72	63	59	72
- cervix uteri	(64)	101	130	123	65	100	311	11	17	22	21	11	17
- corpus uteri	120)	107	107	104	84	100	446	29	26	26	25	20	24
- other	98	102	100	103	97	100	7 014	364	380	375	384	363	373
Diseases of the circulatory system	77	89	101	106	105	100	43 302	1 785	2 059	2 340	2 454	2 413	2 306
- ischaemic heart disease	82	98	107	106	95	100	17 274	751	897	987	973	875	920
- - acute myocardial infarction	74	96	105	105	99	100	12 612	495	648	708	707	665	672
- - other forms of ischaemic heart disease	103	101	113	107	85	100	4 662	255	250	279	266	210	248
- other forms of heart disease	56	70	91	110	124	100	7 442	222	279	358	435	493	396
- cerebrovascular diseases	85	90	99	104	107	100	11 964	540	571	631	661	680	637
- other	77	88	103	109	103	100	6 622	273	311	362	385	363	353
Diseases of the respiratory system	70	77	94	121	109	100	5 205	193	215	261	334	303	277
- pneumonia	71	75	90	123	112	100	3 555	135	143	171	233	211	189
- other	66	82	103	115	104	100	1 650	58	72	91	101	92	88
Other diseases	92	92	103	109	98	100	7 714	379	380	421	446	404	411
- diabetes mellitus	70	79	93	116	113	100	1 845	69	78	91	113	111	98
- senile and presenile dementia	116)	156	126	117	40	100	516	31	42	34	32	11	27
- infections of kidney	83	70	98	105	117	100	1 087	48	41	57	61	68	58
- alcohol-associated diseases	(191)	(120)	(128)	(128)	(24)	100	28	2	1	1	1	0	1
- other	101	96	105	105	95	100	4 238	227	217	237	238	215	226
Accidents and violence	109	90	100	110	98	100	1 949	113	93	104	115	101	104
- traffic accidents	85)	85	105	126	91	100	422	19	19	23	28	20	22
- accidental falls	109	91	98	102	104	100	952	56	46	50	52	53	51
- suicide	(134)	99)	108	110	80	100	256	19	14	15	15	11	14
- other	120)	84	96	114	100	100	319	20	14	16	19	17	17
Person-years (1000)	105	330	512	359	572	1 878							

) : number of deaths < 20
 () : 20 <= number of deaths < 50



APPENDIX TABLE 7.11.

Age-standardized mortality ratios (SMR) and indirectly age-standardized mortality rates by occupational class and cause of death during the period 1976 – 80 (per 100 000 persons), women aged 60 and above.

Cause of death	Standardized mortality ratio (SMR)							Age-standardized mortality (per 100 000 persons)					
	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	Number of deaths	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All
All causes	83	93	103	107	100	100	75 441	2 909	3 284	3 613	3 771	3 531	3 517
All diseases	82	93	103	107	101	100	73 353	2 809	3 187	3 512	3 665	3 443	3 420
Infective and parasitic diseases	67)	86	95	121	106	100	726	23	29	32	41	36	34
Neoplasms	98	102	103	104	95	100	13 611	623	646	652	658	602	635
– stomach	83	84	97	110	109	100	1 820	71	71	82	93	93	85
– lung	132	109	125	100	66	100	767	48	39	45	36	24	36
– breast	130	128	106	85	81	100	1 554	94	92	76	62	58	72
– cervix uteri	(26)	96	109	132	89	100	342	4	15	17	21	14	16
– corpus uteri	(134)	82	112	94	97	100	452	28	17	24	20	20	21
– other	94	101	101	105	97	100	8 676	378	410	406	426	391	404
Diseases of the circulatory system	78	92	103	107	102	100	45 905	1 667	1 964	2 205	2 295	2 181	2 140
– ischaemic heart disease	81	96	108	105	97	100	20 881	785	930	1 046	1 023	941	973
– – acute myocardial infarction	75	90	107	104	102	100	15 538	540	652	778	751	736	724
– – other forms of ischaemic heart disease	98	112	108	109	82	100	5 343	244	278	268	272	205	249
– other forms of heart disease	58	73	91	113	122	100	6 363	173	217	270	336	361	297
– cerebrovascular diseases	80	94	104	108	100	100	11 940	445	525	577	599	554	557
– other	85	93	99	108	103	100	6 721	266	290	310	337	323	313
Diseases of the respiratory system	72	81	98	111	110	100	5 629	190	213	258	290	288	262
– pneumonia	73	78	97	110	113	100	3 905	133	141	177	200	206	182
– other	71	90	101	113	102	100	1 724	57	72	81	91	82	80
Other diseases	88	95	105	109	96	100	7 482	308	332	365	381	334	349
– diabetes mellitus	64	82	99	114	109	100	1 644	50	63	77	88	84	77
– senile and presenile dementia	139)	139	119	123	45	100	550	36	36	31	32	12	26
– infections of kidney	70)	81	96	104	117	100	1 009	33	38	45	49	55	47
– alcohol-associated diseases	(164)	(144)	(96)	(157)	(25)	100	54	5	4	3	5	1	3
– other	94	98	107	106	93	100	4 225	186	192	211	209	183	197
Accidents and violence	103	99	104	109	91	100	2 088	100	96	101	106	88	97
– traffic accidents	(87)	83	109	120	92	100	371	15	14	19	20	16	17
– accidental falls	116	106	100	100	94	100	1 032	56	51	48	48	45	48
– suicide	(117)	93)	112	116	80	100	274	15	12	15	15	10	13
– other	(73)	102	105	117	90	100	411	14	19	20	22	17	19
Person-years (1000)	121	402	576	402	645	2 145							

) : number of deaths < 20
() : 20 <= number of deaths < 50

APPENDIX TABLE 7.12.
Age-standardized mortality ratios (SMR) and indirectly age-standardized mortality rates by occupational class and cause of death during the period 1981 – 85 (per 100 000 persons), women aged 60 and above.

Cause of death	Standardized mortality ratio (SMR)							Age-standardized mortality (per 100 000 persons)						
	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	Number of deaths	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	
All causes	83	93	103	110	100	100	86 126	2 953	3 287	3 639	3 881	3 549	3 543	
All diseases	83	92	103	110	101	100	83 701	2 844	3 183	3 537	3 770	3 462	3 443	
<i>Infective and parasitic diseases</i>	78)	75	98	122	110	100	758	24	23	30	38	34	31	
Neoplasms	101	103	103	103	93	100	16 386	684	692	695	696	625	674	
– stomach	73	88	97	108	111	100	1 856	56	67	74	82	85	76	
– lung	120	109	111	127	60	100	1 029	50	46	47	53	25	42	
– breast	141	117	99	95	82	100	2 039	118	98	83	80	69	84	
– cervix uteri	(57)	96	111	148	71	100	352	8	13	16	21	10	14	
– corpus uteri	84	93	116	82	105	100	488	17	19	23	16	21	20	
– other	99	102	103	101	95	100	10 622	433	448	451	443	413	437	
Diseases of the circulatory system	76	90	103	111	103	100	51 642	1 610	1 902	2 192	2 351	2 179	2 124	
– ischaemic heart disease	78	93	106	109	99	100	24 893	797	947	1 084	1 120	1 010	1 024	
– – acute myocardial infarction	74	88	106	109	103	100	18 404	560	667	803	822	778	757	
– – other forms of ischaemic heart disease	89	105	106	112	87	100	6 489	237	281	282	298	233	267	
– other forms of heart disease	55	73	93	112	124	100	6 001	137	181	230	277	307	247	
– cerebrovascular diseases	79	91	104	112	100	100	13 921	453	521	593	644	572	573	
– other	80	90	102	111	103	100	6 827	225	252	285	312	290	281	
Diseases of the respiratory system	73	88	95	112	110	100	5 568	167	201	217	257	253	229	
– pneumonia	72	86	92	112	113	100	4 112	122	145	156	190	192	169	
– other	74	92	102	113	101	100	1 456	44	55	61	68	61	60	
Other diseases	93	94	104	111	95	100	9 347	358	360	400	427	366	384	
– diabetes mellitus	51	71	110	110	113	100	1 372	29	40	62	62	64	56	
– senile and presenile dementia	104	122	113	119	65	100	2 116	90	106	98	104	56	87	
– infections of kidney	72)	71	97	111	120	100	1 029	30	30	41	47	50	42	
– alcohol-associated diseases	(117)	109	133	155	(13)	100	95	5	4	5	6	1	4	
– other	105	93	100	107	100	100	4 735	204	181	194	208	196	195	
Accidents and violence	109	103	102	111	87	100	2 425	109	103	102	111	87	100	
– traffic accidents	96)	96	101	118	91	100	379	15	15	16	19	15	16	
– accidental falls	106	104	102	106	91	100	1 325	58	57	56	58	50	55	
– suicide	118)	122	109	94	71	100	337	16	17	15	13	10	14	
– other	129)	91	96	134	83	100	384	21	15	15	21	13	16	
Person-years (1000)	150	539	665	431	647	2 431								

) : number of deaths < 20
() : 20 <= number of deaths < 50

APPENDIX TABLE 8.1.

Relative age- and period-standardized mortality rates by occupational class and cause of death during the period 1971 - 85 (upper white-collar employees = 100), men and women aged 60 - 74.

Cause of death	Men					Women				
	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers
All causes	100	129	145	170	125	100	117	131	139	124
All diseases	100	129	145	167	125	100	118	132	140	126
Infective and parasitic diseases	(100)	198	289	366	171	(100)	113	133	184	152
Neoplasms	100	123	150	170	116	100	105	103	103	91
- stomach	100	133	164	195	168	100	113	129	156	148
- lung	100	166	257	307	169	100	94	94	92	43
- prostate	100	109	94	89	85	-	-	-	-	-
- breast	-	-	-	-	-	100	86	75	65	59
- cervix uteri	-	-	-	-	-	..	225	268	295	157
- corpus uteri	-	-	-	-	-	100	89	103	90	100
- other	100	101	103	112	85	100	110	107	106	98
Diseases of the circulatory system	100	131	138	152	125	100	128	152	164	149
- ischaemic heart disease	100	135	138	148	125	100	130	154	157	140
-- acute myocardial infarction	100	137	137	147	135	100	134	161	162	154
-- other forms of ischaemic heart disease	100	128	143	149	95	100	119	134	144	101
- other forms of heart disease	100	170	214	301	231	100	150	195	259	245
- cerebrovascular diseases	100	114	121	140	111	100	126	144	161	148
- other	100	123	140	146	108	100	117	143	154	142
Diseases of the respiratory system	100	157	241	385	223	100	117	145	174	149
- pneumonia	100	134	178	290	159	100	137	167	213	184
- other	100	174	285	452	270	100	99	125	138	118
Other diseases	100	113	111	135	92	100	106	124	129	112
- diabetes mellitus	100	124	118	111	106	100	135	167	192	179
- senile and presenile dementia	(100)	108	82	100	62	(100)	123	113	128	58
- infections of kidney	..	(101)	166	240	168	(100)	91	134	146	145
- alcohol-associated diseases	100	121	112	141	30	..	(74)	(76)	(105)	..
- other	100	111	110	138	97	100	101	117	115	102
Accidents and violence	100	116	158	238	130	100	93	95	114	82
- traffic accidents	100	100	123	176	129	(100)	96	108	138	103
- accidental falls	100	104	149	181	83	(100)	103	104	119	93
- suicide	100	160	209	284	175	100	84	80	77	56
- other	100	105	160	301	122	(100)	92	95	139	88

.. : number of deaths < 20

() : 20 <= number of deaths < 50

APPENDIX TABLE 8.2.
Relative age- and period-standardized mortality rates by occupational class and cause of death during the period 1971 – 85 (upper white-collar employees = 100), men and women aged 75 – 89.

Cause of death	Men					Women				
	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers
All causes	100	112	123	133	111	100	109	120	127	122
All diseases	100	112	123	133	111	100	110	121	128	123
Infective and parasitic diseases	(100)	151	188	222	145	(100)	128	142	169	151
Neoplasms	100	105	122	120	98	100	101	103	104	98
– stomach	(100)	145	169	182	163	100	134	150	152	165
– lung	100	128	195	202	122	100	89	96	89	69
– prostate	100	86	87	73	81	-	-	-	-	-
– breast	-	-	-	-	-	100	89	67	59	54
– cervix uteri	-	-	-	-	-	..	(149)	185	232	148
– corpus uteri	-	-	-	-	-	(100)	84	104	80	72
– other	100	96	100	97	83	100	100	102	107	100
Diseases of the circulatory system	100	112	118	123	109	100	114	127	132	129
– ischaemic heart disease	100	111	116	114	100	100	113	123	122	113
– – acute myocardial infarction	100	115	120	121	113	100	116	133	131	127
– – other forms of ischaemic heart disease	100	103	106	99	74	100	108	105	103	86
– other forms of heart disease	100	143	164	231	199	100	126	158	188	218
– cerebrovascular diseases	100	107	108	111	103	100	109	121	124	119
– other	100	107	115	120	99	100	113	123	134	128
Diseases of the respiratory system	100	132	174	239	173	100	111	127	153	148
– pneumonia	100	125	140	186	148	100	102	119	148	146
– other	100	143	226	321	211	100	141	157	171	156
Other diseases	100	100	100	112	92	100	103	112	119	105
– diabetes mellitus	100	132	112	90	101	100	114	154	172	176
– senile and presenile dementia	100	114	88	98	61	100	115	105	106	48
– infections of kidney	(100)	122	111	213	155	100	111	141	156	175
– alcohol-associated diseases	..	..	(241)	..	..	..	..	..	..	..
– other	100	88	97	107	91	100	93	98	103	94
Accidents and violence	100	113	129	140	113	100	90	98	94	88
– traffic accidents	(100)	112	123	111	139	..	103	141	129	100
– accidental falls	100	114	110	130	96	100	90	93	89	88
– suicide	(100)	125	160	148	96	..	(117)	(166)	(165)	(115)
– other	(100)	(98)	168	216	153	(100)	81	89	87	79

.. : number of deaths < 20
 () : 20 <= number of deaths < 50

APPENDIX TABLE 8.3.
Relative age- and period-standardized mortality rates by occupational class and cause of death during the period 1971 – 85 (upper white-collar employees = 100), men and women aged 90 and above.

Cause of death	Men					Women				
	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers
All causes	100	119	114	116	116	100	104	108	114	113
All diseases	100	118	114	116	115	100	104	110	115	114
Infective and parasitic diseases	..	..	..	..	(109)	..	..	(179)	(226)	211
Neoplasms	100	96	110	97	90	100	91	108	110	92
– stomach	..	..	..	..	(185)	..	..	(106)	(111)	(71)
– lung	..	..	..	..	(126)	..	..	..	..	..
– prostate	..	(130)	(133)	..	111	-	-	-	-	-
– breast	-	-	-	-	-	..	(118)	(85)	(139)	(103)
– cervix uteri	-	-	-	-	-	..	..	..	..	..
– corpus uteri	-	-	-	-	-	..	..	..	..	..
– other	(100)	(73)	79	(80)	72	(100)	93	113	105	98
Disease of the circulatory system	100	120	109	107	113	100	105	111	114	110
– ischaemic heart disease	100	99	88	81	82	100	113	114	109	93
– – acute myocardial infarction	100	97	91	93	94	100	112	130	122	113
– – other forms of ischaemic heart disease	(100)	103	85	(64)	64	100	114	94	93	68
– other forms of heart disease	(100)	135	122	125	157	100	103	132	148	179
– cerebrovascular diseases	(100)	154	123	122	137	100	102	102	108	99
– other	(100)	120	131	139	124	100	98	100	100	93
Diseases of the respiratory system	100	137	148	173	157	100	137	147	165	193
– pneumonia	(100)	132	130	135	140	100	132	142	150	183
– other	..	(156)	215	316	223	..	161	170	234	241
Other diseases	100	111	96	111	100	100	89	81	89	88
– diabetes mellitus	..	..	..	..	..	..	..	(189)	(239)	213
– senile and presenile dementia	..	..	..	..	(29)	(100)	115	92	91	58
– infections of kidney	..	..	..	..	(145)	(100)	(68)	75	(80)	117
– alcohol-associated diseases	..	..	..	..	..	..	..	..	..	..
– other	(100)	(110)	121	(124)	131	100	75	69	79	85
Accidents and violence	..	(151)	(124)	..	150	..	97	75	91	80
– traffic accidents	..	..	..	..	..	..	..	..	..	..
– accidental falls	..	..	(109)	..	129	(100)	94	66	87	76
– suicide	..	..	..	..	..	..	..	..	..	..
– other	..	..	..	..	..	..	..	..	..	..

.. : number of deaths < 20

() : 20 <= number of deaths < 50

APPENDIX TABLE 9.1.
Relative change (%) in age-standardized mortality from the period 1971 – 75 to the period 1981 – 85 by occupational class and cause of death, men aged 60 to 74.

Cause of death	Upper white-collar	Lower white-collar	Skilled workers	Un-skilled workers	Farmers	All	Percentage of all deaths	
							1971 – 75	1981 – 85
All causes	-23	-19	-19	-10	-15	-17	100.0	100.0
All diseases	-22	-19	-19	-10	-15	-16	94.8	95.3
Infective and parasitic diseases	..	(-46)	-51	-50	-30	-47	1.1	0.7
Neoplasms	-7	-8	-13	-5	-11	-10	24.1	25.9
– stomach	-26	-28	-36	-32	-44	-36	3.4	2.6
– lung	-1	-8	-12	-4	-5	-8	10.0	10.8
– prostate	4	-2	-6	23	-9	-3	1.6	2.0
– other	-8	-5	-6	1	-1	-3	9.0	10.6
Diseases of the circulatory system	-26	-22	-18	-7	-13	-16	55.9	56.5
– ischaemic heart disease	-25	-16	-12	-1	-4	-9	37.1	40.2
– – acute myocardial infarction	-25	-18	-14	-5	-8	-12	28.8	30.1
– – other forms of ischaemic heart disease	-28	-10	-7	12	19	0	8.4	10.1
– other forms of heart disease	-41	-42	-46	-45	-48	-46	4.4	2.9
– cerebrovascular diseases	-29	-36	-28	-9	-32	-28	9.6	8.4
– other	-15	-26	-21	-4	-12	-16	4.7	4.9
Diseases of the respiratory system	-14	-28	-34	-26	-29	-29	7.9	6.7
– pneumonia	-27	-30	-40	-26	-35	-33	2.6	2.2
– other	-3	-28	-32	-26	-26	-27	5.2	4.5
Other diseases	-38	-21	-25	-15	-20	-22	5.7	5.5
– diabetes mellitus	..	(-27)	-45	(-56)	-50	-44	0.8	0.6
– senile and presenile dementia	..	..	..	..	..	224	0.1	0.5
– infections of kidney	..	..	(-60)	(-22)	(-42)	-50	0.3	0.2
– alcohol-associated diseases	..	(129)	(176)	(216)	..	137	0.2	0.7
– other	-49	-35	-36	-29	-24	-32	4.3	3.5
Accidents and violence	-36	-17	-23	-17	-24	-22	5.2	4.7
– traffic accidents	-55	-52	-52	-44	-50	-50	1.7	1.0
– accidental falls	..	(42)	1	28	(-1)	1	0.6	0.8
– suicide	(-32)	7	-18	-5	-28	-17	1.4	1.3
– other	(-11)	-14	-5	-17	14	-4	1.5	1.6

.. : number of deaths < 20 at least during one period

() : <= 20 number of deaths < 50 at least during one period



APPENDIX TABLE 9.2.
Relative change (%) in age-standardized mortality from the period 1971 – 75 to the period 1981 – 85 by occupational class and cause of death, men aged 75 to 89.

Cause of death	Upper white-collar	Lower white-collar	Skilled workers	Un-skilled workers	Farmers	All	Percentage of all deaths	
							1971 – 75	1981 – 85
All causes	-19	-15	-15	-13	-14	-15	100.0	100.0
All diseases	-19	-15	-16	-13	-14	-15	97.1	97.0
Infective and parasitic diseases	..	(-40)	-42	-41	-31	-37	1.1	0.8
Neoplasms	-9	2	-2	9	8	4	16.8	20.4
– stomach	(-53)	-37	-32	-26	-34	-33	3.1	2.4
– lung	-3	31	3	33	37	21	4.0	5.7
– prostate	-16	10	5	44	21	14	2.6	3.5
– other	5	2	4	1	10	6	7.1	8.9
Diseases of the circulatory system	-19	-17	-17	-15	-18	-17	57.6	56.0
– ischaemic heart disease	-6	-2	-1	-3	1	-1	26.4	30.9
– – acute myocardial infarction	1	2	-2	-4	4	1	18.9	22.3
– – other forms of ischaemic heart disease	-18	-10	-1	-3	-6	-5	7.5	8.6
– other forms of heart disease	-50	-55	-57	-42	-50	-51	9.9	5.7
– cerebrovascular diseases	-27	-20	-20	-11	-22	-20	13.8	13.0
– other	-27	-26	-23	-27	-27	-26	7.4	6.5
Diseases of the respiratory system	-37	-21	-24	-30	-23	-25	14.0	12.2
– pneumonia	-33	-21	-30	-28	-21	-25	7.2	6.4
– other	(-45)	-22	-18	-32	-25	-25	6.8	5.8
Other diseases	-24	-23	-20	-2	-14	-17	7.7	7.4
– diabetes mellitus	..	(-46)	-45	(-17)	-41	-43	1.1	0.7
– senile and presenile dementia	..	(153)	(97)	..	(212)	146	0.5	1.5
– infections of kidney	..	..	(-33)	(-24)	-25	-35	0.9	0.6
– alcohol-associated diseases	..	..	..	..	..	..	0.0	0.1
– other	-32	-34	-32	-16	-22	-26	5.2	4.5
Accidents and violence	(8)	-13	-4	-11	-22	-12	2.9	3.0
– traffic accidents	..	(-32)	-42	(-60)	-40	-38	0.8	0.6
– accidental falls	..	(-3)	13	(7)	-7	4	1.1	1.4
– suicide	..	..	(7)	(-3)	(-2)	0	0.5	0.5
– other	..	..	(7)	(0)	-36	-18	0.6	0.5

.. : number of deaths < 20 at least during one period

() : 20 <= number of deaths < 50 at least during one period

APPENDIX TABLE 9.3.
Relative change (%) in age-standardized mortality from the period 1971 – 75 to the period 1981 – 85 by occupational class and cause of death, men aged 90 and above.

Cause of death	Upper white-collar	Lower white-collar	Skilled workers	Un-skilled workers	Farmers	All	Percentage of all deaths	
							1971 – 75	1981 – 85
All causes	3	-16	-19	-27	-22	-20	100.0	100.0
All diseases	5	-15	-19	-29	-22	-20	96.6	96.5
Infective and parasitic diseases	0.8	1.2
Neoplasms	(27)	..	-1	12	9.0	12.5
– stomach	(-21)	1.4	1.3
– lung	0.9	1.1
– prostate	(17)	2.4	3.5
– other	22	4.3	6.6
Diseases of the circulatory system	(3)	-21	-24	-25	-29	-25	58.6	55.1
– ischaemic heart disease	..	(1)	-15	(-20)	-12	-7	18.2	21.1
– – acute myocardial infarction	(-11)	(-19)	-4	-5	11.6	13.8
– – other forms of ischaemic heart disease	(-21)	..	(-27)	-11	6.6	7.3
– other forms of heart disease	..	(-53)	(-32)	(-29)	-50	-45	15.7	10.9
– cerebrovascular diseases	..	(-33)	(-28)	(-29)	-32	-31	14.6	12.6
– other	(-30)	(-27)	-17	-17	10.1	10.5
Diseases of the respiratory system	..	(-13)	-20	(-37)	-9	-18	18.5	18.9
– pneumonia	(-9)	(-25)	-8	-14	12.8	13.7
– other	(-11)	-25	5.7	5.3
Other diseases	(-28)	(-40)	-26	-26	9.5	8.8
– diabetes mellitus	0.8	0.5
– senile and presenile dementia	0.3	2.0
– infections of kidney	1.0	1.0
– alcohol-associated diseases	0.0	0.0
– other	-42	7.4	5.3
Accidents and violence	(-10)	-18	3.4	3.5
– traffic accidents	0.1	0.2
– accidental falls	(-8)	2.7	3.1
– suicide	0.1	0.1
– other	0.5	0.1

.. : number of deaths < 20 at least during one period

() : 20 <= number of deaths < 50 at least during one period

. : owing to the small number of deaths, changes in mortality from separate causes of death are not examined according to occupational class

APPENDIX TABLE 9.4.
Relative change (%) in age-standardized mortality from the period 1971 – 75 to the period 1981 – 85 by occupational class and cause of death, women aged 60 to 74.

Cause of death	Upper white-collar	Lower white-collar	Skilled workers	Un-skilled workers	Farmers	All	Percentage of all deaths	
							1971 – 75	1981 – 85
All causes	-24	-23	-22	-22	-24	-22	100.0	100.0
All diseases	-25	-24	-21	-22	-24	-22	96.9	96.8
Infective and parasitic diseases	..	(-54)	-24	-30	-10	-22	1.0	1.0
Neoplasms	-2	-3	1	-1	-8	-3	22.1	27.5
– stomach	(-35)	-26	-31	-39	-30	-30	3.1	2.7
– lung	..	35	69	128	9	60	1.0	2.1
– breast	-17	-6	8	5	7	2	3.0	3.9
– cervix uteri	..	(-21)	-33	-13	(-20)	-21	0.8	0.8
– corpus uteri	..	-39	-24	-38	-7	-28	1.0	0.9
– other	5	1	6	3	-6	0	13.3	17.1
Diseases of the circulatory system	-33	-32	-26	-26	-28	-27	57.6	54.2
– ischaemic heart disease	-25	-20	-12	-10	-7	-12	27.4	31.4
– – acute myocardial infarction	-21	-24	-11	-10	-5	-11	21.2	24.3
– – other forms of ischaemic heart disease	-36	-8	-16	-9	-12	-13	6.2	7.1
– other forms of heart disease	(-47)	-57	-56	-57	-57	-56	6.8	3.8
– cerebrovascular diseases	-39	-40	-34	-32	-38	-35	15.7	13.2
– other	-41	-41	-41	-39	-45	-42	7.7	5.8
Diseases of the respiratory system	(-37)	-31	-35	-42	-41	-36	4.9	4.0
– pneumonia	(-42)	-39	-40	-46	-46	-41	2.9	2.2
– other	(-31)	-19	-29	-34	-33	-29	2.0	1.8
Other diseases	-39	-27	-33	-29	-30	-29	11.3	10.2
– diabetes mellitus	..	-55	-58	-63	-58	-58	2.9	1.6
– senile and presenile dementia	..	(102)	(59)	(116)	..	114	0.4	1.1
– infections of kidney	..	(-62)	-61	-36	-48	-51	1.3	0.8
– alcohol-associated diseases	..	..	..	..	..	(189)	0.1	0.3
– other	-35	-24	-27	-25	-20	-23	6.6	6.4
Accidents and violence	-5	-4	-26	-16	-21	-17	3.1	3.2
– traffic accidents	..	(-24)	-37	-32	-36	-32	1.0	0.9
– accidental falls	..	(-15)	(-37)	(-32)	-24	-28	0.8	0.7
– suicide	..	(30)	-3	(-5)	(-7)	1	0.7	0.9
– other	..	(-4)	(-22)	(20)	(-4)	0	0.6	0.7

.. : number of deaths < 20 at least during one period

() : 20 <= number of deaths < 50 at least during one period

APPENDIX TABLE 9.5.
Relative change (%) in age-standardized mortality from the period 1971 – 75 to the period 1981 – 85 by occupational class and cause of death, women aged by 75 to 89.

Cause of death	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	Percentage of all deaths	
							1971 – 75	1981 – 85
All causes	-25	-22	-24	-23	-28	-24	100.0	100.0
All diseases	-24	-23	-24	-23	-28	-24	97.6	97.5
Infective and parasitic diseases	..	(-18)	-23	-15	-28	-19	0.8	0.9
Neoplasms	3	-3	-5	-4	-1	-3	12.0	15.2
– stomach	(13)	-38	-43	-28	-31	-35	2.3	2.0
– lung	..	-14	17	44	26	21	0.5	0.7
– breast	(30)	5	3	46	13	13	1.1	1.6
– cervix uteri	..	..	(-14)	..	..	-3	0.2	0.3
– corpus uteri	..	(-10)	(0)	(-42)	(14)	-8	0.4	0.4
– other	0	8	4	-4	5	4	7.6	10.2
Diseases of the circulatory system	-30	-25	-26	-24	-30	-26	64.8	63.1
– ischaemic heart disease	-9	-9	-8	-2	-3	-5	22.6	28.4
– – acute myocardial infarction	0	-7	-1	2	1	1	15.6	20.6
– – other forms of ischaemic heart disease	-24	-14	-22	-13	-13	-16	7.0	7.8
– other forms of heart disease	-61	-53	-54	-55	-56	-54	13.6	8.2
– cerebrovascular diseases	-34	-23	-23	-19	-32	-25	18.0	18.0
– other	-40	-38	-41	-39	-39	-39	10.6	8.6
Diseases of the respiratory system	-39	-33	-43	-44	-43	-41	9.2	7.3
– pneumonia	-40	-28	-37	-42	-37	-36	6.7	5.7
– other	(-33)	-45	-55	-52	-58	-53	2.6	1.6
Other diseases	-18	-25	-20	-21	-27	-22	10.7	11.0
– diabetes mellitus	(-67)	-60	-36	-47	-51	-48	2.6	1.7
– senile and presenile dementia	(133)	60	96	124	(306)	129	0.9	2.9
– infections of kidney	(-38)	-36	-38	-41	-41	-39	1.7	1.4
– alcohol-associated diseases	..	..	..	..	..	..	0.0	0.0
– other	-26	-36	-35	-31	-30	-31	5.5	5.0
Accidents and violence	-28	-9	-14	-25	-32	-23	2.4	2.5
– traffic accidents	..	..	(-38)	..	(-26)	-36	0.3	0.3
– accidental falls	(-24)	-12	-15	-21	-31	-22	1.7	1.8
– suicide	..	..	..	..	..	(11)	0.1	0.1
– other	..	..	(2)	(-9)	(-45)	-23	0.3	0.3

.. : number of deaths < 20 at least during one period

() : 20 <= number of deaths < 50 at least during one period

APPENDIX TABLE 9.6.

Relative change (%) in age-standardized mortality from the period 1971 – 75 to the period 1981 – 85 by occupational class and cause of death, women aged 90 and above.

Cause of death	Upper white-collar	Lower white-collar	Skilled workers	Unskilled workers	Farmers	All	Percentage of all deaths	
							1971 – 75	1981 – 85
All causes	-18	-25	-17	-16	-23	-20	100.0	100.0
All diseases	-16	-25	-17	-17	-21	-19	95.8	96.8
Infective and parasitic diseases	..	..	..	..	..	(-30)	1.1	0.9
Neoplasms	..	(-19)	(8)	(6)	-12	1	6.2	7.7
– stomach	.	.	.	.	.	(-9)	0.9	1.0
– lung	.	.	.	.	.	..	0.2	0.2
– breast	.	.	.	.	.	..	0.4	0.8
– cervix uteri	.	.	.	.	.	..	0.0	0.1
– corpus uteri	.	.	.	.	.	..	0.1	0.2
– other	.	.	.	.	.	-5	4.5	5.3
Diseases of the circulatory system	-23	-27	-25	-13	-23	-21	63.1	61.6
– ischaemic heart disease	(6)	-7	-13	18	-3	0	16.7	20.7
– acute myocardial infarction	..	(8)	2	(24)	12	15	9.2	13.1
– other forms of ischaemic heart disease	(-37)	(-22)	-30	(9)	-26	-20	7.5	7.6
– other forms of heart disease	(-38)	-38	-39	-29	-42	-37	17.1	13.2
– cerebrovascular diseases	(-38)	-26	-24	-6	-29	-23	16.3	15.6
– other	(-24)	-44	-27	-31	-5	-25	12.9	12.1
Diseases of the respiratory system	(-24)	-26	-20	-44	-18	-27	14.2	13.0
– pneumonia	..	(-10)	-5	-34	-11	-16	10.5	10.9
– other	..	..	(-56)	(-65)	(-42)	-57	3.8	2.0
Other diseases	(-4)	-15	27	-4	-17	-3	11.2	13.5
– diabetes mellitus	.	.	.	.	.	-45	1.4	0.9
– senile and presenile dementia	.	.	.	.	.	168	1.5	5.2
– infections of kidney	.	.	.	.	.	-44	2.5	1.7
– alcohol-associated diseases	.	.	.	.	.	..	0.0	0.0
– other	.	.	.	.	.	-21	5.8	5.7
Accidents and violence	..	..	..	..	(-60)	-40	4.2	3.2
– traffic accidents	.	.	.	.	.	..	0.1	0.0
– accidental falls	.	.	.	.	.	-33	3.5	3.0
– suicide	.	.	.	.	.	..	0.0	0.1
– other	.	.	.	.	.	..	0.6	0.2

.. : number of deaths < 20 at least during one period

() : 20 ≤ number of deaths < 50 at least during one period

. : owing to the small number of deaths, changes in mortality from separate causes of death are not examined according to occupational class

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Abstract

The study is based on the official death records for Finland in the years 1971 – 85. These records have been linked with the records of the 1970, 1975 and 1980 censuses by means of the personal identification numbers. The study describes changes in total and cause-specific mortality among socio-economic and educational groups. The mortality rates of children, the middle-aged and the aged are studied separately. According to the results, socio-economic differences in mortality have either remained unchanged or increased in all age groups.

Keywords

mortality, social class, education, child mortality, elderly mortality, occupational class

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Socio-economic mortality differences in Finland 1971 – 85

Tapani Valkonen
Tuija Martelin
Arja Rimpelä



Previous Finnish studies on welfare differences have focused on matters such as housing, income, working conditions and health. This study deals with the ultimate criterion of a lack of welfare – untimely death. The study has been carried out jointly by the Central Statistical Office of Finland and a team of researchers at the Department of Sociology at the University of Helsinki. It is based on a data file whose scope is unique: it covers the entire population of Finland during the period 1971 – 1985.

This report describes changes in mortality among different socio-economic and educational groups. The mortality rates of children, the middle-aged and the aged are studied separately. According to the results, socio-economic differences in mortality have either remained unchanged or increased in all age groups. Thus the goal of diminishing mortality differences has not been achieved.

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