PART 3

CASE STUDIES

BUDAPEST: INEQUALITIES IN MORTALITY BETWEEN DISTRICTS

Summary

This case study analyses the socioeconomic inequalities in mortality in Budapest, Hungary. The data come from a study in 1980–1983 comparing the mortality rates of different districts of Budapest. The mortality experience of these districts was expressed in various measures, including the probability of dying between certain ages and life expectancy at birth. In this example, we use the percentage of men who did not complete primary school as an indicator of the socioeconomic level of a district.

Districts with a higher percentage of men with less education had higher mortality rates and lower life expectancy at birth. Several measures that summarize the magnitude of these inequalities in mortality can be calculated and show that the inequalities are fairly large. For example, for men aged 35–64 years, the probability of dying is 36% higher in districts with a low percentage of men with less education than in districts with a high percentage of men with less education. In absolute terms, the difference is such that an extra 10 of every 100 men die between age 35 and 64 years in the districts with a higher percentage of men with less education. These are simple measures of effect but measures of total impact also indicate substantial differences. For example, one of these measures indicates that reducing the mortality rate of the districts with less education to that of the districts with more education would reduce the overall risk of mortality for men between 35 and 64 years in Budapest by 18.5%.

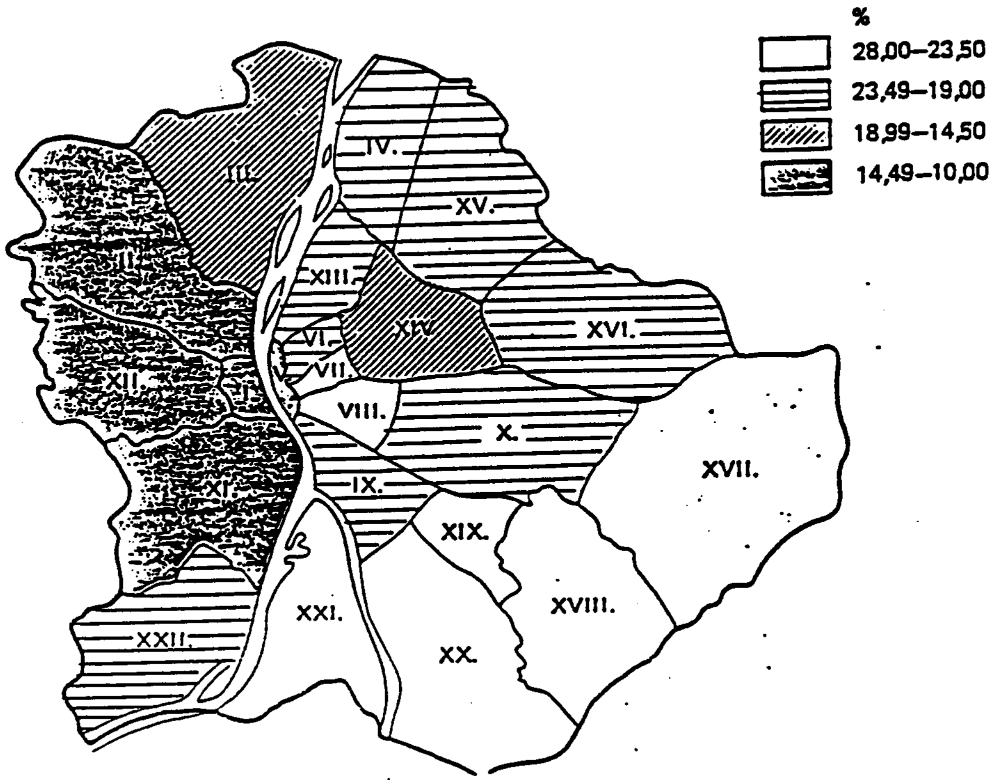
This study was an ecological analysis in which mortality was related to socioeconomic indicators at an aggregate level, the districts of a city. The results of such studies should be interpreted as a rather crude approximation of socioeconomic inequalities in mortality at the individual level.

Of all the countries in central and eastern Europe, Hungary has the most extensive information on socioeconomic inequalities in health. It has data on mortality by socioeconomic status based on unlinked cross-sectional studies in census years *(42)*, and has also recently implemented a national health interview survey.

The data used here are from a study on differences in mortality between districts in Budapest, the capital of Hungary *(144)*. This is an example of an aggregate-level (ecological) study and serves to show how useful insights can be gained with relatively simple means. Many countries that do not have data on socioeconomic inequalities in health at the individual level have been able to demonstrate the existence of health inequalities using this approach *(47–49,133–135)*.

The study was performed by the Hungarian Central Statistical Office and was supported by the United Nations Fund for Population Activities. It covered mortality during the years 1980–1983. For the purpose of this study, Budapest was divided into 22 districts (Fig. 11).

Fig. 11 The proportion of men with less than eight grades of education (primary school) in the districts of Budapest, 1980



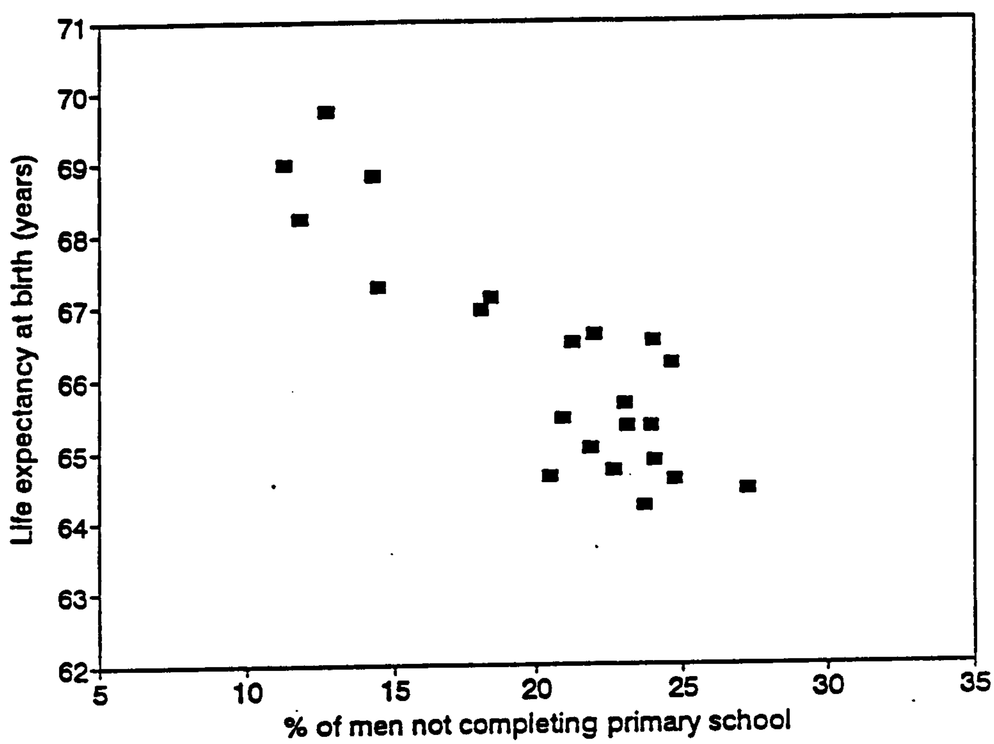
Source: Józan *(144)*.

For each district several socioeconomic indicators were available, based on information collected during the population census of 1980, including level of education and occupation, as well as some proxy measures such as housing characteristics. The percentage of men aged 25 years and over in each district who completed less than 8 grades (that is who did not complete primary school) is chosen as a socioeconomic indicator in this illustration, but similar results were obtained with other socioeconomic indicators. Fig. 11 shows the distribution of the percentage of men with less than primary school education across the districts of Budapest. The pattern is very clear: the proportion of men with less education is relatively low in the northwestern part of the city and relatively high in the southeastern part.

The mortality data were extracted from the mortality registry kept by the Central Statistical Office. The age-specific mortality rates of each district were used to calculate several easily interpretable measures of the risk of dying prematurely, such as the average life expectancy at birth and the average probability of dying between age 35 and 64 years. The mortality data used here are for men only.

The number of deaths in each district was quite large. The total number of deaths in Budapest in the period 1980–1983 was approximately 123 000, and the average number of deaths among men 35–64 years old was approximately 1100 in each district. Although no confidence intervals are presented here, the large numbers of deaths imply that these confidence intervals are small as compared with the size of the differences observed.

Fig. 12. Male life expectancy at birth in the districts of Budapest according to the percentage of men with less than eight grades of education, 1980–1983



Source: Józan *(144)*

Fig. 12 shows the association between the average life expectancy at birth and the percentage of men with less education of the districts of Budapest. The higher the percentage of men with less education in a district, the lower the average life expectancy.

Table 9 presents some basic numerical data on these inequalities in life expectancy. For this table, the 22 districts were divided into 4 groups according to their level of education. The average life expectancy at birth for Budapest as a whole is 66.3 years, but the difference between the two extreme groups is 3.4 years. On average, the inhabitants of the districts with the highest proportion of men with a lower educational level live 65.2 years versus 68.6 years for the districts with the lowest proportion.

Table 9. Inequality between districts of Budapest in male life expectancy at birth, 1980–1983

Level of education	Percentage of men with education < 8 years	Population	Life expectancy (in years)
High	10 – 14.9	461 000	68.6
Medium high	15 – 18.9	290 000	67.0
Medium low	19 – 23.9	721 000	65.5
Low	24 – 28	587 000	65.2
Total	20.20	2 059 000	66.3

These differences in life expectancy at birth are the result of differences in the mortality rates at various ages, and as a specific illustration Table 2 presents data on the probability of dying between ages 35 and 64 years. The probability of dying between ages 35 and 64 years is 26.9% for the average inhabitant of districts with the highest educational level and 36.6% for the inhabitants of districts with the lowest educational level.

The basic data in Table 10 can be used to calculate several summary measures for the magnitude of these inequalities in mortality. Sophisticated measures are irrelevant here because of the crudeness of the approach (aggregate-level analysis), but some simple measures do provide additional insight (Table 11). In relative terms, the probability of dying is 36% higher in the districts with a high educational level than in the group of districts with a low educational level. In absolute terms, the difference is 9.7% (36.6–26.9%), implying that an extra 10 of every 100 inhabitants die between ages 35 and 64 in the districts with a low educational level.

Table 10. Inequality between districts of Budapest in the probability of dying for men between the ages of 35 and 64 years during 1980–1983

Level of education	Probability of dying when 35–64 years old (%)
High	26.9
Medium high	32.8
Medium low	34.8
Low	36.6
Total	33.0

Table 11. Summary measures on inequality between districts of Budapest with high and low educational levels for the probability of men dying between ages 35 and 64 years during 1980–1983

Summary measure	Value
Ratio low:high	1.36
Difference low:high (%)	*9.7*
Population-attributable risk (%)	18.5
Population-attributable risk × overall probability (%)	*6.1*
Index of dissimilarity (%)	9.2
Index of dissimilarity × overall probability (%)	*3.0*

Table 11 also includes some measures of the total impact of these inequalities on the mortality rate of Budapest as a whole. The population-attributable risk was calculated using the districts with a high educational level as a reference category. The population-attributable risk estimate of 18.5% shows that, if the mortality risk of the other districts declined to the level of the group of districts with a high educational level, the overall mortality risk for men aged 35–65 years in Budapest would be reduced by 18.5%.

The index of dissimilarity takes a somewhat different perspective on the total impact of inequalities in mortality and calculates the number of deaths that would have to redistributed to attain the same death rates in each of the four categories of district. The resulting value of 4.6 means that 4.6% of all deaths would have to be redistributed from districts with a medium-low or low educational level to districts with a higher educational level to achieve the same death rate in each group of districts.

The index of dissimilarity is much smaller than the population-attributable risk because the population-attributable risk assumes that equality is attained at a much more favourable level (that of the highest educational group) than does the index of dissimilarity. Of course, both population-attributable risk and index of dissimilarity are simple thought experiments. Using them to measure the magnitude of socioeconomic inequalities does not require the user to believe that these experiments can ever be carried out in real life.

All these summary measures clearly show that the inequalities in mortality among men in this age group are substantial. Comparable analyses can be done for men in other age groups and for women. These analyses showed, among other things, that districts with a low educational level have higher infant mortality rates and that, for men, this inequality in mortality persists until the highest age group that could be distinguished (85 years and over).

Although conclusions must be drawn carefully from aggregate-level studies such as these, the results clearly suggest socioeconomic inequalities in mortality in Budapest in the early 1980s. Differences found in individual-level studies for Hungary as a whole support this suggestion *(42)*.

The existence of differences in mortality between the districts of a city not only suggests differences at the individual level but also is important in itself. It points towards areas with great potential for improving health, and health interventions could be targeted towards these areas.

SPAIN: INEQUALITIES IN SELF-REPORTED MORBIDITY ACCORDING TO INCOME LEVEL

Summary

This second case study analyses socioeconomic inequalities in self-reported morbidity in Spain. The data come from a large health interview survey conducted in 1987. The data used here were on the prevalence of chronic conditions among women aged 20–44 years. As a socioeconomic indicator we selected net household income corrected for the size of the household.

With increasing household income, the prevalence of chronic conditions decreased regularly, although a graphical plot of this association suggests that the decrease becomes less steep at higher income levels. Several summary measures for the magnitude of these health inequalities were calculated, and these show that the inequalities are substantial both relatively and absolutely and in terms of both the effect of income on health and the total impact of theses income-related inequalities on the health of the population as a whole. For example, the prevalence of chronic conditions is 51% higher among women in the lowest two income groups than among women in the highest two income groups, which amounts to an absolute excess of 14.5 conditions per 100 people. To achieve complete equality, 7.5% of all cases of chronic disease would have to be redistributed between income groups. These are examples of simple measures of the magnitude of these health inequalities, but the same impression of substantial inequalities is gained when sophisticated measures are used.

These data are entirely self-reported, and the inequalities documented here may be larger or smaller than inequalities based on objective measurements of the presence of chronic conditions.

Spain has several sources of information on socioeconomic inequalities in health. Ecological analyses provide some evidence of inequalities in mortality, such as differences between neighbourhoods in Barcelona, as do unlinked cross-sectional mortality studies *(40,48)*. In addition, data on socioeconomic inequalities in self-reported morbidity come from the National Health Interview Survey *(145)*. Some of these data are presented here. The data were compiled for us by Dr E. Regidor, Ministry of Health and Consumer Affairs, Madrid, Spain.

The Ministry of Health and Consumer Affairs conducts the National Health Interview Survey, which was established to support a change in health policy away from emphasizing advanced curative health services towards emphasizing prevention and primary health care. One of the specific objectives was "to evaluate advances towards attaining the targets that are proposed for achieving health for all in the year 2000" *(145)*.

The data used here refer to the year 1987 and were obtained from face-to-face interviews plus self-administered questionnaires among approximately 30 000 respondents. The response rate was 99%. The sample was nationally representative and included the noninstitutionalized population without any age limit.

Many health indicators were included in the questionnaire, and for this study we chose the prevalence of chronic conditions. This was measured using a checklist of 23 conditions read to the respondent by the interviewer. The respondents had to specify for each condition whether they had "suffered from any of these chronic diseases recurrently or for any length of time over the last year". The analysis was restricted to nine common conditions (tumour; diabetes mellitus; high blood pressure; heart trouble; bronchitis or asthma; liver and gall bladder trouble; urinary infections or cystitis; persistent skin trouble or eczema; and rheumatism, arthrosis or arthritis).

Education, occupation and income were measured in the survey, and we use income here as an indicator of socioeconomic status, expressed as the net household income adjusted for the size of the household by dividing by the number of people in the household (*n*) to the power 0.36 ($n^{0.36}$). This adjustment was derived from the Luxembourg Income Study *(99)*.

Table 12 presents basic data on the distribution of this equivalent household income among the respondents to the National Health Interview Survey as well as on the age-standardized prevalence of the nine selected conditions combined. All data here refer to women in the age group 20–44 years. For other age groups we observed the same pattern of health inequalities as reported below, but the magnitude of health inequalities sometimes differ: for example, among older women, health inequalities were slightly smaller.

Unfortunately, 39% of the respondents did not report their income. This is by no means exceptional, because income is a sensitive subject, and some respondents may find it difficult to provide this type of information, especially if the sources of income of their household are diverse, irregular or only partly known to them. In this survey, those with unknown income had a higher average level of education than the other respondents, and they probably also had a higher-than-average income. This is completely in line with the relatively low prevalence of chronic conditions among those with unknown income, which suggests that the bias introduced by the lack of information on 39% of the respondents is not necessarily substantial.

In Table 12, the respondents who reported their income were divided into ten groups. We tried to form deciles (groups containing 10% of these respondents each), but this was impossible because of discontinuities in the distribution. These discontinuities were caused by the way income was asked for in the interview: the respondent could choose from a limited number of

Table 12. Inequalities in the prevalence of chronic conditions by level of net equivalent household income among surveyed women aged 20–44 years in Spain 1987 (n=6402)

Income category	Mean net equivalent household income per year (Ptas)[a]	Proportion of total respondents (%)	Age-standardized prevalence rate[b]
1 (highest)	1 490 000	8.0	30.4
2	970 000	7.3	26.1
3	790 000	6.8	34.3
4	700 000	4.2	29.4
5	620 000	8.7	32.7
6	540 000	7.3	41.3
7	440 000	7.4	39.9
8	390.000	2.8	42.9
9	320 000	4.4	41.3
10 (lowest)	230 000	4.0	44.2
Unknown	-	39.0	29.0
All	710 000	100.0	33.0

[a] The approximate exchange rate is Ptas 80 = US $1. This accounts for inflation in consumer prices in Spain from 1987–1994 but uses current exchange rates. Net household income per year divided by household size (*n*) to the power 0.36 ($n^{0.36}$).

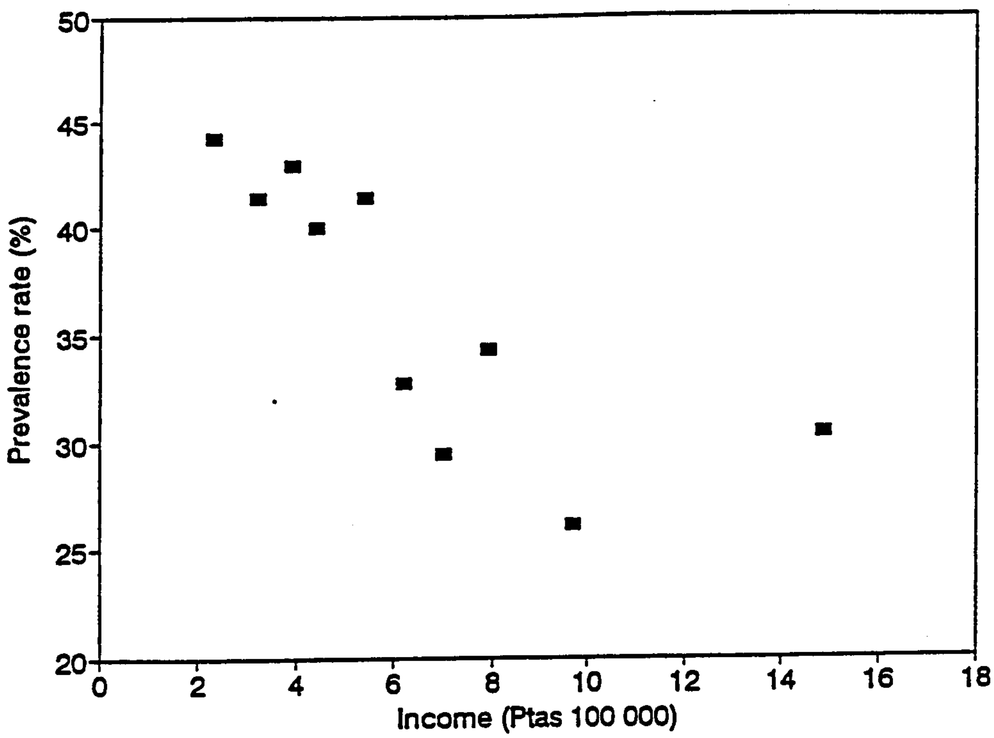
[b] Number of chronic conditions reported per 100 respondents.

Source: unpublished data.

income classes. Inequalities in income are substantial in Spain: the 8% of the population with the highest net equivalent household incomes has an average monthly income almost seven times higher than the 4% with the lowest incomes. The age-standardized prevalence of these chronic conditions decreases with increasing income (Fig. 13). The pattern is quite regular but suggests a less steep decrease at higher income levels.

Table 13 presents some simple summary measures of the magnitude of health inequalities among women aged 20–44 years according to income level in Spain. These summary measures confirm the impression from Fig. 1 that these health inequalities are substantial. For example, the prevalence of these chronic conditions is 51% higher in the lowest two income groups (less than Ptas 360 000 in net equivalent household income per year) than in the highest two income groups (more than Ptas 860 000 per year). In absolute terms, the difference amounts to an additional 14.5 chronic conditions per 100 people in the lowest income groups. The confidence intervals indicate that these differences could be estimated with reasonable precision.

Fig. 13 Prevalence of selected chronic conditions according to level of equivalent household income among women aged 20–44 years in Spain in 1987



Source: unpublished data.

Table 13 also includes measures of the total impact of these inequalities on the prevalence of chronic conditions in the population of women aged 20–44. The population-attributable risk was calculated with the two highest income groups as a reference category. The interpretation of the population-attributable risk of 14.2% is that, if all the women aged 20–44 years had a prevalence of chronic conditions equal to that of women in the highest two income groups, this total prevalence would be 14.2% lower than it is now.

One may also adopt a different perspective. Instead of calculating the (theoretical) effect of lowering the total prevalence of chronic conditions to the prevalence of the highest income groups, one could also estimate the extent of redistribution that would be required to make the prevalence of all groups equal to the average for the whole population: the index of dissimilarity (Table 13), which is 7.5% in this example. This implies that 7.5% of all cases of chronic disease would have to be redistributed (from the low income to the high income groups) to achieve complete equality.

Table 13. Simple summary measures on inequality in prevalence of selected chronic conditions by income level among women aged 20–44 years in Spain, 1987

Summary measure	Value	95% confidence interval
Rate ratio[a]	1.51	1.30–1.76
Rate difference (per 100 people)[a]	*14.5*	*8.5–21.4*
Population-attributable risk (%)[b]	14.2	3.8–24.7[c]
Population-attributable risk × overall rate (per 100 people)[b]	*4.7*	*1.2–8.2*
Index of dissimilarity (%)	7.5	d
Index of dissimilarity × overall rate (per 100 persons)	*2.5*	*d*

[a] Lowest two versus highest two groups.

[b] Highest two groups as reference category. The group whose income is unknown is included in these measures.

[c] Confidence intervals are calculated using formula given in Walter *(146)*.

[d] No formula is available for the calculation of confidence intervals.

Table 14 presents more sophisticated summary measures, which more fully use the data presented in Table 12. The regression-based index of relative effect is 1.055, which implies that for each Ptas 100 000 less in net equivalent household income per year, the prevalence of chronic conditions increases by 5.5% on average. The regression-based estimate of population-attributable risk has approximately the same value (14.8%) as the simple population-attributable risk (14.2%). Finally, the relative index of inequality is 68%, which means that the prevalence of selected chronic conditions increases by 68% from the top to the bottom of the income hierarchy. All these measures suggest that the health inequalities are indeed substantial.

All data from health interview surveys is self-reported. This applies both to income and to the presence of chronic conditions. Without further investigation, it is difficult to decide whether inaccuracies in these self-reports are likely to overestimate or underestimate the health inequalities in Spain. Nevertheless, the results from a few studies of the validity of self-reported chronic conditions in other countries suggest that the degree of underreporting is larger in lower socioeconomic groups, so that health interview survey data are likely to underestimate the socioeconomic inequalities in the prevalence of chronic conditions *(128,129)*.

Table 14. Sophisticated summary measures on inequality in the prevalence of selected chronic conditions according to income level among women aged 20–44 years in Spain in 1987

Summary measure	Value	95% confidence interval
Regression-based index of relative effect	1.055[a]	1.029–1.086
Regression-based index of absolute effect[b]	*1.55*	*0.8–2.42*
Regression-based estimate of population-attributable risk (%)[c]	14.8%	7.8–23.1
Regression-based population-attributable risk (absolute version; per 100)[c]	*4.9*	*2.6–7.7*
Relative index of inequality[d]	1.68	1.40–2.03
Slope index of inequality[e]	*17.3*	*10.2–26.2*

[a] Implies a 5.5% increase in prevalence of chronic conditions per unit (= Ptas 100 000) decrease in net equivalent household income per year.

[b] Predicted rate difference (per 100 people between those with an annual income of Ptas 1 250 00 and those with Ptas 100 000 less (Ptas 1 150 000).

[c] Reference value = Ptas 1 250 000 per year, with a predicted prevalence rate of 28.1 chronic conditions per 100 respondents. The group whose income is unknown is included in these measures.

[d] Predicted rate ratio for bottom versus top of income hierarchy.

[e] Predicted rate difference (per 100 people) between those at the bottom and those at the top of the income hierarchy.

Although the quantitative information presented here helps one to grasp the magnitude of socioeconomic inequalities in health, in this example Fig. 13 already conveyed the main message clearly enough: a lower income is associated with a substantial increase in the prevalence of chronic conditions. Summary measures only become indispensable when comparisons are to be made: for example, between men and women, between countries or between points in time. The next two case studies deal with such comparisons, and because of this document's focus, these are comparisons over time.

FINLAND: TRENDS IN INEQUALITIES IN MORTALITY ACCORDING TO OCCUPATIONAL CLASS

Summary

The case studies from Hungary and Spain focused on the inequalities in health at one point in time; this case study and the next one deal with trends in inequalities over time. The data here come from a study in Finland in which the mortality of the population during the period 1971–1990 was linked to various censuses held during this period, to yield information on the deceased individual's socioeconomic status. This illustration focuses on mortality among those 35–64 years old according to occupational class.

Over this period mortality has generally declined, but this decline has been stronger among upper and lower white-collar employees than among farmers and workers. Among women, mortality increased among farmers and workers in the most recent part of this period. The summary measures calculated to quantify the mortality differentials at the beginning and at the end of the period show that these differentials have become larger in a relative sense. Because of the overall decline in mortality they have not become larger in an absolute sense. The increase in relative differences is seen not only with measures of effect, but also with measures of total impact which take the changing sizes of the occupational classes into account. Depending on the measure used, the increase in relative differences ranges between 26% and 56% in men and between 5% and 50% in women.

Increasing socioeconomic inequalities in mortality have been noted in many other countries than Finland.

Finland has one of the best sources of data on mortality by socioeconomic status in the world. As personal identification numbers are universal in Finland, data on mortality from the national mortality registry can be linked to the socioeconomic characteristics of the deceased as registered at the last census. This linkage started with the 1971 census, following up for the mortality of people enumerated during that census. For this study we use data collected from 1971 to 1990. Although both occupational class and educational level are available in this material, we only present data on mortality according to occupational class, and we further restrict this study to the age group 35–64 years. All data used come from Valkonen et al. *(18,147)* from the Department of Sociology of the University of Helsinki in collaboration with Statistics Finland.

Table 15 presents basic data on the situation in 1971 and 1990 respectively. Four occupational groups are distinguished (except for a group of other occupations, which consists mainly of self-employed people other than farmers): upper white-collar employees, lower-white-collar employees, workers and farmers. Forming such broad groups achieves good comparability over time. The occupational data of the deceased (numerator) and of the living population (denominator) were obtained during the various censuses. Economically active people were classified according to the occupation reported during the census. Pensioners and unemployed people were classified according to their former occupation as reported during a previous census. According to Valkonen et al. *(18)* housewives and other family members were classified according to the occupation of the head of household.

Table 15. Distribution (%) of the Finnish population aged 35–64 years across occupational classes, 1971 and 1990

Occupational class	Men		Women	
	1971	1990	1971	1990
Upper white collar	7.9	15.7	6.4	11.6
Lower white collar	13.3	17.4	23.4	41.4
Workers	49.6	48.4	40.1	32.9
Farmers	21.6	9.2	21.9	7.3
Total (including other occupations)	100.0	100.0	100.0	100.0

Source: Valkonen et al. *(18,147)*.

Similar to many other occupational classifications, the classification in Finland is not strictly hierarchical. Upper white-collar employees are higher in the social hierarchy than lower white-collar employees, but the latter are not necessarily all higher than workers. The relative position of farmers is even more difficult to determine. This actually precludes the use of sophisticated summary measures for the magnitude of socioeconomic inequalities in health, because these require an unambiguous ordering of groups from high to low.

As a measure of mortality, Table 16 presents the standardized mortality ratios for mortality between ages 35 and 64. This measure expresses the age-standardized mortality rate in a specific occupational class as a percentage of the mortality rate among all men or women between 35 and 64. For example, in 1971–1975, men in upper white-collar occupations had a standardized mortality ratio of 65, which implies that their mortality rate was 35% below the average for all men aged 36–64 years. The differences in mortality increased from 1971–1975 to 1986–1990 both for men and women. The gap between the standardized mortality ratios of upper white-collar employees and workers has widened. As the standardized mortality ratio measures mortality relative to the average for the whole population, it is not yet clear whether the absolute differences also increased.

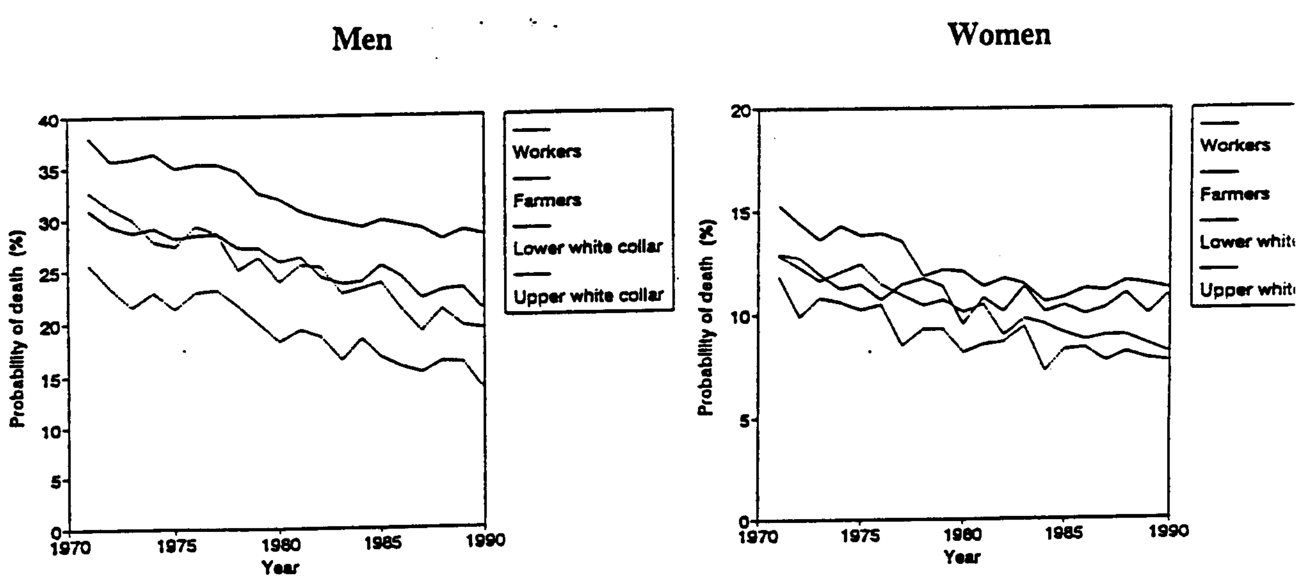
Table 16. Standardized mortality ratios according to occupational class in Finland among the population aged 35–64 years

Occupational class	Men		Women	
	1971–1975	1986–1990	1971–1975	1986–1990
Upper white collar	65	57	82	80
Lower white collar	88	79	93	87
Workers	114	121	111	115
Farmers	66	92	92	104
Total (including other occupations)	100.0	100.0	100.0	100.0

Source: Valkonen et al. *(18,147).*

Answering this question requires using different measures of mortality, such as mortality rates (per 1000 person-years) or the probability of dying between the ages of 35 and 64 years. The latter, life table-based, measure was used in Fig. 14, which shows the trends in mortality according to occupational class between 1971 and 1989.

Fig. 14 Probability of death between ages 35 and 64 of men and women in Finland according to occupational class in 1971–1990



Source: Valkonen et al. *(18).*

Between 1971 and 1989, the probability of dying declined among men and among women and in all occupational classes. The constant distance between the lines for workers and upper white-collar employees suggests that absolute differences have not substantially changed. Since the overall probabilities have strongly declined, these constant differences in absolute terms imply widening differences in relative terms.

Table 17 shows that the ratio of the probability of dying among workers as compared with upper white-collar employees increased both among men and women, although among women the confidence intervals for the two periods overlap. The absolute differences between the probabilities of dying, however, remained more or less the same among men and have decreased among women. This is explained by the strong decline of mortality over time. Nevertheless, in recent years the mortality decline has reversed and mortality rates are increasing among some groups of women (Fig. 15).

Table 17. Summary measures of inequality in mortality according to occupational class among men and women in Finland aged 35–64 years in 1971–1975 and 1986–1990

Summary measure (95% confidence interval)[a]	Men		Women	
	1971–1975	1986–1990	1971–1975	1986–1990
Ratio of probability of dying[b]	1.58 (1.52–1.64)	1.86 (1.80–1.92)	1.34 (1.26–1.42)	1.41 (1.33–1.49)
Difference between probabilities of dying (%)[b]	13.2 (11.9–14.6)	13.3 (12.9–13.7)	3.6 (2.7–4.5)	3.3 (2.7–4.0)
Population attributable risk (%)[c]	30.0 (27.2–32.8)	38.0 (35.8–40.0)	19.5 (17.6–21.5)	20.4 (15.9–24.6)
Population-attributable risk × overall probability of dying (%)	*9.8 (8.9–10.7)*	*9.5 (8.9–9.9)*	*2.6 (2.3–2.9)*	*2.1 (1.6–2.5)*
Index of dissimilarity (%)	7.5	11.7	4.9	7.4
Index of dissimilarity × overall probability of dying (%)	*2.5*	*2.9*	*0.7*	*0.8*

[a] Only approximate confidence intervals could be estimated with the published data. No formula is available to calculate confidence intervals for the index of dissimilarity.

[b] Workers versus upper white-collar employees.

[c] Upper white-collar employees as reference category.

The population-attributable risk (%) increased also, along with the increase of the relative differences. Thus, despite the declining proportion of Finns classified as workers, the extent to which the overall probability of dying could be reduced by lowering the mortality rate of the whole population to that of upper white-collar employees increased, especially for men. This increase in the total impact of inequalities in mortality only occurred in relative terms. As mortality declined over time, the absolute version of the population-attributable risk became smaller.

Finally, the index of dissimilarity (%) increased substantially. Even the absolute version of this index increased for both men and women. This increase in the index of dissimilarity (%) can be explained by an increase in the variation within the population in occupational status. As shown in Table 17, in 1971 many men and women were workers and few were in the highest occupational class, whereas by 1990, the spread over occupational classes was much more even. This implied an increase in the proportion of men and women in jobs with higher status (thus contributing to a more modest increase of the population-attributable risk (%)) but also a larger overall variation within the population in occupational status (thus leading to a large increase in the index of dissimilarity (%)).

This shift of the population towards higher occupational classes thus is valued differently by the population-attributable risk and by the index of dissimilarity. The population-attributable risk reflects the fact that, because of this shift, more people assume the favourable mortality pattern of the higher occupational classes, whereas the index of dissimilarity reflects the fact that the differences in occupational status relative to the population average have increased. Policy-makers may decide which of these two perspectives should be chosen in this case.

This experience of widening relative inequalities in premature mortality in Finland is by no means unique. The mortality gap has widened in several other countries *(23,52,72, 134,137,143)*. Most of these reports, however, come from with the 1970s, and Finland was the first country for which individual-level data on trends in inequalities in mortality during the 1980s were available.

The report from which the data come shows that the widening of relative inequalities in mortality can also be demonstrated by using education as a socioeconomic indicator instead of occupational class. The trend of mortality in the higher occupational and educational groups is more favourable, largely because mortality from cardiovascular diseases declined more than in the lower groups. No decline was seen among farmers. Inequalities in total mortality at older ages (≥65years) were roughly stable between 1971 and 1990 *(18)*.

THE NETHERLANDS: TRENDS IN INEQUALITIES IN SELF-REPORTED MORBIDITY ACCORDING TO LEVEL OF EDUCATION

Summary

This case study deals with changing inequalities in self-reported morbidity in the Netherlands. The data come from the Netherlands' Health Interview Survey and cover changes between 1983–1985 and 1992–1993. Data were selected based on the prevalence of less-than-good perceived general health according to level of education in the population aged 16 and over.

Overall, the prevalence of less-than-good perceived general health increased slightly over time, and so did all the measures of inequalities by level of education. For example, the prevalence of less-than-good perceived general health among those with elementary education was 2.20 times that of those with postsecondary education in 1983–1985, this ratio rose to 2.59 in 1992–1993. A more sophisticated measure of the effect of lower education on perceived general health confirms the increasing inequalities. The impact of health inequalities have on the prevalence of less-than-good health also increased in the total population of the Netherlands. Depending on the perspective chosen, this increase in total impact was modest or large.

These disappointing developments require further studies using other health and socioeconomic indicators. If the findings reported are confirmed by these further studies, an in-depth study of the causes of these widening inequalities in health is indicated.

The Netherlands Central Bureau of Statistics has conducted a continuous, national health interview survey since 1981. It is conducted among a random sample from the noninstitutionalized population of nearly 10 000 respondents each year and contains questions on a number of health indicators as well as on such socioeconomic characteristics as level of education, occupation and household income *(148–150)*. It is the major continuous source of information on socioeconomic inequalities in health in the Netherlands, because no data on mortality according to socioeconomic status are routinely collected *(103)*. Since 1981, data have accumulated and now permit an assessment of changes over time in the size of socioeconomic inequalities in health. Jaap van den Berg of the Netherlands Central Bureau of Statistics kindly made available the data used here.

We focus on trends in the magnitude of health inequalities according to educational level. Comparing trends in health inequalities according to income level or occupational status is more difficult because, respectively, the income classes distinguished in survey questionnaires change, and because information is lacking on the last occupation of part of the economically inactive population.

The health indicator used is perceived general health. This indicator is based on a single item question included in the Netherlands' Health Interview Survey since its start in 1981: "How is your health in general", after which the respondent may choose between "very good", "good", "fair", "sometimes good, sometimes poor" and "poor". Slightly different response categories were distinguished in the first two survey years (1981–1982), and because this could lead to biased estimates of changes in the magnitude of health inequalities after 1981–1982, our trend analysis starts with later years (1983–1985).

Table 18 presents some basic data on differences in perceived general health, measured as the percentage of respondents rating their health as less than good, according to level of education.

Table 18. Percentage of the survey population with perceived general health less than good according to level of education in the Netherlands, aged ≥ 16, 1983–1985 and 1992–1993

Educational level	Distribution of sample according to educational level %		% less than "good"	
	1983–1985	1992–1993	1983–1985	1992–1993
Elementary	25.2	21.7	29.7	34.5
Secondary, low	30.1	23.1	20.3	22.4
Secondary, high	30.9	36.7	16.6	17.4
Postsecondary	13.8	18.5	13.5	13.3
Total	100.0	100.0	20.6	21.5
	(*n*=22 229)	(*n*=14 369)		

Source: unpublished data.

Fig. 15 illustrates these differences graphically. All data are age- and sex-standardized and apply to ages 16 and over. A clear gradient existed in both 1983–1985 and in 1992–1993: the percentage rating health as less than "good" declined regularly with increasing educational level. Over time the prevalence of less-than-"good" perceived general health increased in most educational groups. The important thing is that the prevalence rate in the lower educational groups has not declined as aimed for in the health for all target. At the same time, the relative size of each of the educational groups has changed substantially. The lower two groups have become smaller, and the higher two groups have become larger.

Fig. 15 Percentage of the survey population with perceived general health less than good by level of education in the Netherlands, aged ≥ 16, 1983–1985 and 1992–1993

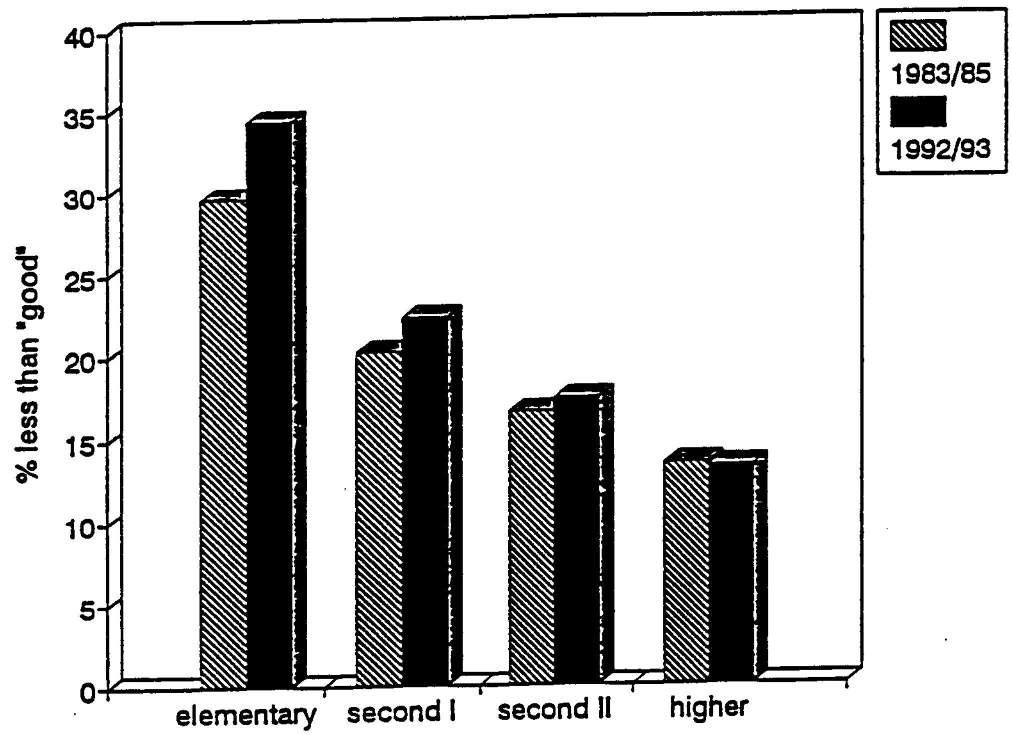


Table 19 presents some simple summary measures for the magnitude of socioeconomic inequalities in perceived general health in 1983–1985 and in 1992–1993. Such measures of effect as the rate ratio (a relative measure) and the rate difference (an absolute measure), appear to demonstrate a substantial increase in inequalities in health. The gap in perceived general health between those with elementary school only and those with postsecondary education has become larger.

A slightly different picture emerges from the population-attributable risk (%) and the product of the population-attributable risk and the average prevalence rate. The population-attributable risk increased, but to a smaller extent than the rate ratio, because the increase in the rate ratio was in part compensated by the diminishing size of the lower educational groups. The proportion of the overall prevalence of perceived ill health attributable to the higher prevalence in lower educational groups thus increased slightly.

Table 19. Simple summary measures on inequalities according to level of education in perceived general health in the Netherlands, 1983–1985 and 1992–1993

Summary measure	1983–1985		1992–1993	
	Value	95% confidence interval	Value	95% confidence interval
Rate ratio[a]	2.20	(1.99–2.43)	2.59	(2.34–2.88)
Rate difference (per 100 people)[a]	16.2	(13.4–19.3)	21.2	(17.8–25.0)
Population-attributable risk[b] (%)	34	(29–40)	38	(32–44)
Population-attributable risk × overall rate (per 100 people)	*7.1*	*(6.0–8.2)*[c]	*8.2*	*(6.9–9.5)*[c]
Index of dissimilarity (%)	11.7	*d*	14.1	*d*
Index of dissimilarity × overall rate (per 100 people)	*2.3*	*d*	*3.0*	*d*

[a] Elementary education versus postsecondary education.
[b] Postsecondary education as reference category.
[c] Confidence intervals are calculated with formula given in Walter *(146)*.
[d] No formula is available to calculate confidence intervals.

The index of dissimilarity (%) and the product of this index and the average prevalence rate increased much more. This increase occurred not only because the rate ratio increased, but also because the inequality within the population in educational level increased. As shown in Table 18, the share of the population having a low educational level declined (thus preventing a large increase in the population-attributable risk), but the variation in educational level in general increased (thus contributing to the large increase in the index of dissimilarity).

The same pattern emerges from Table 20, which presents the sophisticated summary measures calculated using the same data. To calculate the regression-based measures of effect, the educational levels had to be converted into some numerical measure. The minimum number of years of education needed to achieve these educational levels was used for this (6, 9, 12 and 17 years, respectively, for each of the four educational levels). The regression-based index of relative effect is 1.104 in 1983–1985, which implies that one year of education less increased the prevalence of less-than-good perceived general health by 10.4%. (Actually, the index refers to the prevalence odds and not to the prevalence rate.) The estimate for 1992–1993 is 12.6%, which implies an increase of about 20%. The confidence interval estimates hardly overlap, which shows that this increase is probably not simply a matter of random variation.

Table 20. Sophisticated summary measures on inequalities according to level of education in perceived general health in the Netherlands, 1983–1985 and 1992–1993

Summary measure	1983–1985		1992–1993	
	Value	95% confidential interval	Value	95% confidential interval
Regression-based index of relative effect[a]	1.104	1.093–1.115	1.126	1.113–1.139
Regression-based index of absolute effect[b]	*1.03*	*0.92–1.14*	*1.24*	*1.11–1.37*
Regression-based estimate of population-attributable risk (%)[c]	44.7	40.0–49.4	47.9	43.0–52.8
Regression-based population-attributable risk (absolute version; per 100 people)[c]	*9.2*	*8.2–10.2*	*10.3*	*9.2–11.4*
Relative index of inequality[d]	3.45	3.06–3.90	4.69	4.04–5.45
Slope index of inequality[e]	*19.9*	*16.7–23.6*	*25.3*	*20.8–30.5*

[a] Odds ratio for one year less education.
[b] Predicted rate difference (per 100 people) between those with 17 and 16 years of education.
[c] 17 years of education as reference value.
[d] Predicted odds ratio for bottom versus top of educational hierarchy.
[e] Predicted rate difference (per 100 people) between those at the bottom and at the top of the educational hierarchy.

The regression-based population-attributable risk yields estimates that are larger than the simple population-attributable risk measure. This is because the observed rate of health problems in the group with postsecondary education (13.5 and 13.3 in the two periods) is higher than the rate expected in this group based on regression analysis (11.4 and 11.2 in the two periods). The regression-based population-attributable risk increased over time by about 7%. This suggests that the overall importance of health inequalities increased slightly over time, as the result of two opposing developments: the substantial increase in the effect of educational level on morbidity rates and the diminishing size of the groups with less education.

The relative index of inequality increased from 3.45 to 4.69, that is, by about one half of its initial value (less 1). This increase is even larger than the increase in its simple equivalent, the index of dissimilarity. The confidence intervals show that this increase is not simply a matter of random variation.

Is the increase in inequalities in less-than-good perceived general health an artefact related to changes in reporting behaviour? The increase in the prevalence of less-than-good perceived general health among groups with less education could have resulted from, for example, an increasing propensity to complain or changes in the criteria against which one's own health status is evaluated. Although this suggestion is purely speculative, it indicates the necessity to look, for example, at other, possibly more objective health indicators as well.

The results convey the disappointing message that the effect of educational level on less-than-good perceived general health increased substantially in the Netherlands between 1983–1995 and 1992–1993. This increasing effect was accompanied by an increase in the impact of health inequalities on the prevalence of less-than-good perceived general health in the general population. Whether this increase in total impact is small or large depends on the perspective chosen. If one wants to emphasize the fact that the variation in educational levels within the total population has increased, the conclusion should be drawn that the total impact of health inequalities has increased substantially. In this study, however, we prefer the population-attributable risk perspective, which emphasizes the decline in the share of people that are in groups with less education. According to this perspective, the impact of the observed health inequalities on the prevalence of less-than-good perceived health in the Netherlands has only increased modestly.

The unfavourable development observed here should prompt the examination of trends in health inequalities in the Netherlands in more detail, for example, by considering more specific health indicators of physical, mental or social health and by looking at changes in health differences between people with high and low income or occupational status.