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POTENTIALS OF RECORDS AND STATISTICS FROM CIVIL  
REGISTRATION SYSTEMS

FOR HEALTH ADMINISTRATION AND RESEARCH

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**FOREWARD**

This is a consolidation of two papers presented at two separate meetings organized by the World Health Organization and the United Nations. The first paper, entitled "Public Health Uses of Mortality Data," was given at a meeting on Socioeconomic Determinants and Consequences of Mortality held in Mexico City, 19-25 June 1979, and the second, entitled "Advantages and Disadvantages of Continuous Registration Systems for National, Subnational and Differential Mortality Analysis," was prepared for the meeting of the United Nations/World Health Organization Working Group on Data Bases for Measurement of Levels, Trends and Differentials in Mortality held in Bangkok, 20-23 October 1981.

Over the years, mortality statistics derived from the civil registration process have been used extensively for the delineation of public health problems, and for various analytical studies on health and demography. In addition, the individual death record has been useful in identifying infective foci of disease as well as in the epidemiologic studies of chronic diseases. The most important feature of registration statistics is that they provide detailed all-purpose reference tables annually for various segments of the population which can be tapped for specific studies. For public health purposes, a most valuable datum relates to causes of death.

The continuous registration system offers data possibilities which cannot be obtained in any other way. On the other hand, death statistics for the developing countries are frequently of limited usefulness because of incompleteness of the registered events. The improvement of completeness and quality of official death statistics in these countries is a difficult task requiring time and effort. Some suggestions are made on steps that might be taken to develop and improve national death registration systems.

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POTENTIALS OF RECORDS AND STATISTICS FROM CIVIL  
REGISTRATION SYSTEMS FOR HEALTH ADMINISTRATION AND RESEARCH

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For many years, there was only one recognized way of producing vital statistics, and this was from birth and death records filed for legal purposes. This, despite the fact that the statistics derived from these documents in the developing countries were generally so incomplete as to be of limited usefulness.

Shortly after World War II, there arose in developing countries a demand for birth and death statistics for planning, administration and evaluation of health programs; measurement of population growth for family planning programs; and for national social and economic development planning purposes. Because the then current civil registration systems were incapable of providing the needed statistics, other ways and means were sought to estimate birth, death and population growth data. This led to the application of retrospective survey methodology, and the development of indirect methods of estimating fertility and mortality rates. The availability of these methods for estimating birth and death statistics naturally raises questions about the value of civil registration data for statistical purposes.

It is the purpose of this paper to discuss the advantages and disadvantages of the current continuous death registration system as a source of data for differential mortality analysis and other uses of mortality data. To provide a proper perspective to the problem, a historical background relating to the development of mortality statistics will first be given. This will be followed by brief discussions of the death registration process and the uses of both individual records and statistics derived from the death certificate. Then the advantage and disadvantages of the continuous registration system for the production of national mortality statistics will be discussed.

#### Historical development

The forerunner to the civil registers were the ecclesiastic registers. These registers recorded weddings, baptisms, and burials occurring in the parish. The earliest known compilation of bills of mortality was issued in 1532 in London. These bills were weekly lists of burials, and included the name of the deceased, the parish in which the burial took place, and the cause of death with particular reference to the plague. The cause of death was determined by the searcher after she had viewed the body. In the more difficult cases, the searcher consulted a doctor. The searchers made their report to the parish clerk who prepared an account of all the burials every Tuesday night. On Wednesday, the general account was made up and printed. On Thursday, the bills were distributed to subscribers who paid 4 shillings a year.

More than a century later, John Graunt conceived of the idea of utilizing the Bills of Mortality for analytical studies which were published in 1662 under the title of Natural and Political Observations Upon the London Bills of Mortality. Despite medical progress, the diagnostic quality of the bills did

not improve. Also, interest in the old bills waned. Clerks of many parishes failed to report, or reported only irregularly. Even when complete, the bills gave no information about the population of towns and countries.

In 1837, the Registration Act was passed in England with provisions for an inquiry into the causes of death. In 1839, William Farr was appointed compiler of abstracts in the Registrar General's Office, and he, probably more than anyone else, developed and analyzed mortality statistics to delineate the sanitary and health problems of the day. Farr (1) reported on life and death in England, on possibilities and difficulties of extending human life, the effects of sanitation on mortality, mortality and the economic situation, mortality and the water supply, urban and rural mortality pointing out healthy and unhealthy districts, mortality at different ages by sex, mortality of illegitimate infants, and other topics.

Traditionally, official mortality statistics have been derived from the death record filed in compliance with the requirements of the civil registration laws to prevent the illegal disposition and/or transportation of a dead body. In other words, death statistics are, by and large, by-products of a legal process. An exception to this has been the attempt to collect national death statistics in the United States by the enumeration method in conjunction with the decennial population censuses of 1880 to 1900. It should be noted that death registration laws were already in effect in all the States at that time. However, it was felt that the registration coverage was not sufficiently complete for the compilation of national mortality statistics. Therefore, census interviewers were used to collect, on a retrospective basis, information on deaths that occurred in the household over a period of a year. Unfortunately, the census approach yielded fewer deaths than were abstracted through the death registration process in the States with reasonably good registration systems. The census enumeration procedure was therefore abandoned after the 1900 census, and the U.S. Death Registration Area was formed as a basis for national mortality statistics.

It was not until after World War II that developing countries felt an acute need for adequate mortality statistics. Death registration data were then found wanting, with little possibility of rapid development of the registration system. Other methods were therefore sought to produce mortality data. The resulting research efforts led in two general directions, one being direct methods of estimation utilizing field surveys or a combination of records and surveys, and the other being techniques of estimation utilizing indirect indicators of mortality.

#### Some aspects of the death registration process<sup>1/</sup>

The legal base for death registration is some kind of civil law on registration which establishes the compulsory nature of and the requirements for registration of deaths. The law designates the person responsible for registration, the place of registration, and prescribes the time allowed for the registration of the event, fees required, if any, and the penalty for failure to register.

<sup>1/</sup> For full description of the civil registration procedure, see Handbook of Vital Statistics Methods. Studies in Methods. Series F, No. 7, United Nations, 1955.

In most countries, the responsibility for the registration of a death rests with a relative or the head of the family or of the household. Data concerning the decedent are obtained from the informant prior to or at the time of the registration. These data usually include the time and place of death, the personal particulars about the decedent, and characteristics of the parents, attendant at death, informant, witnesses and the registrar, and the method of interment. Another important datum is provided by the medical attendant, if any, or by the medicolegal authority, on the cause of death.

In most countries, the legal record, usually in the form of books of actas, is brief. For statistical purposes, additional information is collected from the informant at the time of registration. The legal record is placed in a permanent repository while the statistical transcript is transmitted to the government agency responsible for vital statistics.

In other countries, the legal and the statistical forms are combined into a single death certificate. The original death certificates are bound into books and filed permanently for legal purposes. Provisions safeguarding the confidentiality of information in these documents vary depending on the country. However, certified copies of the record are generally issued to individuals upon request.

#### Uses of death statistics

Official mortality statistics derived from death records are used extensively for demographic studies and in public health programs. These studies may deal with mortality differentials by age, sex, occupation, socioeconomic characteristics, etc., or they may deal with the demographic characteristics of the decedent to eliminate the effects of age, sex, and ethnicity for studies of mortality risk factors. For public health purposes, the statistics on causes of death figure prominently. Death statistics have long been used as indicators of health, as measures of the magnitude of health problems, and for the evaluation of health programs, despite certain limitations of mortality data for this purpose. The availability of mortality statistics on a routine basis for the various political subdivisions of a country is of central importance to the utilization of death statistics for these manifold purposes.

An important use of mortality statistics is in the study of determinants of disease. For example, Pool and Chan (2) observed the differential decline in the tuberculosis mortality rate for the Maoris and attributed the decline to the disadvantageous position of the Maoris in New Zealand society until the 1940s. Poverty, poor diet, and failure to seek medical treatment were cited as causes of the high mortality rate for the Maoris, and the decline was attributed to improved medical technology in the post-war period. Mass X-ray campaigns and antibiotics were said to have contributed to the accelerated rate of decline.

Another example may be cited as a result of postwar experiences in a number of countries where nationwide malaria control programs were carried out, and where significant reductions in the general mortality rate occurred. Pampana (3) presented data for 6 countries where such programs had been in operation for at least 5 years and for which adequate data were available. In all of these countries, a rapid decline in the crude death rate and in the infant mortality rate invariably followed the countrywide application of DDT. The decline in mortality was most striking in Ceylon where the crude death rate dropped from 20.3 to 14.3 per 1000 population in a single year, 1946 to 1947, after the start of the

malaria eradication program. Although there appeared to be little question about the dramatic decline in mortality in Ceylon, there was not general agreement as to the cause of the reduction. Meegama (4) attributed part of the decrease to malaria control and the rest to the establishment and provision of health and medical services. Fredriksen (5) found similar mortality reductions in non-malarious areas not protected by pesticides, and concluded that the decline in mortality was associated with economic development and the consequent rise in the level of living. Newman(6), on the other hand, took the position that it was not possible to disentangle the effects of the various factors that were operating at that period.

There are many other examples of epidemiologic studies based on official mortality statistics. Hoover and Fraumeni (7) studied the cancer mortality in counties where certain industries were located and found excessively high death rates for bladder, lung, liver and certain other cancer sites in 139 counties where the chemical industry was centered. Blot and Fraumeni (8) compared the lung cancer mortality for counties in the United States where paper, chemical, petroleum and transportation industries were located with that for adjacent counties where there were no such industries. Excessively high lung cancer death rates among males were observed in the counties where these industries were located, which may account for part of the rapid increase in lung cancer reported for the southern coastal counties in the United States. It was suggested that these particular industrial operations be studied to ascertain the etiology of lung cancer.

In the studies described thus far, the observed changes and differentials resulted in inferences leading to hypotheses about disease causation. There are also studies that start with a hypothesis about a disease and accumulate data to test it. For example, Fears (9), in an effort to ascertain if naturally occurring asbestos resulted in increased risk of cancer mortality, identified the various counties in the United States with asbestos deposits. Each of these counties was then matched with two nearby counties that did not have known asbestos deposits. The comparison of cancer mortality rates for the two sets of counties gave no evidence that naturally occurring asbestos is a hazard to the general population.

All of the studies that have been cited have one characteristic in common, namely, that the investigations are based on traditional or official mortality impinging on the general population as well as the special risk factors. Therefore, it is not possible to determine the effect of any particular factor. However, descriptive epidemiology is valuable in suggesting hypotheses or leads for further investigation.

For the testing of epidemiologic hypotheses, it is necessary to include in the study measures of specific risk factors. This is the basis of the case control or the retrospective epidemiologic study and the prospective epidemiologic study which will be discussed later in connection with the uses of death records.

#### Uses of death records

The death record provides a proof of death for burial or other means of disposition of the remains; for the settlement of life insurance and social insurance claims; and for the adjudication of property ownership and inheritance claims. It also provides legal evidence on the rights of surviving spouse to remarry. The death record has also been used for clearing various kinds of files

such as social security files, disease case registers, electoral lists, bank accounts, missing persons files, etc.

The death certificate or the death reports have been used extensively in public health and medical studies. The death record has been useful for program purposes in public health, for linkages to other records, in follow back investigations, and for retrospective and prospective epidemiologic studies. A brief description will be given of each of these uses.

Public health program uses. One of the common uses of vital records in public health is the referral of certain problems to specific program units for follow-up or investigative purposes. For example, in many local health departments, death records involving individuals that died from certain infective diseases are routinely referred to the communicable disease unit. This makes possible the spotting of epidemics, or in the case of virulent epidemic diseases an investigation to examine contacts in attempts to contain the spread of the disease.

Other program uses may be mentioned. Birth records of immaturely born children may be referred to the maternal and child program for follow-up purposes to advise on the proper neonatal care for the baby. In the event that the child was born with a malformation, the crippled childrens' program may provide assistance or make the parents aware of the available services for such children. None of these community and personal services can be provided without the identity of individuals involved.

For many service programs, it is important to update the registers by removing on a current basis those that dropped out of the program through death. This can be done by matching the death records with the registry file. Then there are the administrative and scientific purposes to be served by vital records. One of these is the surveillance of certain disease problems. For example, in establishing a registry for incidence or prevalence studies, the death record plays an important role. For one, the cancer registry attempts to record every known case of cancer. Deaths from cancer, if reported to cancer registries, will serve to supplement the known cases. In the poorer registries, more than half of the registry cases are those that were identified by the death certificate. Even in the better cancer registries, more than 10 percent of the total cancer cases come to the attention of the registry from the death record. Other surveillance systems will also benefit from a routine flow of information from the vital records. Cates, et al, (10) found that surveillance techniques identified more deaths as abortion-related than the death records. However, when the death records were combined with surveillance records, there was a significant improvement in the identification of abortion-related deaths.

One of the important uses of the cancer registries is to make a systematic follow-up of cancer patients in order to schedule periodic examinations. For this purpose, it is essential that the registry clear all cancer patients that die by matching death records to the register cases. This also makes possible the determination of survival rates for the various groups of cases. The survival rate is one means of assessing the effectiveness of different kinds of cancer therapy.

Record linkage. The value of mortality statistics per se, that is, official mortality statistics, is limited for epidemiologic and evaluation purposes. This is because mortality data are not generally classified according to the

factors that need to be studied. One needs to go beyond the usually available demographic characteristics such as age, sex, ethnicity, etc. To break out of the limiting bounds of mortality statistics, one could utilize the death record to link with other pertinent information. A simple example of this may be found in the study of infant deaths. The conventional infant mortality statistics includes rates by age, sex, and cause of death. Although immaturity is tabulated as a cause of death, there is no way of obtaining death rates for low birth weight infants using the death record alone. However, the birth certificates for many countries contain information on birth weight. Therefore, if the infant death record were to be matched to the birth record, it would be possible to utilize the birth weight data recorded on the birth certificates for the numerator as well as the denominator of the rate. Similarly, it will be possible to obtain infant death rates by age of mother, parity, and other information concerning the mother or child which may not be recorded on the death certificate.

Other examples of linked records are available. The Canadian Atomic Energy Commission (11) designed a record-linked population for genetic studies. Birth certificates were matched to marriage records, thus establishing a roster of family units as well as individuals. The death record was also linked. This record linkage system was to keep track of groups of individuals exposed to low levels of radiation to determine the causes of eventual death.

The Oxford Record Linkage Study dealt with a central file of mortality and hospital mortality records for a defined population. Although the pilot study was designed primarily for administrative studies, it also offered resources for epidemiologic investigation of diseases which are generally treated in hospitals. As a result of the pilot study, Acheson, et al, (12) suggested that a national record linkage system be considered for England and Wales by the adoption of a unique identity number for each patient in the National Health Service.

Follow back studies. To go beyond the limitations of the traditional mortality statistics, it has also been suggested that supplemental data be collected by going back to the informants named on the death record. By obtaining the same information for a sample of the living population, it would be possible to present death rates on items not covered in the death record. Also, by going back to the medical attendant at death, it should be possible to obtain additional diagnostic information as well as making the evaluation of the quality of diagnostic data.

Epidemiologic studies. One of the significant developments in the postwar period was the burgeoning of public health interest in environmental problems which gave rise to many studies in chronic disease epidemiology. In these efforts, mortality statistics proved to be an inadequate source of data. It remained for the death record to serve this new need by providing a starting point in retrospective studies and by providing an end point in prospective epidemiologic studies.

In the retrospective, or the case control, study approach, the death record is employed to identify the cases for retrospective epidemiologic study, one group of cases being related to the disease under study and the other to a matched control or comparison group. A follow back is then made to a data source for information on the etiologic factor, and a comparison is made between these two groups to establish whether the factor is associated with one group and not with the other.

Stewart, et al, (13) MacMahon (14) and others have made studies of childhood cancer utilizing the death certificate as the starting point. In the former study, more mothers of children who died of leukemia and other malignant diseases remembered having abdominal or pelvic X-ray during the related pregnancy than did the mothers of a sample of children who did not die of cancer. In MacMahon's study, the children born in a study population who subsequently died of cancer were identified in a review of death and birth certificates. Records of pregnancy and delivery of these children were also reviewed. It was found that cancer mortality was much higher in the X-rayed than in the unirradiated children in the study population.

More recently, Blot, et al, (15) undertook a case control study to identify the factors associated with the unusually high lung cancer death rate among the male residents of coastal Georgia. It was found that the increased risk was associated with employment in the shipyards during World War II. It was also found that cigarette smoking produced a synergistic effect. The findings suggested that asbestos and possibly other exposures during wartime employment accounted for part of the excess mortality from lung cancer in the southeastern coastal areas of the United States.

The prospective study starts with a hypothesis about a disease and data are collected for two defined populations, the "experimental" group and the comparative or the "control" group. These two population cohorts are then followed until an event (i.e., death in the case of mortality studies) occurs. The use of matched controls, that is, two populations similar in all respects except for the factor being tested, provides a stronger basis for showing association between variables than the mentioned retrospective approach.

In a prospective study of mortality from lung cancer among asbestos workers, Doll (16) and Knox, et al, (17) found lung cancer to be a specific environmental hazard of certain asbestos workers. The average risk among men employed for 20 years or more was in the order of 10 times that of the general population. The risk lessened as duration of employment under old dusty conditions decreased.

One of the more significant epidemiological findings of recent years are those demonstrating the association between smoking and lung cancer. Doll and Hill (18) sent questionnaires to about 60,000 men and women on the Medical Register and elicited information on individual smoking habits. Some 40,000 who responded were followed for a period of time and deaths occurring in this population were identified from the files of the General Medical Council and the British Medical Association. With the identification of these deaths, the Registrar-Generals in the United Kingdom provided the particulars on the cause of death. This study showed a significant association between smoking and lung cancer.

Dorn (19) started with about 200,000 policy holders of U.S. government life insurance. A questionnaire was sent to each member of this cohort obtaining information on smoking habits. Mortality of this group of war veterans was ascertained when the death claims were made. The mortality of those who smoked cigarettes only was found to be the highest of all groups of smokers, and 58 percent greater than nonsmokers. The greatest increase in risk of developing a disease was for cancer of the lung. The mortality ratio for regular smokers was about 10 times that for nonsmokers. The death rate of men smoking more than one package per day was 16 times that of nonsmokers.

The atomic bomb explosions over Hiroshima and Nagasaki made the world acutely aware of the dangers of ionizing radiation not only to those who were exposed but to their progeny. Shortly after the end of World War II, the Atomic Bomb Casualty Commission was established to study the delayed effects of ionizing radiation from the A-bombs. A major part of the program is the life span study (20) of A-bomb survivors. In this study, a sample of about 110,000 survivors and controls who were alive on October 1, 1950 was selected to be followed. Dose estimation was made for each survivor from information regarding their physical location and the shielding configuration at the time of the bomb. Deaths occurring to the members of this cohort are ascertained periodically from checks of the family register, and copies of death certificates secured. This unique Japanese system of family registration makes possible the ascertainment of virtually all deaths in the sample regardless of the place of death in Japan.

Comparison of the mortality experience of the exposed population by dose with that of the nonexposed group gives a measure of the relative mortality risk due to varying degrees of exposure to ionizing radiation. To date, it appears that the major problem (21) of A-bomb radiation exposure relate to neoplasia, especially leukemia among the exposed population. Of the solid tumors, lung cancer, breast cancer, cancer of the esophagus, cancer of the urinary tract and lymphomas have been found to be associated with A-bomb exposure. In addition, a residual group of cancers of the digestive tract other than esophagus, stomach, large bowel, rectum, and pancreas was found to be related to radiation dose, suggesting that one or more additional digestive organs may also be involved.

#### Advantages of a continuous registration system

A major advantage of a continuous registration system is the fact that, once the system has been established on an adequate basis, there will be a continuous flow of death records from the local registration units to a permanent repository to serve legal purposes. This makes possible the transcription and/or transmission of copies of death records to a central agency for data processing and statistical compilations.

Registration data deal with the whole universe of events. Therefore, not all of the data may have been tabulated routinely, but much of the needed statistics are usually readily available annually. This is an invaluable feature of registration statistics in providing detailed all-purpose reference tables for various segments of the population that can be tapped for specific studies. It makes possible the conduct of analytical studies on numerous topics either on a cross-sectional basis or over a period of time. The availability of trend data is a very important advantage of a continuous registration system.

The general availability of mortality data by various personal characteristics of the decedent such as age, sex and ethnicity for the country as a whole and for the different geographic divisions down to the smallest political subdivision makes possible the utilization of mortality data for many purposes, as illustrated previously. Shapiro (22) points out that for local health planning purposes the availability of data for the past and present, and likely availability for the foreseeable future, for geographically disaggregated levels down to subdivisions of a city makes up for many of the defects that may be present in mortality statistics. The question posed to the user of mortality data for planning purposes is how to maximize the utility of this resource although conceptual and technical issues still remain.

The compiled data will, at least for countries with well-established systems, generally be comparable from place to place within a country, and from one time period to another. Such internal consistency is one of the remarkable characteristics of registration data. Also, because the definitions and classifications used in vital statistics are usually international in nature, there is a considerable amount of comparability in the data for the various countries.

The availability of statistics on causes of death, and the possibility of obtaining other medical information through the follow-back procedure, makes registration statistics virtually indispensable for public health and medical programs. Even developing countries may be able to generate useful cause-of-death data through a system of lay reporting. This is not as farfetched as it may sound because in developing countries a large proportion of all deaths occur in the childhood years. The common diseases of childhood may frequently be recognized by the mother. These cases, plus the accidental causes, do not require medical training for an adequate description of the cause of death.

It is difficult to ascertain the cost of registration statistics because a large part of the collection costs is borne by the legal registration process. However, it is probably fair to say that the unit cost of registration data is considerably less than that of data obtained from interview surveys.

The continuous flow of data on a permanent basis obviates the necessity of mounting periodic surveys with attendant high costs, and possible changes in survey personnel, objectives, procedures and definitions. In addition to the statistics, the death registration system provides death records which make possible the identification of deaths of individuals for use in communicable disease control and in other public health programs such as those on maternal and child health. It also makes available death records for retrospective and prospective epidemiologic studies. The General Register Office of England and Wales gives invaluable assistance in notifying epidemiologists of deaths occurring to members of a study cohort. The U.S. National Center for Health Statistics is now establishing a national death index to provide similar services to those engaged in scientific investigations. These services made possible the conduct of epidemiologic studies which would otherwise be impossible to carry out, except at exorbitant cost.

#### Disadvantages of a continuous registration system

The monolithic nature of the registration system dealing with the total population of a country is a definite disadvantage in any effort to make changes, or otherwise improve the system. Changes come slowly. The United States, an industrialized country with a literate population, took over 30 years to qualify all the States for the national death registration area.

Another disadvantage of a continuous registration system is the lack of flexibility in making changes in the content of statistical reports. In interview surveys, it is possible to make changes in the questionnaire forms, and to include probing questions if needed. In a registration form, especially if it is part of a legal document, there are definite constraints on the kind of topics that can be included and how detailed the questions are. There may be a little more freedom with the statistical report form independent of the legal registration document, but the registration officials are generally conservative about making substantial changes in the content of the statistical report forms.

The disadvantages of a continuous registration system are relatively few, but there are a number of improvements that need to be made before the civil registration and vital statistics systems are capable of producing useful statistics on a continuous basis. The most serious problem in developing countries is incompleteness of coverage. In most developing countries, access to the local registration offices is difficult in the rural areas. In many countries, there are special problems posed by nomadic and indigenous populations. To complicate matters still further, there is very little incentive to register vital events even if there is awareness of the need to register deaths. The absence of need for death certificates and the lack of awareness on the part of the public of the necessity to register deaths have been cited by civil registration authorities (23) as the biggest obstacles to registration improvement. Incomplete death registration, particularly outside the major cities, is a major impediment to the use of data for mortality analysis. Another major factor is the quality of the local registration personnel in developing countries. Sometimes they are scarcely literate; almost always they are inadequately compensated and untrained. As a result, the completeness and quality of the collected data are adversely affected. In addition, dealing with an illiterate population presents special problems in eliciting seemingly simple information such as the age of the decedent, and the poor quality of information concerning the characteristics of the decedent represents a further complication in the use of data for mortality studies.

In view of these problems, virtually all developing countries find themselves without adequate death statistics in their period of greatest need for data for social and economic planning, and for health planning and administration of health programs. Some countries are adopting other means of collecting data to fill the gap. On the other hand, a large majority of the countries are still struggling along with registration of vital events.

### Discussion

The continuous registration system offers data possibilities that cannot be achieved in any other way. Single round and even multi-round surveys have notably not been successful in obtaining adequate counts of deaths (24) (25). Lunde, (26) in his discussion of the limitations of single round surveys, points out that mortality data for Uganda, Niger, Algeria, and the United Republic of Tanzania were never published because of the obvious defects in the information on deaths obtained from single visit retrospective surveys. Basically, it is extremely difficult to identify retrospectively persons who are no longer present. For example, deaths occurring in single-person households are not identifiable in retrospective surveys. Dissolution of the family or household may also occur on the death of the head of the family or household, or of one of the spouses. In addition, there may be taboos and/or general reluctance about revealing the facts of death, especially to strangers. In all countries, it is difficult to obtain information on deaths of infants who die soon after birth. There are also other non-sampling problems encountered in social surveys such as recall problems, erroneous dating of events and misreporting of age.

The indirect estimation methods are based on characteristics of the living population obtained in a census or a survey. These data such as surviving children of mothers at various ages or of persons at various ages who were orphaned are transformed into mortality estimates of children and adults. The results of indirect estimation techniques are subject to errors from the already mentioned nonsampling problems arising in census and social survey interviews.

The validity of the estimates also depends on the assumptions underlying the analytical development of the methods. In some cases, it is clear that the conditions were not met while in others it is difficult to judge the validity of the assumptions.

For countries with no data at all or very inadequate mortality statistics, even the limited mortality measures provided by the combination of surveys and indirect estimation techniques are valuable for certain purposes. Also, estimates of death reporting completeness provided by indirect methods developed by, among others, Preston, et al, (27) are useful approximations for assessment purposes. On the other hand, it seems apparent that the limitations of the survey and indirect methods of estimation are such that they cannot ever provide the kind and amount of statistical data which are obtainable from death registration data. The advantages of a continuous registration process as a source of records and statistics are so substantial that other methods cannot be regarded as adequate long-term substitutes for death registration data, though in the short run, such other methods may represent the only feasible source of mortality data for some countries.

If there are no satisfactory alternatives to the continuous registration process, what are the possibilities of developing registration data within a reasonable time frame? This is not an easy question to answer because there have not been outstanding developments in civil registration parallel to those in survey methodology and indirect estimation methods over the past 15 to 20 years. Perhaps this is because changes and improvements cannot be obtained quickly in a continuous registration system. To try to establish and improve a nationwide registration system is simply too large a task for the usual staff and budget. Also, there are problems amenable and not amenable to solution depending on the state of social and economic development of the country. Linder (28) has classified problems of civil registration under the following heads:

1. Relatively intractable problems.

Problems which can be solved within the framework of long-range social and economic development, but can hardly be solved by short-range actions taken within the civil registration system itself.

2. Problems soluble but requiring national or outside technical assistance funds.

3. Soluble problems.

Problems that can be solved within the national domain with relatively small financial requirements.

Instead of tackling all the problems at once, Linder suggests that certain tasks should be deferred. One approach to improving the data along this line is the adoption of the registration area concept. For example, the death registration area was established in the United States in 1900 starting with 10 States (out of 48) and the District of Columbia. As the States qualified by the adoption of a standard death certificate form and by demonstrating that 90 percent or more of deaths were registered, they were included in the registration area. By 1933, the registration area covered all the population in the country.

For developing countries, a start might be made with the capital city and

major efforts devoted to the establishment of a satisfactory death registration system. After the registration system in the capital city is deemed operational, efforts should then be transferred, one by one, to the other major cities, leaving the difficult and the sparsely settled rural areas to the last. A problem with this approach is that until coverage has been fairly extensive, the data will be limited to urban experience.

Another possible approach is that suggested by Hauser (29). He proposed that a national sample vital statistics system be established comprising a sample of complete primary registration units or combinations thereof. This makes possible the focusing of energy and funds on a limited number of primary registration units instead of dealing with all the units in the country at once. Data from a representative sample is certainly more desirable than data limited to urban areas, but it would be more complicated administratively to work on a number of non-contiguous primary registration units simultaneously. In addition, Linder (30) in reviewing the experiences of a number of countries undertaking sample registration projects, observed that most of the recent sample registration schemes have departed from the original concept and have established a sample system independent of the existing legal system. This is an unfortunate departure in that it defeats the original purpose of obtaining continuous improvement in the registration system.

As a strategy to improve civil registration in a country, it would seem sensible to concentrate activities on problems most amenable to solution in geographical areas with the greatest population where government services are more likely to be available to the public. However, because of the nature of registration problems, a fully operational system cannot be expected overnight. A good deal of patience and persistence are needed.

The development of a death registration system requires a satisfactory legal base and an administrative organization of local offices. It also requires the understanding and cooperation of the public, of medical attendants and others in the healing arts, hospitals and clinics, of undertakers, and of those in charge of burial places and crematoria. An active and innovative program is needed--not a passive waiting for death certificates to be filed. It is a long road to success but the reward at the end is worthwhile in terms of an invaluable data source to serve the health and demographic needs of the country.

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