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Socio-economic Differential Mortality in Industrialized Societies

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United Nations Population Division
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(Geneva)

Committee for International Cooperation in National Research in Demography
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F O R E W O R D

This brochure is the second in a series, and reports on the second meeting of the CICRED Network on Socio-economic Differential Mortality in Industrialized Societies, held in Wiesbaden (Federal Republic of Germany) on July 1st to 3rd, 1981, under the joint sponsorship of the United Nations (Population Division) and the World Health Organization (Dissemination of Statistical Information).

The two general reports of the meeting are presented here. They give guidelines to a collaborative research effort which will culminate in Rome (Italy) in April 1983, when the third meeting of the Network will be convened.

In this brochure, national reports from Australia and Hungary are published for the first time. It will be recalled that the first brochure in this series, in 1981, published reports from Denmark, France, Japan, Norway and the U.S.A. These countries are not dealt with in this brochure. On the other hand, the following countries have reports in both the first and second brochures : Belgium, Federal Republic of Germany, Finland and the Netherlands.

It is a privilege for the CICRED Chairman to warmly thank all the institutions participating in the Network for their valuable contributions. The principles of the Network - and of all the other CICRED inter-centre cooperative research projects - are now well-known : free adherence, mutual assistance and self-help. The last point is worthy of note; it means that each participating institution bears all the costs incurred by its national share of work and by the participation of its representatives in the Network meetings. This point must be emphasized in these times of financial difficulty. It shows the eagerness of population research institutions to cooperate with each other.

Jean BOURGEOIS-PICCHAT

CICRED Chairman

May 1982

P A R T O N E

SECOND JOINT UN/WHO/CICRED MEETING

ON

SOCIO-ECONOMIC DIFFERENTIAL MORTALITY IN INDUSTRIALIZED SOCIETIES

WIESBADEN, FEDERAL REPUBLIC OF GERMANY

JULY 1ST TO 3RD, 1981

WELCOMING SPEECH
by the
Minister of State for Rheinland-Pfalz (Rhineland-Palatinate)
Mr. Kurt BÖCHMANN

May I extend a cordial -welcome to you here at the *Staatsdomäne Niedermhausen*. It may perhaps seem to some of you a little unusual to be received by a Minister of a *Land* government. The Federal Republic of Germany, however, for historical as well as political reasons, presents a different political structure from most of the countries from which you come. The Federal Republic of Germany is a federation consisting of eleven federal *Laender*, including Berlin (West). These *Laender* are roughly comparable to States, Districts, Territories or Provinces in other countries, but they possess a high degree of political autonomy, guaranteed by the Basic Law, i.e., the constitution of the Federal Republic.

One of these federal *Laender* is Rheinland-Pfalz, known in English as Rhineland-Palatinate. In contrast to some other federal *Laender*, as for instance Bavaria, Rhineland-Palatinate cannot look back on centuries of tradition, since it was constituted as recently as August 30th, 1946, by decree of the French Occupation Power and was given a Constitution in a plebiscite held on May 18th, 1947. This is considered the day that Rhineland-Palatinate was founded. Like each federal *Land*, Rhineland-Palatinate has a *Land* parliament, better known as the *Landtag*, and a government headed by a Prime Minister who, since the very beginning, came from the ranks of the Christian Democratic Union of Germany (CDU).

Geographically speaking, Rhineland-Palatinate is situated predominantly on the left bank of what we call the middle part of the Rhine river. It embraces the mountainous areas of the Eifel, the Hunsrück and the Westersald, the river valleys of the Lahn river, the Moselle and the Nahe river, the so-called *Pfälzer Wald* or Palatinate Forest, and part of the *Oberrheinische Tiefebene* which may be translated as the Low-lands of the Upper Rhine.

The *Land* stretches about 200 kilometers from North to South and about 150 kilometers from East to West. With an area of approximately 20,000 square kilometers, it covers about 8% of the territory of the Federal Republic of Germany. According to area and population, which numbers 3.7 million inhabitants, Rhineland-Palatinate ranks in sixth place among the federal *Laender*.

Rhineland-Palatinate is often described as the land of forests, vines and beets. Even today, half of the total area of the *Land* is still used for agricultural purposes; almost 40% of the *Land*'s area is covered by woods. And, most important of all, 70% of the viticulture, i.e. wine-growing area, of the entire Federal Republic of Germany, is located in Rhineland-Palatinate.

Based on successful structural policies and the development and extension of trafficways, a variety of industries, predominantly medium-sized, have developed in the last few decades. Only the city of Ludwigshafen, as the centre of the chemical industry, can boast of a combine that is known world-wide : the BASF.

The distinct industrial upswing in the last two decades did not seem at all to be a matter of course in view of the unfavourable starting conditions for the economy prevailing at the time of the founding of Rhineland-Palatinate. The hilly ranges located further away from the River Rhine did not facilitate transport and communication. The economic development of the Western parts of the *Land* had been neglected, because it was not far from the frontier and had been utilized by the military.

A considerable contribution for improving the economic situation and employment was also made by tourism. According to the latest available data, Rhineland-Palatinate was, and hopefully still is, the federal *Land* with the highest proportion of overnight stays by foreign visitors.

During the last two decades, this *Land* has had the highest growth rate as far as the (real) gross national product is concerned. The last available figures showed it in third place among the area states of the Federal Republic of Germany.

Ladies and Gentlemen, in Rhineland-Palatinate, as in the Federal Republic of Germany in general - as well as in many other industrialized countries - population research has greatly gained in importance as a result of the decline in the birth rate in the sixties. Since that time, in particular, great efforts have been made here to work out the best possible realistic prognoses about population development. Continuous efforts are being made to improve and refine these. The population decline entails especially problems regarding the so-called generation gap, i.e., the question of securing old age pensions. The problems result from the fact that, in the course of a continued decrease in population, fewer and fewer working people have to sustain more and more retired people financially.

At first sight, and vis-à-vis the foregoing, the subject of your investigations appears to be of lesser topical interest. Since, however, the decline in the birth rate necessarily leads to an ageing of the economically active population - in addition to the health aspect - your investigations also gain a general political significance.

As I understand from existing reports, other countries have, for some time, performed studies of the mortality rate according to characteristics based on employment statistics. In the Federal Republic of Germany, we have so far not gone beyond first approaches in the microcensus. A possibility of intensifying such investigations is said to result in an evaluation of the registers of persons who are insured under compulsory old age insurance, provided that legal obstacles concerning data protection, which in our country enjoys a high protection, can be removed.

Ladies and Gentlemen, I wish you good luck in your deliberations, particularly since this seminar can result in valuable suggestions and ways of identifying new ideas and new knowledge essential for the necessary cooperation between science and politics.

WELCOMING SPEECH
by the
President of the Federal Statistical Office
Mr. Franz KROPPIENSTEDT

We consider it a special pleasure and honour that you have chosen Wiesbaden to be the place of your second meeting. As President of the host institution, I therefore should like to take the opportunity of warmly welcoming the organizers of this meeting, Monsieur Bourgeois-Pichat, Dr. Hansluwka, and the representative of the United Nations, Mrs. de Lattes, as well as the delegates of the eleven participating countries and the colleagues from our own federal *Laender* and the Federal Institute of Population Research.

At the first meeting held last year in Geneva, you had started the exchange of experience related to methods and results of investigating the socio-economic differential mortality. We consider the objectives connected with these endeavours as highly significant and extremely useful. Such an exchange of experience not only provides stimulation for further studies in this field, but is also conducive to closer international cooperation in these research projects and could possibly also lead to a certain division or distribution of the work at hand.

These investigations of socio-economic differential mortality are of particular importance on account of the fact that the age structure of the population in industrialized countries is undergoing changes which, as a consequence, results in an ageing of the economically active population. At this point, the analyses of birth trends meet, especially with regard to the declining birth trends in the industrialized countries observed since the mid-sixties, because the changes in the age structure are a result of the development of the birth rate. It therefore seems only logical that Mr. Tabah, Head of the Division of Population Research at the United Nations, has, as I understand, stated last year that the United Nations will again increasingly turn their attention to the analyzing of mortality trends.

As you are aware from the publications and results of the first meeting, there are a number of countries (let me, by way of example, only mention France, Great Britain, the Scandinavian countries and the United States of America) which have, for many years, or even decades, performed mortality studies based on characteristics relating to employment statistics. Unfortunately, we, in the Federal Republic, have as yet no comparable "statistical tradition" in this area, although we too had already, decades ago, initiated the computation of a so-called "table of the working population"; in order to enable us to provide information on the average duration of working life. I refer, in this connection, to a paper written in 1953 by Dr. Horstmann of the Federal Statistical Office; further contributions in this respect had been submitted in 1967 and 1976. Studies in this field are, for instance, performed by private insurance companies for their respective clienteles, and do not admit any generalizations. The possibility of bringing together data from registers and from surveys as a means of forming a basis for the analysis of differential mortality is practically non-existent, due to the very strict obligation of secrecy and data protection. We therefore must fall back upon data sources and procedures which will make it possible to perform studies of differential mortality without the additional bringing together of data from different sources.

In the course of this meeting, we shall report to you about the first results of an evaluation of the repeat survey of the microcensus. Methodologically, we are here confronted with new territory which needs to be explored further. As a further possibility, it is envisaged to evaluate by characteristics, which are based on employ-

ment and occupational statistics, the deaths of persons, i.e., workers and employees, who are insured under compulsory old age insurance. It will, however, hardly be possible to submit an adequate evaluation in this respect before 1983.

We still have some catching up to do in this area and are, therefore, very interested in all procedures and results of studies which are being performed in other countries with regard to mortality. I am sure that the reports and discussions during the next three days can and will be an extension of experience and a valuable stimulation for everyone's own investigations.

In conclusion, may I express the hope that your meeting will be fully successful and that you will also enjoy your stay in Wiesbaden.

CONFERENCE BACKGROUND PAPER :
ISSUES OF INTER-CENTRE COOPERATION

CICRED Secretariat

The present document has been drafted by the CICRED Secretariat as the starting point of the discussions in view of establishing a programme of inter-institutional cooperation. When drafting the document, the Secretariat constantly followed the basic principles enumerated hereafter :

(i) the document is aimed at giving the kick-off to the debates, but cannot replace them. It thus has to be open-ended : the proposals it mentions may be substituted and/or supplemented by other topics suggested by the participants at the meeting.

(ii) the document is not aimed at assessing the state-of-the-art, but at elaborating a programme of cooperation. It is not oriented towards past findings, but future undertakings.

(iii) in matters of inter-institutional cooperation, the role of CICRED - and of the United Nations and the World Health Organization also - is solely that of a liaison office. The principle, strength, efficiency of cooperation are to be decided upon and implemented by the researchers themselves, on a voluntary basis.

1. Simple procedures to activate exchange among researchers and strengthen the comparability of data and findings

1.1 For the time being, a large amount of articles, books, working papers, etc., are published on socio-economic differential mortality. It appears, however, quite difficult to obtain a comprehensive view in the matter since data and findings are heterogeneously presented. It is understandable that each researcher has his/her own motivations and constraints, including cost of printing, which prevent him/her from providing fully detailed information on data and findings. On the other hand, there is a communication gap between researchers in the field.

1.2 (a) it can be suggested that each researcher, when publishing an article on socio-economic differential mortality, send to the focal point of the network a working paper for dissemination amongs the members of the network. This working paper will provide, where possible :

- (i) data by 5-year age groups (25-29, 30-34, 35-39, etc.);
- (ii) detailed definitions of the social or occupational groups used in the article;
- (iii) number of deaths (enumerator) and people at risk (denominator) for the individual occupations which constitute the social group or the broad occupational group used;
- (iv) detailed definitions of the various education attainment groups when used;
- (v) etc.

(b) it can also be suggested that the researchers give, if possible, a correspondence table : (i) between their social or occupational groups and the ISCO categories; the last issue of the International Standard Classification of Occupations was published by ILO in 1968; (ii) between their national education attainment groups and the categories enumerated in ISCED, the international classification published by

UNESCO in 1977.

(c) it can be suggested to generalize, where possible, the "cause of death" breakdown. Researchers are invited to give not only overall mortality rates of each social group, but also rates by causes; the first step perhaps is to agree on a common "minimum list" of causes of death (the causes which are most socially discriminating) of which use will subsequently be made by all the members of the network. Such a list, of course, does not hinder making a more detailed breakdown.

(d) generally speaking, it can be suggested that researchers, when completing a piece of research on socio-economic differential mortality, disseminate it among the network (through CICRED or another focal point) in a detailed format, whereas the published material is necessarily shorter. Needless to say, such a detailed document is only a working document which does not require editing, correct presentation, and the like. Through this procedure, each researcher would assist his/her colleagues in gathering more comparable data and would be assisted by them for the same objective.

1.3 The above proposals of information exchange are made in a permanent perspective. But it could appear unrealistic to maintain a sustained enthusiastic adhesion to an exchange programme for a long period. An alternative decision could then be that each researcher fulfil the above items (where approved) :

- (i) with regard only to his/her next piece of research;
- or (ii) with regard to the last publication;
- or (iii) the works to be carried out until the next meeting of the network (tentatively scheduled to take place in 1983).

2. A systematic search for methodological weaknesses and inconsistencies

2.1 Studies on socio-economic differential mortality have to cope with many methodological weaknesses and inconsistencies. The few examples quoted below show that this research topic is a difficult one :

(a) the occupation, or the education group, registered on the certificate of death may not be the real one. Some occupations appear attractive, others repulsive, for the relatives of the deceased when they notify the death. The enumerator of the mortality rate may then be underestimated or overestimated, according to the occupation. This may then reduce or even abolish the phenomenon of differential mortality.

(b) a great deal of people, when they die, are no longer in their lifelong occupation because they become economically inactive, or move down to a less well remunerated occupation, or move up to a higher status occupation. How to cope with the underestimation of the mortality rate of the initial occupation?

(c) there is also the well-known problem of identifying - and reporting - the effective cause of death.

(d) etc.

2.2 In industrialized societies, the problem of overcoming methodological weaknesses and inconsistencies is now seemingly more important than the collection of new data, at least in some statistically developed countries. But, so far, there is no systematic effort in this direction. The practice of having one or two discussants for a conference paper (see the proceedings of the Mexico City meeting, June 1979) is very sound, but is too limited. Generally speaking, literature reviews give rise to the feeling that insufficient attention is paid to methodological problems and their issues :

(a) Researchers do not like to point out the methodological inconsistencies of their colleagues' works;

(b) When they draft a paper on methodological problems, they often circulate it as a working paper among a few colleagues or publish it as a small "note". It is not always easy to discover such notes;

(c) In the published materials, the striking findings of differential mortality are well presented whereas the methodological weaknesses are not always fully dealt with.

2.3 Progress in the field probably postulates now a systematic effort in view of identifying all the methodological inconsistencies and, more basically, of measuring the biases they introduce. A group of two or three researchers could be set up (on a voluntary basis, of course) : they will conduct this new-style research in collaboration with all the members of the network. An alternative proposal could be that each member of the network be invited to produce a paper fully devoted to methodological inconsistencies and the evaluation of their impact. All the papers will be collected at the focal point and a synthesis will be drafted. All these documents will, of course, be disseminated among the network members.

3. New paths for research

3.1 Broadly speaking, the current undertakings, as concerns socio-economic differential mortality in the industrialized world, are directed towards the main objective of adding a new value to existing time series. In other words, their principal merit (at least for the majority of them) is to indicate if the mortality gap between social groups is widening or decreasing. Such a merit must not be underestimated. Nevertheless, the question is whether the time is coming to design new paths for research. Some of these may require new approaches, new procedures for data collection, and even new thinking.

3.2 The following list is a tentative one; it is far from being exhaustive. Moreover, it is not sure that the questions raised are all relevant. As is pointed out at the beginning, its main objective is to serve as the starting point of the discussions.

(a) There is a basic need for a drive towards designing a theoretical framework in the matter. "Without theoretical thinking, the collection of new data on socio-economic mortality differentials soon becomes useless" (Valkonen, 1979). If we succeed in building up a sound theoretical frame, we can probably reach a relevant explanation of the numerous "anomalies" which are now "enigma" for our understanding (Golini) : e.g., why are the poorer Italian regions experiencing the lower mortality levels?

(b) A great deal of past findings did not succeed in separating the respective impact of sex, region and socio-economic status stricto sensu. How to resolve the problem? To simplify the question, some works were devoted to male mortality only; how to efficiently cope with female socio-economic differential mortality?

(c) Socio-economic differential mortality studies are mostly concentrated on the lifespan when mortality levels are low. But the bulk of deaths occur in the older ages. Is it not time to now focus our attention on socio-economic differential mortality of aged people? How to proceed? Is this feasible?

(d) Each cohort was experiencing a specific history and, consequently, a particular pattern of mortality. The observed broadening or decreasing of the social mortality gap could be, in great part, an effect of observation on different cohorts. Is it not time to introduce cohort analysis at full scale in the field? How to proceed? Is this feasible?

(e) How to evaluate the impact of action programmes? And how to design them? More generally, how to link research activity and policy design in such a sensitive field (see, for example, van Poppel's paper)?

(f) Etc.

3.3 One can imagine that, for each topic (suggested above in 3.2, or put forward during the meeting), a working group of two or three is set up. The working group has mandate to carry out research on the topic and to report at the next meeting (tentatively scheduled to take place in 1983). An alternative - and more flexible - way is simply to agree upon a small number of priority topics and to draw up the list of the researchers who are planning to do something on each topic during the next two years. It is hoped that those who are interested in the same topic will mutually exchange information and experiences.

4. Implementation perspectives

The cooperation programme proposed here has to be discussed and finalized at the meeting. It is a flexible programme based on the simple idea that mutual assistance and exchange are the best ways to strengthen the research productivity of individual workers. Needless to say, any researcher can join the programme or any segment of it. It is understood that, in so doing, he/she acts as a member of his/her own institution, which takes in charge all the expenses incurred by the work. To this extent, the programme is a plan for inter-institutional cooperation in the field of socio-economic differential mortality.

WORK IN PROGRESS AND WORK PLANNED

Rapporteur : Anthony J. FOX

Written reports were received from :

Sweden	(Dr. Anne Marie Bolander)
Belgium	(Mme Michèle Van Houte-Minet)
Netherlands	(Frans van Poppel, Jan van Reek, J.D.F. Habbema and P.J. van der Maas)
France	(Jacques Vallin, Mlle. C. Lévy)
Hungary	(Peter Jozan)
Australia	(Alan Lopez)

The discussion concentrated on the positions in Australia, Belgium, Denmark, Finland, France, Federal Republic of Germany, Hungary, Italy, Netherlands and the United Kingdom, as well as the Council of Europe. These are summarized below :

Federal Republic of Germany : Mr. Linke described how, since the last meeting, West Germany had attempted to estimate socio-economic mortality differentials using the 1979 follow-up to the 1978 1% micro-census. As mentioned at the previous meeting, this approach had been adopted because of constraints on the use of alternative methods which required record linkage. Approximately 75% of households in the sample had been revisited and, for these, interviewers were invited to identify the reason for any departures. The reasons included occupation, marriage, death, departure of entire household and other. Comparison with national death rates suggested an overall shortfall of approximately 15-20%, although this varied by age. Tables were provided which suggested that the most marked differences were between active and non-active persons and between males and females. Differences between occupational groups were also noted.

Hungary : The demographic interest in differential mortality in Hungary stemmed from a rather marked rise in mortality rates which were of particular concern to the government. This enabled the Hungarian Statistical Office to plan an ambitious programme of research into the reasons for the rise. Dr. Jozan outlined the programme which is described in detail in his report. It will be concerned with socio-economic differentials in mortality (linking deaths in 1980 to 1980 census returns), morbidity and mortality (using a longitudinal follow-up survey approach), cause of death (using multi-cause data) and geographic differen-

ces (analysing several years' data by area of residence). This programme will also attempt to develop a theory for the relationship between the demographic and geographic transition in Hungary and mortality and will make comparisons with neighbouring countries. While it was recognized that this was an ambitious programme, Hungary was to be encouraged in its endeavours.

Australia :

Dr. Lopez described the two approaches which had been used in Australia. For the period 1970-72, deaths to men aged 15-64 had been coded by occupation and related to census denominators (without record linkage). This study, following the approach used in the UK, had not demonstrated clear socio-economic gradients, but had demonstrated marked differences by occupation. Dr. Lopez questioned how such findings should be interpreted. The second approach used in Australia was the ecological approach which had been used in a number of different studies. In most, socio-economic factors had been found important. In the discussion of this paper, it was pointed out that occupational mortality statistics were generally collected for three reasons, namely :

- (i) to identify occupational hazards specific to individual jobs;
- (ii) to measure social inequality and relate it to health inequality;
- (iii) as the basis for further understanding aetiology.

Finland :

Professor Valkonen set the programme of work for Finland against a background of high male mortality, with marked regional variations, and low infant mortality. The programme used three approaches, the ecological, a study of trends and a study of socio-economic differentials. The ecological approaches had incorporated a number of factors including socio-economic. The studies of trends had incorporated individual causes of death by sex and age over an extended time period (data were available back to the late 18th century). The third group of studies Professor Valkonen described were based on further analysis of the record linkage study reported already by Hannali Saule and described in Elizabeth Lynge's report at the first meeting. Professor Valkonen described how these data were now being used to study mortality by level of education and to look at the interactions between socio-economic group, marital status, region, language group and degree of urbanization.

Denmark :

Mr Andersen up-dated the report presented the previous year by Ms. Lynge. The Danish mortality study was now being extended to cover the period 1971-80 and would include measures of housing circumstances, marital status and region, as well as occupation. Ms. Lynge was now involved in a second project which aimed to link cancer registrations to the 1970 census and also to subsequent mortality. Mr. Andersen also reported that there would be no census as such in Denmark in the future, but that census statistics would be derived from registers and register matching. In this context, it was found necessary to develop a new register of people's work-place and their functions.

The discussion of Professor Valkonen's and Mr. Andersen's papers highlighted the envy among those countries where such record linkage studies had been considered impracticable. Those countries which had been using registers to derive statistics had demonstrated that, as long as adequate precautions in the access to and control of these registers were established, there was little danger of the registers being mis-used. On the other hand, it was now clear that there were considerable advantages to be gained from such studies. It was agreed that confidentiality and privacy arguments were generally overstated and that efforts should be made by international agencies to promote these kinds of data collection strategies.

Belgium :

Mme. Van Houte-Minet described two studies being conducted in Belgium. The first was concerned with adult male mortality and was using the ecological approach to correlate geographic differences in mortality by cause of death with a number of characteristics such as food consumption, pollution, socio-economic group and marital status. Discriminant analysis was being used to identify the most important factors. The study indicated that there were important cultural differences, with mortality among French-speaking males being relatively high. Mme. Van Houte-Minet also pointed out that it should be possible to undertake a national mortality study by occupation using the information recorded on identity cards. Although not detailed, nor up-to-date, this approach could be of value. Mme. Van Houte-Minet indicated how the ecological study was being extended to look more closely at individual causes of death, in particular cancer and cardiovascular disease.

The second part of the presentation described research into factors affecting infant death and still births. These projects were based on linkage between mortality records and infant death records for 1974-75 and aimed to identify high risk families. The survey was followed up by a second study in the Province of Mainaut for the period 1979-80.

The third aspect of the research on infant mortality is focussed on the study of families at risk with regard to their regional context (counties), i.e. ecological or aggregate variables, in view of "explaining" regional differences.

France :

Mr. Vallin described the results of a comparison he had recently undertaken between socio-economic differentials based on the 1954 Census Prospective Study and those based on a cross-sectional unlinked approach. It was clear that different gradients were observed and he explained them in terms of the differential treatment of the 'inactive' population in both studies.

During the discussion of the difficulties the paper highlighted, it was suggested that a future meeting should discuss the merits of alternative measures of socio-economic circumstances. Mr. Desplanques then described a new prospective study based on the 1975 Census. Unlike the previous study, the present one would cover a representative sample of men and women; it would include region of residence, occupation and housing measures; and for a small group, approximately 3000 people, would allow comparison between 1954 and 1975 occupations. He also mentioned a second study in which, for one percent of the population

(based on four birth dates), 1968 census records had been linked to 1975 census records and to marriage, fertility and mortality records. The group expressed great interest in this study and suggested it be given some priority as an important development. Mr. Dinh described a study of death to all people over 90 years of age and the results of a study of infant mortality based on linkage between birth and infant death records. The results were presented in the first report of the group.

Italy :

Professor Golini described four approaches currently being pursued in Italy. Although deaths by sex, age, area and occupation had been collected, they had never been tabulated nor published. He hoped to be able to analyse these deaths and to relate them to denominators based on the 1981 census. The second approach was the commonly used, but widely criticized, ecological approach using regional data. The third approach was to look at health differentials based on a sample survey of 80,000 private households. It was recognized that some care would be required in the interpretation of this study as it did not cover sick people who were in non-private households. The fourth approach was described in a paper Professor Golini was presenting in Dakar on morbidity-mortality life tables.

England and Wales :

Professor Fox outlined the current activities in England and Wales which could be considered in six areas. First, deaths for 1979-83 were currently being coded for the 1981 decennial supplement series which would also look at area and country of birth differences in mortality. The Office of Population Censuses and Surveys (OPCS) longitudinal study provided the second aspect of research (a report was currently being prepared for publication and this would be circulated before the next meeting). The third group of approaches were being advanced by various epidemiological units. These included mapping and correlation studies, cohort analysis of published data and case-control studies of young cancers.

Professor Fox also described the mechanisms available for more detailed prospective mortality studies and the development of case-control studies using cancer registers. These latter two approaches had been widely used to study particular occupational hazards. Dr. Bolander pointed out that England and Wales had also participated in the joint WHO study on perinatal mortality and had routine infant mortality data by social class.

Council of Europe :

Mr. Grebenik reminded members that the Council of Europe was not a research organization, but was able to commission reviews of current knowledge and to give recommendations to ministers. Currently, two reviews of relevance to this group had been commissioned. The first was concerned with geographic differences in mortality and the second with occupational differences. The Committee had now commissioned a third report to describe morbidity data available to member states.

Netherlands :

The paper for the Netherlands emphasizes the difficulties encountered by researchers in this field when confidentiality and privacy

considerations determine the availability of data to the extent that few approaches are possible. Mr. Habbema described how this had led many researchers to turn to more theoretical questions and he described how people could contribute in this way. It was hoped that a meeting of people from countries such as Italy, Belgium, the Federal Republic of Germany and the Netherlands might determine ways of reviewing these problems.

DEVELOPMENT OF FUTURE ACTIVITIES OF THE NETWORK

Rapporteur : Tapani VALKONEN

The participants in the meeting were unanimous about the importance of continuing cooperation in research on socio-economic differential mortality. The following proposals were agreed upon :

1. The report of the Wiesbaden meeting

A preliminary report on the discussions of the meeting and plans for future activities will be prepared by the rapporteurs (John Fox and Tapani Valkonen) and distributed to the participants in the meeting for their comments. CICRED will prepare the final report. This report and the up-dated versions of the country reports will be included in the second booklet on socio-economic differential mortality in industrialized societies. The deadline for submitting the revised country reports to CICRED is October 1st, 1981.

2. The next meeting of the network

Since the contacts within the network are now well established, it was agreed that it is not necessary to organize a meeting every year. The next meeting is therefore planned to be held in 1983. April was considered to be a better date than June-July. The meeting welcomed the message from Professor Golini that the Institute of Demography at the University of Rome is ready to be the host of the next meeting. It was agreed that the meeting will last four days.

It was considered useful to agree on the topics to be discussed in the sessions of the next meeting as well as on the "key persons" who would organize the sessions. The following list of topics and organizers was agreed upon :

<u>Topic</u>	<u>Organizer</u>
1. Classification of socio-economic status	John Fox The City University Department of Social Statistics Northampton Square London EC1 (UK)
2. Problems and possibilities of research in countries with limited data	W. Linke Federal Statistical Office Gustav-Stresemann-Ring 6 D 6200 Wiesbaden (FRG)
3. Census-based prospective studies	Guy Desplanques Institut national de la statistique et des études économiques 18 boulevard Adolphe Pinard 75675 Paris Cedex 14 (France)
4. Ecological research	J.D.F. Habbema Institute of Public Health and Social Medicine Erasmus University, P.O. Box 1738 3000 DR Rotterdam (Netherlands)

<u>Topic</u>	<u>Organizer</u>
5. Infant mortality (including ecological research)	Anne Marie Bolander National Central Bureau of Statistics Fack, S-102 50 Stockholm (Sweden)
6. Other topics (e.g., quality of data)	to be appointed later
7. Plans for future activities	to be appointed later

It was pointed out in the discussion that, in order to take into account the special needs of socio-economic mortality research in the 1990 round of censuses, plans should be prepared within a few years. This aspect should be considered in the planning of the sessions.

It was agreed that papers prepared for the sessions of the next meeting should include substantive findings, but the main emphasis should be given to the discussion of methodological problems and the interpretation and assessment of findings.

Each appointed organizer of a session will act as the key person for research on the respective topic. They should, therefore, be well informed about relevant research under way. Informal workshops or meetings may also be arranged if this seems possible and practical. It is hoped that members of the network will aid the key persons by sending them information and suggestions.

3. Exchange of information and attempts at improving the comparability of data and findings

It was considered most practical to have one centre for disseminating information about research on socio-economic differential mortality. CICRED agreed to take this responsibility. CICRED will send an enquiry to the members of the network and to other relevant institutions once a year. The members should then send to CICRED all relevant research reports (including reports from institutes which have not participated in the activities of the network). Each report should contain an abstract in English or French. CICRED will prepare a publication including the abstracts received and, possibly, other relevant information.

It is recommended that research reports be as explicit as possible about the exact content of the categories used in classification of social or occupational groups, level of education, cause of death, etc. Code numbers according to relevant international standard classifications should be included in the reports. It was also recommended that an English or French translation of the headings of tables and figures should be included in reports written in other languages.

4. The scope of the relevant topics of research

The meeting discussed thoroughly the advantages and disadvantages of broadening the scope of research relevant to the network by including also studies on differentials according to other than socio-economic variables and/or studies on differentials in health in addition to studies on differentials in mortality.

It was recognized that differentials in mortality not only arise from occupational and socio-economic factors, but also from marital status, migration and other demographic variables. It was agreed that the scope of the network should also cover studies on mortality differentials according to such socio-demographic factors.

Recognizing that mortality is closely associated with morbidity, it was agreed that studies on differentials in morbidity may also be of relevance to the objectives of the network.

5. Recommendations about publication activities by UN, WHO and CICRED

The meeting wished to acknowledge the special contributions of the United Nations, the World Health Organization and CICRED to the study of mortality, particularly through the collection and dissemination of data published in the *Demographic Yearbook*, the *World Health Statistics Annual* and the CICRED publications. The series of stimulating articles regularly appearing in the *Population Bulletin* and the *World Health Statistics Quarterly* may also be mentioned.

It should be recognized that these activities play an important role in research within and between countries. Therefore, it is recommended that these activities be continued and enhanced, with particular emphasis on differential mortality.

LIST OF PARTICIPATING INSTITUTIONS

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Socio-Economic Differential
Mortality in Industrialized Societies
(Wiesbaden, Federal Republic of Germany
July 1st-3rd, 1981)

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P A R T T W O

FACTS AND WORKS : COUNTRY REPORTS

A U S T R A L I A

OCCUPATIONAL AND SOCIAL CLASS DIFFERENTIALS IN MORTALITY A REVIEW

Alan LOPEZ

Consultant to the World Health Organization

INTRODUCTION

Although the occupation of deceased males in Australia has been routinely collected at a national level since 1907, relatively little interest has been shown in investigating the differential survival of workers in the various occupations until quite recently. Those studies which were conducted generally focussed on a specific disease such as tuberculosis, or on the occupational hazards of a particular occupation (for example, miners or railway employees). It may well have been the case that findings from overseas, especially British studies, were accepted as indicative of the Australian experience or, alternatively, perhaps the myth of Australia as an egalitarian society effectively discouraged such initiatives.

This paper will briefly review the approaches and major findings of studies on socio-economic mortality differentials in Australia according to whether the orientation was primarily directed towards occupational differentials in mortality (the "cross-sectional unlinked" approach) or whether the study was more concerned with investigating the role of socio-economic factors through areal analysis (the "ecological" approach). It may be mentioned here that only studies based on population aggregates (occupational or ethnic groups, statistical divisions) have been possible in Australia since confidentiality laws have precluded the matching of death certificates with census schedules necessary for analysis at the individual level.

OCCUPATIONAL DIFFERENTIALS IN MORTALITY

Probably the most comprehensive study of mortality differentials by occupation in Australia is that undertaken by Dasvarma (1980). Using broad occupational categories, he found striking differences in the mortality experience of working-age males (15-64 years) in Australia for the period 1970-1972 (see attached table). Age-standardized mortality ratios (!) for all causes of death were 11% lower for professional and technical workers than the average for the total male Australian population at these ages. The class of administrative and executive workers also enjoyed significantly lower mortality than the standard. Conversely, mortality among miners and quarrymen was 62% above average. Significantly higher mortality ratios were also recorded for transport and communication workers (37% above average), the armed forces (29%), service, sport and recreation employees (21%) and among craftsmen, labourers, etc. (19%).

Note : The views expressed in this paper are those of the author alone and do not necessarily reflect the views of the World Health Organization.

Roughly the same pattern of mortality variation was evident when occupational differences according to leading causes of death were investigated. The greatest overmortality for most causes occurred among transport and communication workers and miners and quarrymen. Only for arteriosclerosis was the excess mortality in these occupations statistically insignificant. Service, sport and recreation workers showed significantly higher mortality than average from the major chronic diseases, but not for accidents, whereas the opposite was true for workers engaged in primary industry. Interestingly, the mortality rate from ischaemic heart disease among administrative and executive workers was significantly higher than average while the excess observed for professional and technical employees was not. Both groups of occupations, however, enjoyed significantly lower mortality from all forms of accidental death than did the total male population of working age.

Whilst the pattern of differential mortality suggested by the table is largely consistent with the experience of other industrialized countries, some aspects nonetheless deserve special mention. In particular, the two occupational categories "Inadequately Described" and "Not in Workforce" consistently exhibit significantly lower than average mortality wheras, for the latter group at least, one might reasonably have expected mortality to be higher than average due to selection effects. Males in this category, however, enjoyed significantly lower mortality from comparable causes of death over the period 1965-1967 suggesting that the mortality advantage of the group may indeed be real. No attempt was made in the study to explain why this pattern might occur although a closer examination of their socio-demographic characteristics could provide some further insight. One may also observe the excessively high mortality of the Armed Forces, a comparatively small group, from motor vehicle accidents which, in the Australian context at least, probably reflects as much their irresponsible driving habits as specific occupational hazards.

In an attempt to identify social class differentials in mortality, Dasvarma reclassified minor occupational groups into four grades according to previous occupational classifications based on respondent's judgement. When standardized mortality ratios were computed for these classes, it was found that only men working in those occupations in the lowest socio-economic class (2) had significantly higher than average mortality, with the ratios for the remaining three categories being roughly equivalent. Moreover, the same pattern was evident for periods around the 1961 and 1966 censuses leading Dasvarma (1980, p.115) to conclude that *unless there is a large difference in social grade, mortality differentials do not manifest themselves.*

The only other study in Australia to use occupation as an indicator of socio-economic status in relation to health is that of Powles (1977). On the basis of standardized mortality ratios from all causes of death during 1967-1973, the study concluded that work hazards or relative poverty alone were not sufficient to explain the observed occupational differentials in mortality. Rather, the author considered that much of the observed differences could be accounted for by different levels of educational achievement, differences in marital status composition of occupations and variable labour market (unemployment) experience. In short, those with weak labour force attachments and/or who lived in an unstable social environment had lower chances of survival.

ECOLOGICAL ANALYSES OF SOCIO-ECONOMIC FACTORS AFFECTING MORTALITY

Studies of this type in Australia have usually been confined to identifying socio-economic characteristics of significance for the survival of infants. The first such attempt appears to be that of Wilson (1972) who analyzed variations in infant and neonatal mortality among 47 municipalities and shires in Melbourne over the period 1961-1967. From an array of independent variables describing the social, demographic and economic condition of each area, he found that municipalities with the highest infant mortality rates were typically those with the highest proportion of non-British immigrants and which had more private dwellings tenanted. For neonatal mortality, the variation in the proportion of adult women who were economically active accounted for

almost one-half of the variance in rates. Interestingly, Wilson found that, in both cases, the population per dwelling ratio was negatively associated with the level of mortality, a finding which would seem to contradict accepted wisdom. This was, Wilson suggested, largely due to the concentration of early reproductive (i.e., low parity) units in these areas and a higher proportion of ex-nuptial births to single women living alone or in de facto or other irregular relationships.

Kraus and Redford (1975), in their study of perinatal mortality in local government areas of Sydney in 1971, reported that variables reflecting law violations and socio-educational characteristics were most closely associated with the level of mortality, followed by differences in demographic characteristics of the areas, particularly the birth rate and the rate of population growth.

Burnley (1977) has also analyzed variations in infant mortality in Sydney for the three periods 1960-1962, 1965-1967 and 1970-1972 using local government areas as the unit of analysis. According to his findings, areas with low socio-economic status, high population density and a large proportion of recent immigrants tended to exhibit the highest mortality. Socio-economic class, in this case, was determined according to the distribution of the workforce over upper and lower white and blue collar occupations. Statistically significant correlations (0.38 and 0.43 respectively) between the level of mortality and the proportion of lower blue collar and total blue collar workers were identified. The coefficient with the proportion of upper white collar occupations (-0.21); though in the expected direction, was not significant. The evidence, nonetheless, was sufficiently convincing for Burnley (1977, p.35) to remark that there was a moderately strong association between higher infant mortality and low occupational status. A correlation analysis of directly age-standardized death rates for males and females with variables measuring renting practices, population density, educational achievement and social disorganization revealed the strongest association (0.69 and 0.52 for male and female mortality levels respectively) with the index of population density. On the other hand, correlations with the social disorganizational variables were almost always not statistically significant.

Socio-demographic correlates of infant mortality have also been studied at a national level in Australia using data for 65 statistical divisions from the 1971 census and infant deaths for the period 1970-1972 derived from vital registration (Dasvarma, 1980). The relationship of each variable with the level of infant mortality was as to be expected with the proportion of ex-nuptial births, the percentage of aborigines in the population, the average number of persons per room, the child to married woman ratio and an index of heat discomfort all displaying large positive correlations with the level of infant mortality. Conversely, variables describing sanitary conditions, the availability of health care and ethnic homogeneity were inversely related to infant mortality.

In view of the strength of the associations between infant mortality and these variables, a multivariate approach was adopted via the technique of path analysis. In general, the incidence of ex-nuptial births and the variation in the proportion of the population who were aborigines accounted for much of the indirect effects of the other variables on post-neonatal mortality while, in the case of neonatal deaths, these effects were mostly felt through ex-nuptial births and the index of heat discomfort. The path analysis also confirmed the greater relevance of the set of "predictor" variables for explaining variations in post-neonatal rather than neonatal mortality ($R^2 = 0.84$ and 0.58 respectively).

SOME CONCLUDING REMARKS

From this brief review, it is clear that knowledge about socio-economic mortality differentials in Australia remains somewhat superficial, due largely to methodological limitations. Quite apart from the inherent deficiencies of the data arising from differential reporting of occupation on the census and death certificates, one is faced with distinguishing between the relative importance of occupational and non-occupational factors.

pational factors in the determination of mortality patterns. Occupational factors themselves may be further classified according to direct (occupational hazards) or indirect (selective entry of healthy or unhealthy persons into certain occupations, selective transfer among occupations) influences. Among the most important of the non-occupational considerations which are difficult, if not impossible, to isolate from purely occupational factors are such socio-economic characteristics as education and income. Certain occupations may also, by their very nature, incur additional environmental hazards depending, for example, on the physical environment within which the industry is normally located.

A similar dilemma to that arising in the study of mortality by cause of death also prevails when investigating occupational mortality. Thus, on the one hand, the choice of broad occupational groups reduces the risk of misclassification of specific occupations as they appear on the death certificate and in the census schedule, but on the other, the resulting occupational categories may be too heterogeneous to permit meaningful conclusions to be drawn from the observed pattern of occupational differentials.

It must also be recognized that ecological analyses are merely suggestive of factors affecting survival and are of limited use in unravelling the often intricate pattern of disease causation. It is clearly necessary, for example, to distinguish between the direct effects of a variable on mortality and the extent to which the variable acts as a proxy for other social, economic or environmental determinants. Moreover, the variables utilized in such exploratory analyses depend, of course, on what information is collected by the census which is typically a somewhat limited account of man's socio-economic circumstances.

Nonetheless, the strength and general consistency of the associations uncovered by these methods suggest that factors other than chance are acting to determine mortality relationships. In this context, there is an urgent need to improve our understanding of the nature and extent of behavioural differences among population subgroups drawing on the voluminous epidemiological literature about detrimental health practices. Given the restricted scope for census-based individual record analysis in Australia, there may be little alternative to this community-orientated approach if we are to better understand the determinants of socio-economic differentials in health and survival.

F O O T N O T E S

1. The standardized mortality ratio for a particular occupation from the i^{th} cause of death was computed as :

$$SMR = \frac{D_i}{\sum_x P_{x,i} m_{x,i}} \times 100$$

where D_i is the observed number of male deaths from cause i in the occupation group;

P_x is the number of males aged x in the occupation group, and

$m_{x,i}$ is the age-cause-specific death rate for the total Australian male population (the "standard").

The significance of the ratios can then be examined by computing the standard error of the SMR as :

$$S.E. (SMR) = \sqrt{\frac{D_i}{\sum_x P_{x,i} m_{x,i}}} \times 100$$

and referring to tables of the standard normal distribution.

2. These include miners and quarrymen; bus, tram, etc., workers; railway, etc.; deckhands, etc.; labourers; other workers not elsewhere indicated.

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Standardized Mortality Ratio (SMR) among men aged 15 to 64 years by occupational group and selected causes of death. Australia, 1970-72

Occupational Group	Cause of death					All Causes (a)
	B19 Malignant Neoplasms	B28 Ischaemic heart disease	B30 Cerebro- vascular disease	B46 Arterio- sclerosis	BE47 Motor vehicle accidents	
0. Professional, Tech., etc.	98	108	102	83	66*	50*
1. Administrative, Exec., etc.	104	108*	106	69*	78*	59*
2. Clerical	108	123*	121	89	69*	43*
3. Sales	110	114*	114	77*	84	40*
4. Farmers, Fishermen, etc.	93	96	84*	88	120*	144*
5. Miners and Quarrymen	150	148*	127	162	166*	482*
6. Transport and Communication	133*	137*	140*	110	192*	145*
7/8. Craftsmen, etc. and Labourers	121*	115*	115*	114*	133*	131*
9. Service, Sport and Recreation	120*	120*	132*	114	107	91
10. Armed Forces	141	132	110	89	176*	101
11. Inadequately Described	47*	51*	51*	77	77*	88
12. Not in Workforce	44*	41*	50*	109	34*	58*
All Occupations	100	100	100	100	100	100

Note: (a) Includes the six selected causes and the remainder.

* SMR statistically significant ($p < .05$)

Source: G.L. Dasvarma, (1980) Differential Mortality in Australia 1970-1972. Ph.D. thesis, Department of Demography, The Australian National University, Canberra.

B E L G I U M

RECHERCHES RECENTES ET EN COURS

Département de Démographie
Université Catholique de Louvain

1. En matière de mortalité des adultes

En premier lieu, pour les années 1969/1972, nous avons mené une analyse détaillée de la mortalité belge toutes causes et par cause, selon l'appartenance régionale des individus, afin de découvrir à quelles causes de décès étaient liées les différences régionales observées en Belgique.

Il s'agissait principalement d'analyser la surmortalité masculine wallonne, mais l'intérêt s'est porté également sur les causes des décès féminins.

Les travaux ont porté ensuite sur la recherche des déterminants de la surmortalité masculine :

(a) Inventaire de la littérature scientifique, épidémiologique et médicale afin d'y découvrir les variables qui ont été rattachées le plus souvent aux causes de décès précédemment reconnues comme responsables des différences régionales observées en Belgique.

(b) Mesure de ces variables à partir des données régionales existantes.

(c) Application aux données des techniques de l'analyse discriminante afin de déterminer la ou les variable(s) qui différencient le plus les régions.

L'approche opérée est de type écologique : faute de données individuelles et suivies, les variables ont été mesurées à partir de données agrégées et, donc, imparfaites quant à leur pouvoir explicatif. Néanmoins, on a vu se confirmer le rôle explicatif de certaines variables de consommation ou de comportement : tabagisme, alcoolisme, consommation de beurre.

Les recherches actuelles et futures sont axées sur les deux principales causes de décès : cancer et maladies de l'appareil circulatoire.

(a) en matière de cancer : on étudie actuellement la mortalité à partir des statistiques officielles belges et européennes : description de l'évolution dans le temps des risques de décès selon le siège de la tumeur et l'âge, et comparaison du niveau atteint en Belgique par rapport aux autres pays européens. Par ailleurs, on s'efforce d'utiliser les statistiques de morbidité existantes afin d'obtenir une vue plus dynamique du processus cancéreux. On tentera également de faire une analyse comparée de l'organisation et du mode de fonctionnement de quelques registres du cancer de pays développés et d'élaborer, pour la Belgique, un projet de Registre National permettant de suivre les individus et d'étudier leur survie.

(b) en matière de maladies cardio-vasculaires : le Département de Démographie est associé à un plan quinquennal interuniversitaire visant à réduire la mortalité et la morbidité cardio-vasculaires dans la province du Luxembourg. Il s'agit d'un projet visant à amener la population cible (hommes et femmes de 20 à 50 ans) à éviter et à corriger les facteurs de risque des maladies cardio-vasculaires en choisissant à bon escient ses aliments, en équilibrant son alimentation, en modifiant ses habitudes tabagiques, sportives et de loisir, en se soumettant aux examens médicaux préventifs.

Si l'on connaît bien les facteurs de risque qui engendrent les troubles cardio- artériels, on connaît moins bien, par contre, la distribution de ces comportements dans l'espace social et culturel. On a de fortes raisons de penser que les groupes socio- culturels ne sont pas homogènes du point de vue de la consommation alimentaire, du tabagisme, de la prévention médicale, des activités sportives, etc.

L'enquête permettra de lutter plus efficacement contre le risque coronarien dans la mesure où seront mieux définis les "patterns" sociaux et individuels de comportement et où seront connus, grâce à des "check-up" médicaux, l'état de santé et les antécédents médicaux des sujets enquêtés. Elle débouchera sur une action d'éducation de la population dans son ensemble et de chaque individu examiné.

2. Recherches sur les déterminants socio-culturels de la mortalité infantile

(a) Recherches Poliwa II et III

La recherche Poliwa II est une recherche extensive des facteurs individuels de la mortalité infantile en Belgique. Elle se fonde sur un appariement des bulletins d'état civil de naissance et de décès (mort-nés compris) des enfants décédés avant un an au cours des années 1974-75. Le fichier de base fut constitué pour l'ensemble des naissances et des décès infantiles "de droit" de la Belgique. Cette recherche visait à identifier des familles-types à risque faible ou élevé de mortalité infantile (mortalité natale, mortalité néonatale et postnéonatale), à partir d'une analyse de segmentation. Il s'agissait d'identifier des configurations particulières de risques de nature diverse : sociaux ou physiologiques appelées "famille à risque".

La recherche Poliwa III actuellement en cours est une recherche intensive visant à observer plus précisément divers comportements pouvant être rattachés aux familles à risque identifiées par la recherche Poliwa II. Cette recherche se fait au moyen d'enquête auprès de toutes les nouvelles accouchemées de la Province du Hainaut au cours de la période 1979-1980.

(b) Thèse de doctorat en démographie, G. Masuy-Stroobant : Les déterminants individuels et régionaux de la mortalité infantile en Belgique.

Objet de la thèse :

Recherche des déterminants individuels et collectifs (régionaux) de la mortalité infantile. Tentative d'établir un lien réel entre ces deux niveaux d'analyse.

La recherche comprend d'abord une analyse historique de la mortalité infantile, de sa régionalisation et de ses déterminants au cours du 19ème siècle.

L'évolution régionale, les mutations subies par la mortalité infantile au cours du 20ème siècle sont ensuite analysées.

Les facteurs individuels de la mortalité infantile actuelle (sociaux, biologiques) sont identifiés selon diverses méthodes d'analyse multivariée (segmentation, analyse des correspondances,...) : ce sont les familles à risque déjà analysées en partie dans la recherche Poliwa II.

Enfin, les configurations aux familles à risque de mortalité infantile seront replacées dans un contexte régional (arrondissements) afin d'être confrontées avec des variables "écologiques" et collectives, dans une perspective "d'explication" des différences régionales.

F E D E R A L R E P U B L I C O F G E R M A N Y

Deaths of Economically Active Persons :
Results of the Follow-up Inquiry to the 1979 Microcensus

W. LINKE

Federal Statistical Office, Wiesbaden

PRELIMINARY REMARKS

At the first meeting, we were told by colleagues of some countries (e.g., France, United Kingdom and the Scandinavian countries) that the evaluation of deaths and the analysis of mortality in connection with socio-economic variables have, for many years and decades already, been part of the tools of social statistics. In the Federal Republic of Germany, there exist only very few studies on this subject at the present time. The relevant investigations were almost exclusively performed by private life insurance companies, so that the evaluation was of necessity restricted to the specific group of the persons insured with these companies. A comprehensive study covering all population groups unfortunately does not exist so far. About 25 years ago, the Federal Statistical Office performed a special investigation covering deaths by former occupation and causes of death (1). The death enumeration cards on which the last occupation was indicated and the medical certificate of death showing the cause of death were brought together and evaluated at that time. In the absence of the appropriate data, it was, however, not possible to show risk groups, i.e., to relate the deaths to specific groups of the active population.

The bringing together of different statistical records for purposes of evaluation has, meanwhile, become much more difficult and not only for cost reasons, but above all due to the very strict data protection provisions. Moreover, each individual survey of official statistics requires a legal foundation specifying not only the date, the catalogue of characteristics, the group of respondents to be included, but also the possibility of passing the data on. There is, for instance, in the Federal Republic no such possibility as it exists in Sweden and Denmark where data from several files may be brought together by means of the personal identification number. When debating the new registration law which has come into force in August 1980, the *Bundestag* (Federal Parliament) strictly rejected the proposed introduction of a personal identification number.

For the evaluation, we have, therefore, to draw upon data sources which exclude the bringing together of different statistical records, but, on the other hand, enable us to provide comprehensive information. At the first meeting in Geneva, I had mentioned two possibilities of evaluating deaths in connection with data of statistics on economic activity and which we are going to further develop in the next few years :

1. Evaluation of deaths of employees subject to obligatory social old age insurance

Since January 1st, 1981, the departures due to death have been shown separately in the register of employees subject to obligatory social old age insurance. On the basis of these cases of departures, the relevant data records comprising the demographic and employment statistical data of the relevant cases can be sorted out. This would permit a comprehensive and detailed evaluation and presentation of the mortality of employees by socio-economic characteristics : e.g., by age groups and major occupation groups, sectors of economy and categories of training/education.

2. Follow-up of the microcensus

I shall report on this project in what follows. This is the first evaluation of this kind performed as part of the microcensus, and we are quite aware of the fact that some improvements will still have to be made from a methodological point of view. It is hoped that this evaluation on the basis of the follow-up enquiries can be repeated every two years.

SOME REMARKS CONCERNING THE METHOD

As part of the 1% - sample of the microcensus (continuous annual sample survey of population and economic activity), 75% of the households included in the preceding year are questioned a second time. On the basis of the data derived from this follow-up enquiry, it is possible to make longitudinal evaluations, i.e., evaluations of individual changes over the period of one year. Relevant evaluations have, for instance, been made within the scope of the joint labour force sample survey of the member countries of the European Communities with regard to changes in the structure of the economically active population (2).

In the follow-up enquiry, the interviewers ascertain the persons who left the households of the selected sampling districts (3) since the first enquiry. For the persons who have left, the reason of leaving is recorded in the household questionnaire of the follow-up enquiry. In the follow-up enquiry of April 1979, about 181.000 households were questioned a second time. In doing so, the interviewers covered 39,000 departures since April 1978 (first questioning). If we assume that, for the households covered for the first time in April 1979 (in the 25% of newly-selected sampling districts), the same relations of departures applied in the preceding year, there results, if the figures are raised to the total population of April 1978, the analysis of cases of departure as shown in Table 1.

Table 1 : Breakdown of cases of departure

Reason for departure	Number of persons (raised) 1,000	Percentage share of total number
Departure for occupational reasons	167	3.2
Departure because of marriage	243	4.6
Deaths	553	10.6
Departure of entire household	3 115	59.5
Other reasons	1 159	21.1
TOTAL departures	5 238	100.0

As, in what follows, we shall report on the results of an evaluation concerning the economically active persons who died between May 1978 and April 1979, it was first necessary to find out to what extent the number of deaths as determined by the follow-up enquiry deviates from the deaths actually observed and, if so, to what systematic errors (4) this deviation would be attributable. For the period May 1978 to April 1979, a total of 706,000 deaths (excluding infant deaths) (5) were registered. Compared with the raised number of deaths as determined by the follow-up enquiry (553,000), there was a deviation of 22%. Broken down by age groups, this deviation differed, however, considerably : for the under-15-year-olds - 4%; for the persons aged 15 to under 65 years -

15%; and for those aged 65 years and over - 24%.

Part of the undercount of deaths is no doubt due to the fact that the interviewers very frequently recorded "departure of the entire household" or "other reasons" where they could not get any more specific information concerning the case of departure. Especially in the case of lone persons aged 65 years and over, there could, for instance, also be a death behind the departure of the entire household. Moreover, it would be necessary to estimate, for the persons who moved out of the enumeration district (reason : departure of entire households), the number of deaths on the basis of the general death rate. Considering these systematic error components, there still remains, however, an estimated rate of underenumeration of 15%. It would seem conceivable to reduce this rate if, in the future training courses, the interviewers were instructed to cover more accurately the cases of departure, especially as regards the deaths.

RESULTS

The following results relate only to the group of persons aged 15 to under 65 years*. Between 1978 and April 1979, a total of 150,300 deaths were registered in this age group. If we transfer the share of economically active (6) and non-active persons who died, as determined by evaluation of the follow-up enquiry, to this figure, the picture is as follows (Table 2).

Of the 93,900 men who died at the age of between 15 and under 65 years, an estimated total of 53,800 (57.3%) had been economically active and 40,100 (42.7%) non-active. As had to be expected from the activity rate (46.7%), the number of economically active women who had died in this age group was much lower with 16,500 (29.3%). The number of non-active women who had died was estimated to be 39,900 (70.7%). It is, however, more interesting to compare the death rates, i.e., the number of deaths related to 1,000 economically active or non-active persons of the basis population of April 1978. Related to all 15 to under-65-year-old persons, there resulted a death rate of 3.8. The men of this age group had a death rate of 4.8. It was 70% higher than the rate for the women of the same age (2.8). The differences were even greater in the case of the rates of economically active and non-active persons. For the men of the age group mentioned who were economically active in April, there was an estimated death rate of 3.4 and, for the non-active men, of 11.5. The corresponding death rates were much lower for the women. So, the women who were economically active in April had a death rate of 1.7, while it was 3.7 for the non-active women. Especially in the case of the men, it becomes quite obvious which orders of magnitude may be behind the general death rate and which can be perceived only if a further differentiation is made.

The deaths of economically active persons determined in the follow-up enquiry were further evaluated according to the last occupation practised. The occupational data were derived from the first enquiry. In the majority of cases, it can be assumed that these were actually the last occupations practised. The recorded number of economically active persons who had died were in a sex-specific analysis adjusted to the already extrapolated total deaths (cf. Table 2). In order to permit a comparison of the mortality level between the major occupation groups and selected minor occupation groups, respectively, occupation-specific death rates were calculated (number of deaths related to 1,000 economically active persons who had practised the relevant occupation in April 1978). See Table 3. It was found that bricklayers, carpenters and other construction workers (4.8), transport equipment operators (4.1), architects, engineers, technicians (3.5) had a slightly higher mortality than the average of the economically

* In respect of the sampling errors, a differentiation by further age groups was not carried through.

active persons (2.8). In the case of the male economically active persons, there were, for these occupations, correspondingly high death rates, because these are occupations mainly occupied by men. The lowest death rate (2.4) was determined for administrative workers. Because of the very low number of cases, only a few death rates could be computed for the female economically active persons. Of particular interest is that the low death rate for administrative workers mentioned above conceals a relatively high death rate for males (4) and a particularly low death rate for females (1.).

The differences of the occupation-specific death rates described above are attributable both to the age structure of the economically active persons in the relevant occupations and also to factors resulting from the type of the activity and the working conditions on the job. Table 4 shows a rather rough age distribution of the economically active persons aged 15 to under 65 years in the major occupation groups mentioned. Since, as a result of the small number of sample results, it was not possible to calculate age-specific death rates for the economically active persons, a corresponding standardization procedure could not be applied. It can, however, be seen from the relative age distribution for the persons working in the individual major occupation groups whether and to what extent the number of the older or the younger economically active persons is prevailing. The relative determined for this purpose was the relation : number of economically active persons aged 15 to under 35 years to the number of the economically active persons of age 35 to under 55 years in the individual major occupation groups. With a value of under 1, the number of the 35 to under-55-year-old economically active persons is higher, while with a value of over 1, the number of the economically active persons aged 15 to under 35 years is prevailing. A comparison of this relative with the corresponding occupation-specific death rate shows that, in the major occupation groups/minor occupation groups with an above-average death rate (Bricklayers/carpenters and other construction workers, Transport equipment operators, Architects/Engineers/Technicians, Agricultural/Animal husbandry and Forestry workers/fishermen), the mentioned relative is also far below 1. This relation had to be expected due to the increasing mortality in the upper age groups. As has already been explained, the age distribution constitutes only one factor influencing the occupation-specific death rate. In addition to further occupation-conditioned factors, the individual forms of life certainly will also play an important part.

Footnotes:

- 1) Beruf und Todesursache (Results of a special count of 1955);
Fachserie A, Reihe 7, Statistisches Bundesamt, Wiesbaden, 1963.
- 2) Zur Abgrenzung und Struktur der Erwerbslosigkeit, Wirtschaft und Statistik
No. 1/1979;
labour sample surveys,
Statistical Office of the European Communities (publication of the results
1973, 1975, 1977)
- 3) The microcensus is based on an area sample. Sampling frame is the addresses of the households as derived from the 1970 population census from which geographically adjacent sampling units (segments) with an average of 30 households are formed.
- 4) For the extrapolated number of deaths, a relative standard error of \pm 2 % may be assumed.
- 5) As we proceeded from the state of the population in April 1978, infant deaths among those born after that date could not be covered.
- 6) There are considered as economically active those persons who are gainfully occupied or are independently operating an enterprise or an agricultural holding or are pursuing a liberal profession. This includes also family helpers. It is of no importance to what extent the activity contributes to the livelihood.

Table 2 : Estimated number of deaths of economically active and non-active persons aged 15 up to 64 years between May 1978 and April 1979.
Results of the follow-up survey of the 1978/79 Microcensus.

Sex	Unit	Total ¹	Deaths		Death rate per 1,000 ³		
			Economically active persons ²	Non-active persons ²	Persons, total	Economically active persons	Non-active persons
of the age group concerned							
MALE	100	939	538	401	4.8	3.4	11.5
	/	100	57.3	42.7			
FEMALE	100	564	165	399	2.8	1.7	3.7
	/	100	29.3	70.7			
TOTAL	100	1 503	703	800	3.8	2.8	5.6
	/	100	46.8	53.2			

(1) Registered number of deaths (May 1979 - April 1979)

(2) Estimated number of deaths

(3) Related to 1,000 persons of the age group concerned from Microcensus,
April 1978

Table 3 : Economically active persons aged 15 up to 64 years by occupation (major groups), estimated number of deaths and death rates : results of the follow-up survey of the 1978/79 Microcensus

Occupation Major groups ¹	Economically active persons Total			Male			Female		
	April 1978 (2)	Deaths (3)	Death rate (4)	April 1978 (2)	Deaths (3)	Death rate (4)	April 1978 (2)	Deaths (3)	Death rate (4)
Minor groups									
Agricultural, animal husbandry and forestry workers, fishermen	13 800	48	3.5	6 906	/	/	6 894	/	/
Miners, quarrymen, stone workers	1 261	/	/	1 236	/	/	25	/	/
Production and related workers <u>incl.</u>	86 116	225	2.6	68 474	195	2.8	17 642	30	1.7
- blacksmiths, tool makers, mechanics, plumbers, metal workers	19 047	53	2.8	18 395	53	2.9	652	/	/
- bricklayers, carpenters, and other construction workers	8 209	39	4.8	8 153	39	4.8	56	/	/
- labourers not elsewhere classified	9 818	28	2.9	6 199	/	/	3 649	/	/
Architects, engineers, technicians	13 782	48	3.5	12 357	43	3.5	1 425	/	/
Service workers <u>incl.</u>	136 788	367	2.7	69 356	248	3.6	67 432	119	1.8
- sales workers	19 369	56	2.9	7 645	29	3.8	11 724	27	2.3
- transport equipment operators	16 076	66	4.1	14 258	60	4.2	1 818	/	/
- administrative workers	48 747	119	2.4	22 194	89	4.0	26 553	30	1.1
- protective service workers	10 681	31	2.9	9 993	29	2.9	688	/	/
- catering, lodging, house-keeping services, laundries, cleaners, waiters and related workers	13 859	39	2.8	2 870	/	/	10 989	30	2.7
Workers not classifiable by occupation	3 548	/	/	1 989	/	/	1559	/	/
TOTAL	255 295	703	2.8	160 318	538	3.4	94 977	165	1.7

/ = Raised figure less than 2,500 cases

1) = Classification of Occupations, 1975 (Federal Statistical Office)

2) = Results of April 1978 Microcensus

3) = Raised figures

4) = Related to 1,000 economically active persons in the occupations concerned as of April 1978.

Table 4 : Economically active persons aged 15 up to 64 years by occupation (major groups), age groups and death rates : results of the follow-up survey of the 1978/79 Microcensus

Occupation Major groups ¹ ----- Minor groups	Economically active persons, total						Relation $\frac{15-34}{35-54}$ (3)	Death rate (4)
	April 1978 (2)	15-24	25-34	35-44	45-54	55-64		
		100	%					
Agricultural, animal husbandry and forestry workers, fishermen	13 800	11.7	13.6	27.5	29.4	17.8	0.44	3.5
Miners, quarrymen, stone workers	1 261	13.1	9.1	26.3	44.4	7.1	0.31	/
Production and related workers incl.	86 116	22.7	18.6	27.7	22.0	9.0	0.83	2.6
- blacksmiths, tool makers, mechanics, plumbers, metal workers	19 047	30.0	24.1	24.0	16.0	5.9	1.35	2.8
- bricklayers, carpenters, and other construction workers	8 209	14.7	17.5	34.4	25.1	8.2	0.54	4.8
- labourers not elsewhere classified	9 818	19.0	22.0	27.1	22.8	9.1	0.82	2.9
Architects, engineers, technicians	13 782	9.9	24.4	33.6	22.7	9.4	0.61	3.5
Service workers incl.	136 788	21.3	22.5	25.9	19.6	10.7	0.96	2.7
- sales workers	19 369	23.4	18.9	26.8	19.7	11.2	0.91	2.9
- transport equipment operators	16 076	10.5	21.9	31.6	24.7	11.3	0.58	4.1
- administrative workers	48 747	18.6	24.0	26.6	20.0	10.8	0.93	2.4
- protective service workers	10 681	44.5	17.2	16.9	13.4	8.0	2.04	2.9
- catering, lodging, house-keeping services, laundresses, cleaners, waiters and related workers	13 859	18.1	18.3	27.8	23.9	12.0	0.71	2.8
Workers not classifiable by occupation	3 548	37.6	15.3	21.0	17.3	8.8	1.38	/
TOTAL	255 295	20.3	22.0	27.1	20.7	9.9	0.88	2.8

/ = Raised figure less than 2,500 cases

1) = Classification of Occupations, 1975 (Federal Statistical Office)

2) = Results of April 1978 Microcensus

3) = Index of Labour Force Renewal

4) = Related to 1,000 economically active persons in the occupations concerned as of April 1978

F I N L A N D

RECENT STUDIES ON SOCIOECONOMIC ASPECTS OF MORTALITY

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Research on socioeconomic aspects of differences and changes in mortality has been quite active in Finland in recent years. Instead of attempting to summarize the problems and results of this research, only a listing of selected works available in English will be presented here. Further information may be obtained from the institutions mentioned in the list.

I Studies from the Department of Sociology, University of Helsinki,
Franzeninkatu 13, 00500 Helsinki 50.

Valkonen, Tapani & Veijo Notkola: Influence of Socioeconomic and Other Factors on the Geographic Variation of Mortality in Finland, Sweden and Norway, Yearbook of Population Research in Finland XV, 1977, pp. 9-30. (Based on data on counties and municipalities).

Valkonen, Tapani: Excessive Adult Male Mortality in Finland: Its Origins and Development since 1870, Dept. of Sociology, University of Helsinki, Working Papers n:o 3, 1977, 20 p.

Valkonen, Tapani & Veijo Notkola: Social Environment and Natural Environment in Relation to Ischaemic Heart Diseases Mortality in Finland, Nordic Council for Arctic Medical Research, Research Report n:o 19, 1977, pp. 95-100.

Valkonen, Tapani: Transition of mortality in Sweden and Finland, Dept. of Sociology, University of Helsinki, Working Papers n:o 15, 1980, to be published in Beiträge zur Demographie, Berlin (DDR), 28 p.

Valkonen, Tapani & Marja-Liisa Niemi: The development of male mortality by county and cause of death in Finland in 1961-75. (In Finnish, summary and table headings in English). Dept. of Sociology, University of Helsinki. Working Papers n:o 12, 1980, 71 p.

Valkonen, Tapani & Marja-Liisa Niemi: Decline of Mortality from Cardiovascular Diseases in North Karelia (letter). British Medical Journal, Vol. 280, 1980, p. 46.

Pyörälä, Kalevi & Tapani Valkonen: The high ischaemic heart disease mortality in Finland, in Boström H. & N. Ljungstedt (eds.): Medical Aspects of Mortality Statistics, Scandia International Symposia, Stockholm 1980, 37-57.

Martelin, Tuija & Tapani Valkonen: Changes in smoking habits and mortality among middle-aged men in Finland: development in 1951-75 and projections to the year 2000. (In Finnish, summary and table headings in English). Dept. of Sociology, University of Helsinki. Working Papers n:o 19, 1981, 82 p.

Valkonen, Tapani: Sociodemographic mortality differentials among middle-aged men in Finland and problems in accounting for them. Paper prepared for the General Conference of the International Union for the Scientific Study of Population, December, 1981, Manila, Philippines. (Based on linked data for 1971-75).

Valkonen, Tapani: Psychosocial stress and sociodemographic differentials in mortality from ischaemic heart disease in Finland. Paper prepared for the sixth Paavo Nurmi Foundation Symposium "Neurogenic and psychological factors in coronary heart disease", 17-19 September, 1981. To be published in Acta Medica Scandinavica Supplementum. (Based on linked data for 1971-75).

II Studies from the Department of Public Health Science, University of Helsinki, Haartmaninkatu 3, SF - 00290 Helsinki 29.

Koskenvuo, Markku & Seppo Sarna & Jaakko Kaprio: Mortality by Marital Status and Social Class in Finland during 1969-1971. Scandinavian Journal of Social Medicine 6, 1978, pp. 137-143.

Koskenvuo, Markku & Jaakko Kaprio & Antero Kesäniemi & Seppo Sarna: Differences in mortality from ischemic heart disease by marital status and social class. Journal of Chronic Diseases. Vol. 33, 1980, pp. 95-106.

Koskenvuo, Markku & Seppo Sarna & Jaakko Kaprio: Cause-specific mortality by marital status and social class in Finland during 1969-1971. To be published in Social Science & Medicine.

(These three studies are based on unlinked data for the period 1969-71).

III Studies from the Department of Public Health Science, University of Oulu, Kajaanintie 46 D, SF - 90220 Oulu 22.

Näyhä, Simo: Social group and mortality in Finland. British Journal of Preventive and Social Medicine 31, 1977, pp. 231-237.
(The study is based on unlinked data for period 1969-72).

Näyhä, Simo: Short and medium-term variations in mortality in Finland. A study on cyclic variations, annual and weekly periods and certain irregular changes in mortality in Finland during the period 1868-1972. Dept. of Public Health Science, University of Oulu. A dissertation 1980, 101 p.

IV Studies from the Central Statistical Office of Finland. Box 770.
SF - 00101 Helsinki 10.

Sauli, Hannele: Occupational mortality in 1971-75. (In Finnish, summary and table headings in English). Central Statistical Office of Finland. Studies n:o 54, 1979, 158 p.

Kolari, Risto: Cohort Mortality in Finland from 1851. (In Finnish summary and table headings in English). Central Statistical Office of Finland. Studies n:o 57, 1980, 97 p.

H U N G A R Y

THE PROJECT OF THE HUNGARIAN CENTRAL STATISTICAL OFFICE CONCERNING THE MAIN ASPECTS IN RESEARCH ON MORTALITY

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A. BACKGROUND

The secular trend of mortality has been rising since the middle of the 1960's in Hungary. The crude death rate was 10.2 per thousand between 1961 and 1965, and 12.9% between 1976 and 1980. Even the expectation of life at birth for males decreased recently and the life expectancy for females levelled off in the second half of the 1970's. The unfavourable trend is partly due to the ageing of the population; however, besides this, the age-specific death rates have also increased in certain age groups from 1965 onwards. First of all, the probability of survival of middle-aged males deteriorated significantly during the last fifteen years. Consequently, the level of mortality of the population of Hungary is one of the highest among the industrialized developed countries.

B. DEVELOPMENT OBJECTIVE

The development objective of the project is to reveal the factors responsible for the increase and high level of mortality respectively, and using the recently acquired, relevant knowledge properly, to decrease the level of mortality and to improve indirectly the health condition of the population in Hungary.

Describing the epidemiological transition in the framework of demographic transition provides a better understanding of the secular trend of mortality and what has been going on in this respect since the middle of the 1960's. With the knowledge and understanding of past decline and the recent rise in mortality, the projection of the future trend would be more reliable.

C. IMMEDIATE OBJECTIVES

1. Studying the social-economic-occupational mortality differentials : revealing, analyzing and, if possible, explaining the mortality differentials among different socio-economic-occupational groups in the country (cross-sectional approach).

2. Studying the effect of social mobility on mortality differentials by the prospective approach. This will yield measures of the mobile and will indicate how far they contribute to social mortality differentials.

When these differences have been revealed, analyzed and, if possible, explained, social, medical and other measures can be carried out to improve the conditions of the disadvantaged population groups and of those whose health, if at all, has been damaged by one kind or another of social mobility.

3. Studying the structure of causes of death, especially the relative weights of the various chronic diseases, the role of multiple causes in the process of dying,

first of all in the ageing population.

Finding the chain of events, and the synergic effects of the various mainly degenerative and/or malignant processes is the first step to identifying priorities and introducing health care for the elderly.

4. Studying the regional mortality differentials on a county level (i.e., 19 counties and the capital), taking into account the distribution of population by demographic, socio-economic variables and the environmental factors.

When those relevant factors responsible for higher mortality have been identified, appropriate environmental and other measures can be taken to decrease exposure to risk factors and improve the quality of life in the counties in question.

5. Studying the epidemiological transition in the framework of demographic transition : evaluating the relative importance of socio-economic, structural changes (industrialization, urbanization), the changes in the way of life and the development of public health measures and medicine in relation to the secular trend and changing pattern of mortality.

6. International comparison of some aspects of mortality of the Socialist countries of Central and Eastern Europe and some other European countries (i.e., Austria, Finland), whose mortality patterns are similar to those of the Socialist countries.

Studies n°s. 1, 2, 3 and 4 are, in a certain sense, society-, age- and region-oriented respectively. What is common to all of them is that they make it feasible to find the relevant preventive measures for improving the health, and, in this way, decreasing the mortality, of the sub-populations in question. These are the means for reducing general mortality.

Studies n°s. 5 and 6 are less practical in character than the other four, their importance being mainly scientific. Nevertheless, the scientific endeavour would be worthwhile, considering that revealing the epidemiologic transition in the framework of demographic transition in Hungary would explain possibly the secular trend of mortality in the context of socio-economic development in a Central European country which would then be compared with the classical transition of North-western Europe.

The international comparison of some aspects of mortality of the Socialist countries in Central and Eastern Europe (and some other countries) would give a reliable picture, among others, of the sex-, age- and cause-pattern of mortality in these countries in the context of rather similar socio-economic development.

D. ACTIVITIES

1. Study of socio-economic-occupational differentials in mortality (cross-sectional study). The Death Statistical Data Sheets of all persons who died in 1980 will be used. Causes of death will be collected and analyzed from these sheets. The sheets will be matched with the census questionnaires of those persons who died in 1980. All the data, excluding those connected to death, will be collected from the census questionnaires.

2. Study of mortality differentials of socially mobile people (longitudinal study). A sample of the population, based on households, will be followed. The size of the sample is 0.5% of the population. Questionnaires will be filled out regularly by the interviewers on those who have been selected in the sample.

3. Study of multiple causes of death. In 1983 and in subsequent years, a sample will be drawn month by month from Death Statistical Data Sheets. The size of the sample will be 20%. No more than four causes will be used for tabulation. The cross-tabulated

causes will then be interpreted, looking after the relationship of the most frequent underlying causes of death to the other causes. In the cross-tabulation, the demographic variables will also be taken into consideration.

4. Study of the regional mortality differentials. Deaths occurring between 1980 and 1982 will be studied according to their regional distribution. Crude death rates, age-adjusted death rates, sex-, age- and cause-specific death rates, the standardized mortality ratio and county life table indices will be used to reveal mortality differentials. Correlations between various mortality measures, on the one hand, and some demographic, socio-economic indices on the other will be examined.

5. Study of the epidemiological transition in the framework of demographic transition in Hungary. The influence of socio-economic structural changes, the changes in the way of life and the development of public health measures and medicine on the secular trend and changing pattern of mortality will be examined.

6. International comparison of some aspects of mortality of the Socialist countries of Central and Eastern Europe. The trend and actual level of mortality will be compared using the most important mortality measures : crude death rates, adjusted mortality rates, sex-, age- and cause-specific mortality rates and some indices of the life table. Correlation between the measures of socio-economic development and mortality will be examined.

E. PREPARATION OF WORK PLAN

1. Study of socio-economic-occupational differentials in mortality. Begins in 1982, ends in 1986.
2. Study of mortality differentials of socially mobile people. Begins in 1983; there is no exact date to end the study yet.
3. Study of multiple causes of death. Begins in 1983, ends in 1986.
4. Study of regional mortality differentials. Begins in 1982, ends in 1984.
5. Study of the epidemiological transition in the framework of demographic transition in Hungary. Begins in 1982, ends in 1986.
6. International comparison of recent mortality differentials of the Socialist countries of Central and Eastern Europe. Begins in 1982, ends in 1986.

F. OUTPUTS

Publications of the six proposed studies :

1. Study of socio-economic-occupational differentials of mortality. Date of first publication : 1984.
2. Study of mortality differentials of socially mobile people. Date of first publication : 1987.
3. Study of multiple causes of death. Date of publication : 1985.
4. Study of regional mortality differentials. Date of publication : 1983
5. Study of the epidemiological transition in the framework of demographic transition in Hungary. Date of publication : 1986.
6. International comparison of recent mortality differentials of the Socialist countries of Central and Eastern Europe. Date of publication : 1986.

N E T H E R L A N D S

DIFFERENTIAL MORTALITY AS A SUBJECT OF RESEARCH POLICY AND AS A THEME IN POLITICAL DISCUSSIONS: THE CASE OF THE NETHERLANDS IN THE SEVENTIES

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INTRODUCTION

Since the late sixties, critical statements about the Welfare State have frequently been uttered in the Netherlands. Criticism came especially, but not exclusively, from the group known as the New Left. Their comments were mainly directed at the minimal progress the Welfare State had made towards equality in the areas of education, housing, income distribution and health services. As a consequence of their criticism, "social inequality" again became a topic in the political and scientific discussion. It is not surprising that, besides the differences in power, knowledge and income, also differences in mortality between socio-economic groups attracted the attention of politicians and scientists.

PLANNING FOR RESEARCH

The first sign of scientific interest in the last subject was the thematic commencement for a National Programme for Demographic Research (Van de Kaa, 1974), drawn up in 1973 by members of the NIDI staff. In an argument for the improvement and expansion of the collection of basic data and the better utilization of existing sources of statistical information, priority was given, among others, to improved use of data obtained from the present system of registration of births and deaths for the sake of the study of occupational mortality differences.

As adviser to the Royal Commission on Population*, Frinking (1974) also made a plea for new research into differential mortality. His proposal to update the Central Bureau of Statistics (CBS)-research relating to the years 1959-1961 came, however, at an unfortunate moment. Opposition to the 1971 population census, among others from war victims, left-wing political parties and religious organizations, and caused by plans to introduce a personal identification number and fear for the growing number of data bases, was reason for the CBS for not cooperating in the essential linkage of data from the personal cards of the deceased to census data for those persons.

In the report of the "Study Group on Morbidity and Mortality" of the above-mentioned Royal Commission (Ziekte, 1976), remarks concerning socio-economic mortality differences were confined to : "the analysis of these social differences is clearly defective in The Netherlands". It was recommended that the gap in this area should rapidly be filled. The Study Group's advice was adopted by the Royal Commission.

In the Royal Commission's final report, presented to the Minister for Public Health and Environmental Hygiene in 1976 (Bevolking, 1977), it can be read that the "inequality of death" is one of the most poignant forms of inequality. According to the Commission, high priority should be given to an inquiry into the exact extent and background of this problem. The indications that there are mortality differences according to occupation, education-and-income are considered strong. The government

* In 1972, the then Minister of Public Health and Environmental Hygiene set up the Royal Commission on Population to examine demographic trends and their effects on Dutch society.

is advised to minimize these differences and, for this reason, powerful support to the research into the causes of these differences is advocated.

After the Minister for Science-Policy, in 1974, had drawn up the National Programme for Demographic Research (NPDO) - aimed at programming and stimulating demographic research in The Netherlands - the necessity of research into differential mortality was strongly brought out, building on the inquiry proposed in the Thematic Commencement and linking up with the Royal Commission's advice. This was the case as early as 1976, in the Programme in Outline (Programma, 1976), but it gets a lot more noticeable in the NPDO's later reports.

In 1978, the NPDO Programme directors appointed an *ad hoc* study group which was to give advice on subjects and projects in the area of "Mortality" which were of relevance for the further elaboration of the Programme in Outline. This *ad hoc* study group presented a report in 1981 (Rapport, 1981). The group pleaded for a change in the methodology of mortality research (by means of linking existing statistical sources on an individual level) and for a more active compilation of data concerning deceased individuals. Some relevant suggestions concerning new forms of research are made in the report as an elaboration of the Programme in Outline, *viz.* research into permanent registration of mortality according to occupation, into techniques which could be used for the compilation and linkage of data concerning public health and into differential mortality according to occupation and social class. The use of data from different data bases and the possibilities of follow-back surveys are especially suggested as good approaches. In its Priority Program (Prioriteiten, 1980), the NPDO has already given highest priority to research into differential mortality according to occupation and social class.

In 1977, going along with the increasing interest in the subject, the NIDI, in an exchange of ideas with the CBS about the planned 1981 census, argued for a direct linkage of data on the socio-economic characteristics of the respondents, compiled by means of a sample census, to data on persons deceased in the period after the census. Provision for exploitation of the sample census data for this aim was officially requested "the Central Commission for Statistics in 1978 (this Commission is charged with the general control of official government statistics). This request was rejected late in 1978; technical objections (linkage could only be carried out with the aid of names and addresses) and the "privacy aspect" were the basis of the rejection. The last-mentioned aspect played an increasingly important part through the years and culminated in a statement, in February 1979, by the Minister responsible for the census, that he intended to include a ban on the linkage of census data to other personal data in the Census Act". The fact that the problem of social inequality of death was discussed at various scientific meetings also illustrates the increased interest in this subject. This was the case at, amongst others, meetings of the General Netherlands Society for Social Medicine*** in 1976 (theme : Regional and Social Mortality Differences), the Netherlands Demographic Society in 1979 (theme : Differential Mortality in The Netherlands) and, again in 1980, a large congress of the General Netherlands Society for Social Medicine. Under the heading "Inequality in Health and the Health Services" (Ongelijkheid, 1980), a great number of research results were discussed. The necessity of longitudinal research and the restrictions it experiences because of the privacy aspect were especially emphasized.

* Tweede Kamer der Staten Generaal; Session 1979-1980; stuk 15726 nr. 4.

** This is the most prominent organization of people working in the field of social medicine. Approximately 2,700 people (mostly medical doctors) belong to this organization.

POLITICAL DISCUSSION

How did these activities carry over into the political area? One of the first reactions indicating an interest in the problem of social inequality of death came from the Department of Social Affairs. This reaction came in answer to a publication in the NIDI-bulletin in which the results of English, Norwegian and French research into differential mortality were discussed and which included an argument for a prospective study based on the planned 1981 census. Late in 1978, a discussion with members of that Department took place in connection with a report on social inequality brought out by the Netherlands Scientific Council for Government Policy (Wetenschappelijke Raad, 1977)**. In this report, a (largely hypothetical) relation was established through empirical research. To that end, it would have to be looked into whether the differences in death risks, which pre-eminently lead to as problematic experienced social inequality relate at all to the position within the labour structure. The lack of research possibilities, however, soon curbed the enthusiasm.

Partly in connection with the above-mentioned publication in the NIDI-bulletin, a member of the Labour Party (the largest political party) asked the Secretary of State for Public Health, in the Second Chamber of the Parliament, to take action leading to the collection of statistical data in this area. These statistics should be included in the permanent series of statistical data compilation***. No direct answer was given to this question.

In the same parliamentary year (1978-1979), the Permanent Commission for Public Health of the First Chamber of Parliament asked the Minister of Public Health to release further information on higher mortality among manual labourers. The measures taken by the Government in this area were also asked for. In his answer, the Minister pointed out the necessity of collecting data on this subject. In consultation with the CBS, the Department decided to have the possibilities for data collection looked into****. In the session-year 1979-1980, the Permanent Commission for Public Health of the Second Chamber asked for an inventory of the possibilities of starting research into differential mortality and its causes*****. The Minister's answer mentioned a request by the Secretary of State to the Central Commission for Statistics to make some propositions concerning the best way to fill the existing gap in the information. During the discussion of the 1979-1980 Budget, the Minister for Public Health was again asked, this time in the First Chamber, whether he had undertaken any activities and, if so, which, in the area of differential mortality*****. Differential mortality was again introduced as a topic during the discussion of the 1980-1981 Budget of the Department of Public Health. In the Second Chamber, the Minister was asked to use the data of the different trade organizations charged with the execution of the social security regulations in order to get an insight into the mortality differences between the various socio-economic groups. During the debate, the Minister stressed that he consulted regularly with the Central Commission of Statistics with the aim of arriving, as quickly as possible, at a proposal for the collection of statistical data on differential mortality. Existing sources had, as far as possible, to be incorporated into this system*****.

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- * The aim of this council is, among others, to procure in aid of Government policy scientifically based information on developments which could influence society in the long run.
 - ** Parliamentary reports 31/10-2/11-1978, pp. 941, 943, 1043.
 - *** Memorandum in reply, First Chamber 15300, nr. 61 a, pp. 4,5, 13, 14.
 - **** Second Chamber, session 1979-1980 15800 Ch. XVII, nr. 18.
 - ***** Parliamentary reports First Chamber, 4th March, 1981, p.281.
 - ***** Parliamentary reports Second Chamber, session 1980-1981 16400 Ch. XVII.

Apart from these positive aspects, there was also (from the point of view of research possibilities) a negative development. In June 1980, the Second Chamber was informed that the Government had decided to postpone the 1981 census, at least until 1983. The expected non-reliability of the results, taking into account the problems due to non-response and public refusal to cooperate in the pilot census, and the wish to realize a privacy-act before holding another census played the main part in this decision^x.

Politically important also is that the Trade Unions are directing more and more attention to industrial circumstances which threaten the health of employees. In a discussion-report published in 1980 by the Federation of Netherlands Trade Unions (FNV)^{***}, ample attention is paid to socio-economic mortality differences (*Beter Werk*, 1980). It is stated that unhealthy labour conditions and the unfavourable income position are partly to blame for these differences. The trade union movement, which clearly has to play an important part in the area of healthy and safe industrial circumstances, cannot simply ignore the problem of differential mortality. In the Report, a plea is made for industrial action for better labour conditions^{****} and for influencing Government policy, research and the activities of various institutes, in so far as they are directly related to labour conditions.

NEW PERSPECTIVES?

When the Secretary of State for Public Health asked the Central Commission for Statistics to make propositions concerning the way to fill the information-gap on socio-economic mortality differences (see above), it was requested that starting points for the inquiry should also be looked for in other than the traditional sources. A study was requested as a sort of inventory of potential data sources. The first reaction of the Central Commission, worded by the Director General of Statistics, included the statement that the aim for an (integral) picture of mortality according to occupation in The Netherlands could not be realized in the near future. Various possibilities were impracticable :

- the occupational data on the deceased's personal card are not considered employable as the description of the occupation is too concise^{*****} and as nothing is usually mentioned about the "occupational history";
- preserving census material is not realistic because of the privacy aspect;
- an inquiry among relatives could give rise to ethical objections and would probably result in an unacceptably high non-response;
- linkage of data originating from, among others, the Social Security authorities, to CBS data would be difficult to realize because of privacy reasons.

^x Second Chamber, session 1979-1980 nr. 91.

^{***} The FNV is the largest union with 1,078,000 members, i.e., 60% of the Trade Union members and 24% of the total dependent working population.

^{****} According to an article in *Het Parool* (27.10.77), the industrial trade union NVV, district Amsterdam, had already, in 1977, distributed pamphlets among employees of hundreds of small industrial companies, in which social mortality differences were mentioned, aiming to make these employees aware of the dangerous work situations in many small companies.

^{*****} It is slightly ironic to read the following in the official regulations referring to the registration of the occupation on the personal card : "Considering that the data relating to occupation, c.q., ex-occupation, is highly significant for the compilation of statistical data on mortality according to occupation and social status respectively, the necessity of observing the indications given on this point is greatly stressed". (Leidraad, 1970).

It was proposed that the "inventory" study should be postponed until discussions about another possibility, to wit, an additional question concerning the socio-economic background of the deceased on the Death Certificate, were completed. The Secretary of State replied by stating that a further elaboration of other alternatives of data collection would be appreciated.

Connecting up with this, the NIDI recently took the initiative of planning a feasibility study into the possibilities of a follow-back survey. The possibility of linking this feasibility study to the above-mentioned inventory study is still under consideration. Cooperation with CBS and other relevant agencies is envisaged in this respect.

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N E T H E R L A N D S

SOME NOTES ON ECOLOGICAL RESEARCH IN SOCIO-ECONOMICAL DIFFERENTIAL MORTALITY

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INTRODUCTION

1. Ecological analysis of mortality differentials is of limited value because of the inherent methodological and statistical problems. When combined with analysis of data about individuals, an ecological analysis may give additional insight on a geographical level, which is quite often appropriate from a point of view of organization and decision-making. Performing an ecological analysis only essentially reflects a lack of availability of more powerful alternatives on an individual level.
2. Consequently, countries can usefully be divided into two groups. The first group consists of countries where, e.g., linkage of data from cohort studies to census data can be carried out (e.g., the Scandinavian countries, England). In this case, results from an ecological analysis can be interpreted very well by comparing them with the results from an individual-based analysis. The second group of countries (e.g., Belgium, the Federal Republic of Germany and the Netherlands) has to rely, to a large extent, on ecological research due to strict privacy regulations or to technical limitations of mortality registration. The best that these countries can do, when possible, is to perform surveys in order to get at least some individual-level information that may help in checking and interpreting the results from an ecological analysis (such a survey was carried out by the authors in Amsterdam in connection with the ecological mortality study in Amsterdam districts). The results from this ecological study are described in: van der Maas, Habbema et al (1981) : *Socio-economic mortality differences between districts in the city of Amsterdam*, p.79-82 in *Socio-economic Differential Mortality in Industrialized Societies*, United Nations/WHO/CICRED - 1981).
3. Consequently, ecological research is the only type of research that can be performed right now in all industrialized societies. Thus, when international comparisons on socio-economic differential mortality are to be based on a comparable analysis, ecological research is the only choice. Consequently, a study of methodological problems in design of, and inference from ecological studies may be important for the UN/WHO/CICRED meetings on coordination of research on socio-economic differential mortality in industrialized societies. Moreover, many of the participants in these meetings have personal experience with ecological studies, and may even have direct access to ecological data bases. This makes the group of participants in the meetings a good platform for making progress into tackling these ecological analysis problems, and into critical appreciation and application of newly proposed methods.
4. The present paper aims to indicate some of the main problems in ecological studies, without any claim of being comprehensive or thorough. Maybe it is appropriate to propose a brief definition of what we would call an ecological study on socio-economic differential mortality : *A study in which the relationship between at least one variable describing mortality in some geographical areas and at least one variable indicating aspects of the socio-economic situation in these areas is analyzed.*

SOME LIMITATIONS OF ECOLOGICAL RESEARCH

5. There will always be problems with interpreting interactions between the explanatory ecological variables, which may differ fundamentally in time, space and meaning. At least the following groups of variables can be distinguished :

a. Real regional characteristics, like : climate, soil composition; air pollution, drinking water composition; health services. Each of these variables may have a quite different latency period before it has an effect on mortality.

b. Variables which show some degree of spatial differentiation : a high degreee of differentiation is found in the socio-economic characteristics of the ecological areas; ethnicity, migration, density and crowding show a moderate degree of spatial differentiation.

An important observation on socio-economic characteristics is that migrating individuals tend to move to ecological units of about the same socio-economic status as before.

c. Variables describing heterogeneity are particularly difficult to interpret because the same degree of heterogeneity (e.g., in religion) may be uniformly present on the whole unit, or may result when the geographical unit consists of two extremely difficult, but in themselves homogeneous, sub-units.

6. Choosing a good subdivision into geographical units also creates some problems.

a. Smaller regions are more homogeneous with regard to all kinds of characteristics, but also involve smaller numbers of deaths. Greater homogeneity increases the power of the analysis, but smaller numbers of deaths decrease the very same power.

b. These may be administrative differences in recording of the ecological variables between the units in the total region under study. In general, this causes far less problems for small regions (e.g., a city) than for a large region (e.g., Western Europe).

c. When units are chosen in such a way as to maximize the differentiation of some of the explanatory variables, these same variables will, by circularity of reasoning, turn out to show the best differentiation between the geographical units. When using a grid analysis, on the other hand, differentiation of variables will be smoothed out because of the entirely mechanical determination of boundaries between units.

7. Interpretation problems abound. Some of them are :

a. When an explanatory variable (e.g., the fraction of people living alone) is associated with mortality in an ecological study, this may reflect an individual effect on an aggregated level or a real ecological effect on all inhabitants of the ecological unit, or both (but in what proportions?).

b. Whole clusters of explanatory variables may show extremely high intercorrelations (e.g., the socio-economic level related variables like income, education, housing quality and professional status). This makes a disentanglement of the possible ecological effects of the individual variables in the cluster impossible.

c. The interpretation of ecological correlations and regressions is particularly problematic. On the one hand, the numerical value of the "real" correlations may be changed or even reversed of sign when the correlation reflects the aggregation of correlations on an individual level.

On the other hand, both poorly differentiating explanatory variables and small numbers of deaths in the units may attenuate the numerical value of a real ecological correlation. Regression lines, including the stepwise selection of explanatory vari-

ables, are nearly uninformative, because of the reasons mentioned above, but also because of the multicollinearity problem. Moreover, ecological relations between explanatory variables and mortality are not necessarily linear. For example, air pollution may have to reach a certain threshold before showing any effect on mortality at all. Another example : when a small percentage of workers is unemployed, an increase in mortality resulting from social stress (by being treated as deviant) may result. But when the percentage grows, unemployment becomes less deviant, and thus, the social stress decreases and may even reverse and become greater for the people who are employed.

SOME WAYS OF PROCEEDING FROM HERE

8. There are several options open for further examination of the problems discussed. These include :

- a. Performing ecological analyses for different sizes of the geographical units, and comparing and explaining differences in results (this is possible for nearly all ecological studies, and is, for example, undertaken in the Amsterdam study).
- b. Comparing an individual-based analysis with an ecological analysis (this can be done in a few countries only).
- c. When, in addition to the ecological study, a survey is carried out, ecological and survey results can be compared (this is being done in the Amsterdam study).
- d. Theoretical, mainly analytical research on the analysis of ecological studies (cf., the classical papers on ecological correlation, and the new fields of spatial analysis and multilevel models).
- e. Numerical experimentation with simulation models, where individual and ecological effects, and the results from their aggregation on an ecological-unit level, are studied by Monte Carlo methods. Such models are currently being developed at our Department.
- f. In our opinion, it is highly desirable that a reasonably simple, understandable and self-contained set of methods for description, analysis and presentation of ecological research in our area should be developed. This set should de-emphasize (but not throw away) methods like correlation, regression and multivariate linear methods.

TO CONCLUDE

9. In order to be able to prepare a session on ecological research on socio-economic differential mortality in industrialized societies (excluding infant mortality) for the next meeting, we would kindly ask you :

- a. to bring to our attention all studies (especially in your country) satisfying the definition in point 4, when possible with relevant literature and with the full address of one of the research workers in the project.
- b. to comment on the paper, to criticize it, and to supplement it.
- c. to make further useful suggestions for our preparation of the session.

A N N E X

CURRENT AND FUTURE RESEARCH ON SOCIO-ECONOMIC DIFFERENTIAL MORTALITY AT THE DEPARTMENT OF PUBLIC HEALTH AND SOCIAL MEDICINE, ERASMUS UNIVERSITY, ROTTERDAM

1. REPORT ON THE STATE-OF-THE-ART

(i) The most important research project is the ecological study of socio-economic mortality differences between districts in the city of Amsterdam. This study has been reported in the CICRED brochure Socio-economic Differential Mortality in Industrialized Societies, I, 1981, pages 79-82.

Another relevant study is that of medical and socio-economical determinants of the development of (spatial) mortality patterns in the Netherlands between 1850 and 1980. A literature review and a preliminary inventarisation of accessible relevant data for the Netherlands are in progress.

A number of other research projects at our department, e.g., those concerning mass screening, air pollution and CNSLD, health interview surveys, yield, more or less as a by-product, material concerning socio-economic differential mortality.

(ii) Major findings and drawbacks concerning the Amsterdam-district study can be found in the reference mentioned. The other studies are not yet far enough in progress in order to discuss findings and drawbacks fruitfully.

(iii) Work to be carried out in the near future : A further analysis of the Amsterdam-district data; Analysis of health interview survey data in districts of Amsterdam and comparing them with the ecological data; Further work on and decision about how to proceed with the study on medical and socio-economical determinants of mortality in the Netherlands between 1850 and 1980.

(iv) We plan to start working on a number of methodological problems in 1982. The department has always had a strong interest in methodological problems, but, due to full-time work on empirical research, these problems have not yet been seriously tackled. See section 2.

(v) Thinking of inter-centre cooperation, we shall primarily be interested in cooperating on methodological problems. But also with research workers who are working on comparable empirical projects as our own main ones.

2. SOME METHODOLOGICAL RESEARCH TOPICS

Some of our main topics of methodological interest :

General

- (a) Modelling and interpretation of age, time and cohort factors in mortality analysis.
- (b) The methodology of standardization, its uses and limitations, and its relation to more advanced statistical models.
- (c) Research towards the relation between privacy regulations and the possibilities of socio-medical research.

(d) Interpretation and analysis of simultaneous historical time-series, as occur in determining the impact of socio-economic developments on mortality figures.

(e) Efficiency, biases and limitations of the distinct types of research on socio-economic mortality differences.

Ecological research

(f) Sample-size requirements in ecological research.

(g) Correction for attenuation of the correlation coefficient in ecological research.

(h) Limits to the use of linear models (correlation, regression, structural equation models) in ecological research, due to, for example, multicollinearity.

(i) Dependency of the inference on the size of the ecological units chosen (a special case of multilevel analysis).

(j) Comparison of inference using ecological data with that using survey data.

A useful tool in assisting us with answering these questions is the micro-simulation programme MISCAN which has been developed at the Department over the last three years.

N E T H E R L A N D S

FUTURE POSSIBILITIES OF RESEARCH ON SOCIO-ECONOMIC DIFFERENTIAL MORTALITY IN THE NETHERLANDS

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I. INTRODUCTION

The analysis of socio-economic differential mortality in the Netherlands was mainly restricted to the ecological method. A recent proposal for studying mortality on the individual level was made in a report of the National Programme on Demographic Research. In this report, the privacy and confidentiality problems were mentioned (!). It is necessary to deal with this dilemma, before an investigation on the individual level can be undertaken. A solution for this dilemma might be a choice of methods in which explanatory data and information about the causes of death are collected on a voluntary basis from potential respondents such as doctors and relatives. A classification of methods, set up at the UN/WHO/CICRED meeting in 1980 and elaborated by Elsebeth Lynge (2) will be used for a discussion about this possible solution.

II. METHODS APPLIED IN SOCIO-ECONOMIC MORTALITY RESEARCH

1. Less expensive methods

1.1 : Cross-sectional studies

In these studies, occupational mortality is expressed in social class gradients, using the population denominator by sex, age and occupation from the census and the numerators from the death certificates.

This crude method leads to results which appear to be similar to the results of a longitudinal study (3). Social class gradients of mortality are published for England ever since 1851, and are even published for poor countries nowadays (4). The absence of these statistics for the Netherlands is surprising.

1.2 : Ecological studies

This method has been applied in several Dutch studies. It could lead to interesting results, because data of acceptable quality are available for some explanatory variables. The main problem of this method is that it is used as an interpretation of individual mechanisms on the aggregated level. It certainly leads to hypotheses that could be tested on the individual level.

2. Moderately expensive methods

2.1 : Proportional mortality studies

In this type of study, the proportion of deaths due to a certain cause of death is compared between occupational groups. If the information about the occupation on the

death certificate is used, this could lead to a valuable contribution to the Dutch mortality statistics despite the questionable validity of the occupational information.

2.2 : Case-control studies

The purpose of this method is to study relative risks. It is a preferable method in studies of rare diseases. It could also be applied in the Netherlands.

3. EXPENSIVE METHODS

3.1 : Matched records

Individual census data are matched with death certificates (5). It is not allowed to apply this method in the Netherlands. The method is out-dated anyway, because it does not include important explanatory variables.

3.2 : Retrospective studies

The follow-back method has been applied several times during recent years. Relatives and doctors are questioned particularly about the history of morbidity and the risky habits of the deceased. Insufficient response and reliability of the answers to the questionnaires can present a problem. With due consideration to the methodological problems, it might be a feasible method for the Netherlands. A positive aspect of this method is that it can be used to test hypotheses arising from ecological studies within reasonable limits of time and money.

3.3 : Prospective studies based on census data

A cross-sectionally registered population sample is followed-up during a certain period starting in a census year. Records are matched by means of personal identification numbers.

Considering the strong opposition against a personal identification number, it is unlikely that this method will ever be applied in the Netherlands.

3.4 : Prospective studies based on cohort data

This method is widely used in occupational mortality studies. It involves the registration of individual characteristics from the date of entry into an occupation. Occupational registration has recently been suggested in the Netherlands. A way to deal with the opposition might be the rule of the register, that the participants cooperate on a voluntary basis. It might be a feasible method of studying occupational risks in the Netherlands.

3.5 : Longitudinal studies

This method has been applied in several studies by the linking of data from subsequent censuses and death certificates. It will not be possible to use Dutch censuses for this purpose.

III. CONCLUSION

The conclusion may be drawn that cross-sectional, ecological, proportional mortality case-control, retrospective and prospective cohort studies could be undertaken in the Netherlands. Studies involving census data on an individual basis tend to remain plans; Frans van Poppel tells the sad story of the NIDI-initiatives in full detail (6).

It should be worth mentioning that especially the methods applied in ecological, case control and prospective cohort studies are also promising for a combined analysis of morbidity and mortality.

The ecological studies will continue in the near future. The regional mortality differences seem to correlate with some explanatory variables. This could lead to hypotheses which should be tested on the individual level. A comparison between results from studies on the ecological and individual levels might be interesting. Analysis on the ecological level is also of interest.

The most interesting new possibilities are retrospective studies and prospective studies based on cohort data. Retrospective studies might be feasible, but the most difficult part will be the design of data collection methods, which lead to sufficient response rates among the relatives of the deceased. Occupational registers could be used for prospective studies based on cohort data. Such registers might be possible if the participants cooperate on a voluntary basis, but it will be highly costly and time-consuming, especially when questionnaires on explanatory variables like risky habits are regularly sent to the participants. The Dutch mortality according to occupation has been published in detail for the periods 1891-1895, 1896-1900 and 1908-1911 (7, 8, 9).

By means of these data, it is not quite possible to calculate a mortality in social class gradients. Nevertheless, from the under-mentioned examples of mortality among males in the age group 18-50 per 1,000 males in an occupational category, it would appear that there was probably a mortality gradient in social class in those days : all 8.20, navigation (commanders, navigation officers, etc.) 6.53, navigation (sailors and boatswains) 14.86, and without an occupation 15.88 (10). It is a great pity that these particularly interesting results did not give rise to a prolonged and more profound research.

The inexperience of the Dutch mortality researchers with large-scale research on socio-economic differential mortality is a problem. Advice of experienced foreign researchers should be necessary. Among other groups, the "Benelux working group on mortality research" and the "UN/WHO/CICRED group on socio-economic differential mortality in industrialized societies" offer interesting possibilities of contact at present.

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