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DATA COLLECTION METHODS AND TECHNIQUES PROVIDING VITAL STATISTICS AND RATES

By
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This paper presents, first, an overview to collect vital statistics and rates through the civil registration method, followed by the various approaches to collect fertility, nuptiality and mortality data through population censuses [1] and sample surveys of various types (a single-round retrospective survey, a multi-round survey or a dual-records system)[2]. The advantages and limitations of data from these methods are discussed in the light of past experiences around the world. Also addressed is the potential of population censuses and surveys to overcome some of the most serious errors and biases in order to obtain reliable data, at least on the major subdivisions of the country.

It also reviews briefly indirect techniques for estimating vital statistics and rates. A detailed description of the assumptions underlying the indirect techniques is provided in various United Nations publications.[3] The immediate potentiality offered by the indirect estimation techniques makes them an attractive means to generate measures of fertility and mortality if requisite data from censuses and surveys are available. However, the application of these techniques depends much on the purposes to be served by the various estimates taking into account the limitations of the different methods. The assumptions underlying the indirect techniques must be carefully considered before selecting any particular technique. Once the technique has been selected, the parameters derived need to be evaluated by internal and external comparison for which all data sources available should be used.[4]

A. The civil registration method as a source of data on vital statistics

As defined by the United Nations,"**civil registration is the continuous, permanent, compulsory recording of the occurrence and characteristics of vital events (i.e., live births, deaths, foetal deaths, marriages, divorces, judicial separations, annulment of marriages, adoptions, legitimations and recognitions of illegitimate children) and as provided through decree of regulation, in accordance with the legal requirements in each country**. Civil registration is carried out primarily for the value of the legal documents as provided by law. However, the usefulness of these records as a source of vital statistics is universally acknowledged.

The term "**registration method**", refers to the procedure employed in gathering the basic observations upon which vital statistics are based. It is used in contradistinction to both the term, "**enumeration method**", which refers to the means used to produce population and other census or survey statistics, and the term "**administrative method**", which refers to the method by which statistics are produced as a by-product of management controls (as, for example, in the case of statistics of foreign trade that are derived from ships'manifests or customs declarations). Therefore, vital statistics provide a measure of the occurrence of

certain events during a specific period of time and which, moreover, provide this measure on a current basis. Experience has shown the registration method to be the only reliable one to obtain a continuous and current record of events occurring throughout a period. In order to ensure both the current nature of the statistics and their accuracy with respect to dates and characteristics, the registration record should be completed as soon as possible after the occurrence of the event. The simplest and quickest way of accomplishing this end is to require the informant to provide the information as soon as the event occurs.

The continuous aspect of registration implies also that the procedure is permanent. Registration maintained for short periods and then allowed to lapse will not produce vital statistics which are useful as current **incidence** statistics.

Continuous, permanent recording of vital events can best be ensured by means of legislation which makes registration compulsory. Such legislation should also provide sanctions to ensure fulfillment of this obligation. Therefore, the registration method is characterized not only by the continuous character of its observations, but also by its compulsory nature. Both provisions are fundamental for its successful operation. When registration is voluntary rather than compulsory there can be no assurance of complete or accurate vital records or statistics.

The establishment and development of a civil registration system will require the designation of responsibilities, which should lie with an agency or agencies of a national government. The assignment of functions should be accompanied by a clear designation of duties and responsibilities with respect to registration, recording, custody of records, statistical reporting, collection, compilation, analysis, presentation and dissemination of data and the critical inspection and evaluation of the system.

In organizing and administering a civil registration system it is essential to give thought to the relationship between the registration function and the statistical function. The two functions are generally performed under the auspices of different ministries of the Government. Registration is a function of the local registration offices and is under the jurisdiction of either the ministry of interior, the ministry of local government, the ministry of health, etc. The statistical function is either under the national statistical services or often times is shared between two ministries, for example, the national statistical services and the ministry of health.

The administration for the organizational structure to carry out a civil registration system may be under a centralized or decentralized fashion. There are several organizational options within each type of arrangement.

Vital records have in fact a legal and protective advantages to individuals
Thes safeguarding of human rights with respect to social status and benefits requires that each vital event be registered. None of the other techniques described in this paper can met this requirement. In the case of sample registration schemes, it is only the segment of the population that is covered, while in the case of the remaining measures , the operations are in principle purely statistical.

Full registration also has administrative advantages not found in any other system. For some administrative purposes it is necessary to keep records on an individual basis, as with death by cause, and the number and identity of persons requiring maternal and child care, for example. Further, since vital statistics derived from civil registration records are a continuous flow data and are compiled from the local registers, their coverage is nationwide and comprehensive and it is possible to meet the frequent needs for data for small civil or geographic divisions; for data derived in some other manner must be based either on

sample inquires or on analytical techniques involving assumptions that render the estimates derived from these data unsuitable for application to smaller population areas.

Data and information that could be derived from a registration system include family size, infant mortality rates, neonatal and perinatal mortality, maternal mortality, patterns of mortality by causes of death, life tables, health conditions, social and economic factors,etc. Other demographic indicators can be calculated in conjunction with population census data as denominators; for example, the crude birth rate, the crude death rate, age-specific fertility, mortality, nuptiality rates, etc. These indicators can be obtained for any geographical division of the country.

It is therefore essential that countries maintain an effective civil registration system, which yields timely and accurate data. In this context, the organizational aspects of the system, including good management tools are key elements to ensure the flow of the operational activities and the proper maintenance of the system.

Regrettably, most of the civil registration systems, except those of developed countries and a few developing countries are far from yielding the complete, timely and accurate data needed for the direct estimation of basic social and demographic measures. While the lack of reliable and timely vital statistics, in particular birth and death statistics from the civil registration system, has been apparent for the last four decades, the demand for accurate data on fertility and mortality has grown immensely over the same period in the developing countries. To fulfil these gaps, the other two principal methods of data collection, that is, the population censuses and the household sample surveys, have been used to contribute to provide data required for the estimation of the vital rates: crude birth and death rates, age-specific fertility and mortality rates, general and total fertility rates, gross and net reproduction rates, life expectancy, infant and child mortality rates, etc. These methods of data collection have brought to light much-needed information to estimate levels, patterns and trends in fertility, nuptiality and mortality.

B. Population censuses for collecting data on fertility, nuptiality and mortality

The population census was originally seen as providing data on the population at risk only, that is, the denominator needed to estimate the birth and death rates, the age-sex specific fertility and mortality rates, and other basic demographic parameters. However, the rates so obtained in a sizeable number of developing countries were too low to be accepted as true values. Therefore, other specific questions were devised to gather the information on fertility and mortality in the population censuses.

With regard to statistics on marriages, the civil registration system covers only the legal marriages and not religious marriages, customary marriages, consensual unions. Furthermore, statistics on divorces from the civil registration system are equally restricted to the dissolutions of legal marriages. Therefore, there are inherent difficulties in measuring the dynamics of nuptiality from the civil registration data and presenting a complete picture of the family formation and the modes of dissolution. Similarly, statistics on single persons are missing in the civil registration system. In an attempt to cope with these gaps, questions regarding current marital status have been included in population censuses to conveniently measure marital status at a specific point in time, including the time in years since first marriage (or date of first marriage).

The various approaches used in population censuses to collect data on fertility, nuptiality and mortality are illustrated in the following sections. As the proper wording of the questions is relevant to the completeness and quality of the data collection, some examples are also provided.

1. Current births and deaths

Early efforts have been made in population censuses to collect live births and deaths in the 12 months preceding the interview (or any other fixed-period, such as 24 months, and so on). This approach was intended for the direct estimation of birth and death rates. When sex and age of the deceased were included, age-sex-specific mortality rates were calculated and from them other mortality measures were derived, as both numerators and denominators were then readily available in censuses.

The earliest attempts of this type have been found in the censuses of the United States of America in the nineteenth century, when data from civil registration were largely unsatisfactory. More recently, attempts by other countries have included similar retrospective questions for collecting information on births and deaths in the past year in their censuses. As shown in tables 1 and 2, 33 out of 174 censuses studied during the 1970 census decade (1965-1974), and 46 out of 201 during the 1980 census decade (1975-1984), have inquired about the number of births in a fixed-period preceding the census date. The information was collected either by asking the heads of households how many children had been born alive in the household in the preceding 12 months (or 24 months) or asking each woman of child-bearing age, the question: **"How many children have you borne alive in the past twelve months?"**. The latter approach, that of inquiring of women, is considered to yield better results than the former method and it also permits the estimation of current age-specific fertility rates and other refined fertility measures. As a general rule, these questions have been asked in addition to a series of questions on fertility addressed to women in their child-bearing ages.

Similarly, the number of deaths among members of households in the preceding 12 months (or any other fixed-period) preceding the census date was collected in 11 censuses in the 1970s and in 28 censuses in the 1980s. Data on the sex and age of the deceased were collected in 9 censuses in the 1970s and in 28 censuses in the 1980s, mainly censuses in Africa and Asia (see table 2).

Each country has paraphrased the questions in different ways, and some of the most commonly used forms are as follows:

Births in the previous 12-months:

Question addressed to the head of the household:
How many children were born alive in this household in the past year?
Was any child born alive in this household last year?
How many children alive did you give birth last year? (addressed to women in their child-bearing period, usually 15 to 49 years)

Deaths in the previous 12-months
Addressed to the head of the household:
How many deaths have there been in this household last year?
How many deaths have there been in this household during (calendar year)?
Was any death in this household last year?

Some countries have included sex and age of the deceased (or date of birth and date of death); and some countries also inquired about the total number of deaths in the 24 months preceding the census date.

It is observed that quality of data gathered through these approaches has been poor. In some, analysis of the collected data led to the conclusion that the questions had not produced useful results.[5] The poor performance is attributable to the recall lapse, misconception of the reference period, misstatement of ages, inclusion of foetal deaths, or simply misunderstanding of the nature of the question. Despite all these problems, collection of data in population censuses on deaths by sex and age might be useful inputs to indirect estimation due to new developments in methodological analysis.[6]

2. Children ever born alive and children still living

Traditionally, questions on the number of children ever born alive to adult women and, of them, the number who are still living and/or the number who are dead at the time of the census have been widely asked in population censuses. In the last 20 years or more, information on the number of children ever born was obtained either by one straightforward question: **"How many children have you ever borne alive?"**, or by two separate questions: (a) **"How many children, who were born alive, are still living at the time of the census?"**, and (b) **"How many children who were born alive have died up to the census date?"**. The reason for asking the two questions was to minimize the omission of children ever born who had died shortly after birth.

The straightforward question only was asked in 50 censuses in the 1970s and 27 censuses in the 1980s (table 8.1). Furthermore, 67 censuses in the 1970s and 88 censuses in the 1980s have included two questions: one on children ever born alive and another on children still living. **Information on children still living (or dead at the census date)** was useful in estimating mortality in infancy and childhood. New refinements in indirect methodology have since been proposed.[7]

Information on children born alive has been collected mainly from all women in their reproductive ages regardless of their civil status. However, some countries gathered this information for a segment of the total women. For example, in some societies, the questions on children ever born alive and/or surviving are too sensitive to query single women, and so a number of countries have restricted these questions to ever-married women or currently-married women. International comparability has remained largely hampered as result of this diversity of universes from which data were collected.

The main limitation of such information on lifetime fertility is that no timing of birth could be inferred for the age-specific fertility rates estimated on the basis of these data, except the recent improvements in methodology. In most censuses, information collected on **children ever born alive** clearly suffered from serious omission, especially for the older cohorts of women, i.e., 35 years and above. It was explained that these women might not have reported their children who had left home and were living elsewhere or those who had died in early infancy. New strategies have been suggested so as to minimize those errors and include, for instance, asking a series of questions in population censuses as follows:

Of the total number of children you have ever borne alive:
- How many are currently living with you in this household?
- How many are currently living elsewhere in another household?
- How many have died up to the census date?

Seventeen censuses in the 1970s and 28 censuses in the 1980s have approached the problem as above-mentioned. However, owing to the numerous topics to be covered and space limitations in a census questionnaire, these new strategies are more suitable for a survey, as they are more lengthy and time consuming and require specially trained enumerators.

3. Date of the most recent child born alive

At the time that improvements in techniques for collecting data on dead and living children were made, another strategy was also sought to obtain data on recent fertility and infant mortality.[8] It included collecting the date of birth of the most recent child born alive and the survival status of this child at the time of the census inquiry; if the child was dead, its sex was sometimes collected. Data on children born alive in the preceding 12 months and among them children who had died in the same period could then be obtained at the processing stage more accurately. This approach minimizes the well known problem of misunderstanding of the reference period. The question on the survival of the last child at the census date is intended for improving the count on infant deaths.

Thirty censuses in the 1970s and 40 censuses in the 1980s have gathered data on current fertility through the question on the date of birth of the last child born alive (table 1). Survival of the last child born alive was included only in 28 censuses in the 1970s and in 58 censuses in the 1980s (table 3).

Aside from these approaches, 5 censuses in the 1970s and 13 censuses in the 1980 decade have included a straightforward question to collect information on infant deaths with reference to a retrospective fixed-period, generally one year preceding the census date. Infant deaths by sex were investigated in four African countries between 1978 and 1984. This approach obviously has all the limitations described for deaths of all ages in the previous twelve months.

Few censuses have inquired about the name and date of birth of each child born alive, whether or not it was alive at the time of the census, and, if not, the date of death: that is, a maternity history. It was used in a sample survey undertaken as a component of the population census programme, as it is actually a technique more suitable for sample surveys owing to the lengthy interview required and added complexities at the coding, editing and tabulation stages. In the 1970s and 1980s, 9 and 7 censuses, respectively, have included this approach.

Inquiring about the date of birth of the last child born alive and whether or not it was still alive at the time of the census, and about its sex has had better results than the traditional straightforward questions on children ever born alive in the past year and how many were dead among them. Such questions have, in fact, reduced the problem of misunderstanding of the reference period, and therefore the resulting estimates of infant mortality and current age-specific fertility rates have undoubtedly improved. However, they did not overcome all the problems of information derived from retrospective questions. A number of analytical techniques for the assessment and correction of basic data have been developed to make better use of such data. Further, these questions have been included in censuses of the 1984-1995 decade.

4. Data on orphanhood

Developments in indirect techniques for demographic estimation of adult male and female mortality have led to the inclusion of specific questions in censuses and sample surveys to collect data on survival of natural or biological mother and father.[9] The relevant census questions are as follows:

Is your mother still alive?
Is your father still alive?

Data gathered through these questions contain no information about timing either, as the expected responses were simply either yes or no. Data on orphanhood of both mother and father were collected in

10 censuses of the 1970s and 1980s. Maternal orphanhood was collected in 5 censuses of the 1970s and in 15 censuses of the 1980s.

A question intended to overcome duplications of parents commonly reported by siblings was later proposed: **"Are you the eldest surviving child of your mother/father?"**. Thus, tabulations on orphanhood from mother/father will be restricted to the eldest surviving children. These questions were included in the 1974 census of Bangladesh, and in the 1978 censuses of the United Republic of Tanzania and Kiribati. Further analysis of these data in different countries of the world, have shown, however, that an exaggerated number of people claimed to be the eldest child of their mother.

The most common problems of these data arose from the adoption practice, multiple reporting of the same parents by siblings, the effect of declining mortality and misreporting of age.

5. Data on widowhood

It has been suggested that enquiries be made about the survival of the first spouse among the ever-married population, to aide in the estimation of adult male and female mortality.[10/] The earliest attempts, in population censuses, are found in the United States of America (in a retrospective survey of fertility and mortality tied to the 1970 population census), in Bangladesh (1974), in the United Republic of Tanzania (1978) and more recently in France (1982) and in Mauritius (1983). The universe from which these data were collected was the ever-married population. The most common wording of the question was: "Is your first husband (spouse) still alive"?.

The poor performance of the suggested approach has been attributed to the effect of remarriage, as it is likely that respondents who have been remarried might give information for their present and not for their first spouse. Another source of error arose in those countries having a sizeable proportion of their population living in consensual unions. It is assumed that these people might have been confused about what constituted a previous marriage.

The set of items in population census schedules from 1965 to 1984, intended for the measurement of fertility and mortality, are shown in tables 1, 2 and 3.

6. Other relevant data from population censuses for the measurement of fertility, nuptiality and mortality

The population census collects various socio-economic data that are useful in calculating basic demographic parameters. Available data on population totals, by age, sex, place of birth, current marital status, usual place of residence and other economical and social characteristics, down to the smallest geographical subdivision of the country, allow for estimating age-specific and character-specific fertility, nuptiality, and mortality rates, life tables and other basic parameters, in combination with accurate data from the civil registration system. For countries with defective registration data, some of the same data can be extremely useful for demographic estimation through a number of indirect techniques.

Nuptiality data collected in the population censuses can play a significant role in improving indirect estimates of fertility and mortality when age misstatement is a major problem in population censuses. Age misreporting distorts the patterns of fertility and mortality derived from techniques that use cross-tabulations of women by age and children ever born alive, surviving children, births and infant deaths in the previous

year, and so on. It is believed that date of marriage is much more easily recalled than age (or date of birth) because marriage is a very important event and more recent than birth. Therefore, questions to measure "duration or time in marriage" were suggested. Examples of such questions in census are:

What is the date of your first marriage? (or age at first marriage)
Time, in years, since the first marriage? (or time elapsed, in years, from the first marriage)
How many years have you been married?

Information on duration or time in marriage was collected in 59 censuses in the 1970s and in 55 censuses of the 1980s. Some censuses included an additional question: "Are you still in your first marriage?" to make sure that the time in marriage refers to the first marriage only.

Other data relevant to fertility estimation are mother's age at her first live-born child. In the 1970s, 37 censuses and in the 1980s, 32 censuses, have collected this information.

As was mentioned earlier, nuptiality patterns at a certain point in time can be obtained by including in population censuses a question: "What is your current marital status?" for population 15 years old and above.

Finally, an item that is usually collected in population censuses for control purposes, that is, **"the relationship of each reported household member to the head or reference member of household"**, has also been used since early in the 1970s for fertility estimation in some countries by the so called own-children method, which uses the information on relationship to identify the natural mother, when possible, of each child enumerated in the correspondent census questionnaire. From such data, maternity histories are reconstructed and from them aggregate fertility and age-structure of fertility can be estimated, provided that age misreporting is not severe.[11/]

7. Advantages and disadvantages of census data for deriving fertility and mortality estimates

The strength of the census data stems from the fact that population figures by sex, age, place of birth, usual residence and other social and economical variables are readily available at all levels of geographical subdivisions of the country. The census also provides needed data on the population at risk to calculate various basic demographic parameters.

The general limitations of the census data are those common to information gathered from retrospective questions. Any historical reconstruction of personal data is subject to recall lapse error. Further, the operational time and cost are larger than in the case of sample surveys. Moreover, the respondent in a population census is, in general, the head of the household who also serves as a proxy respondent for other household members. This is a factor, among others, that leads to misstatements of age, underreporting of births, misdating of births and deaths. Even if errors in the data were minimized, a population census can seldom provide timely data for estimation of fertility and mortality because detailed census data are generally not available until at least two or three years after the field-work has ended. A further shortcoming is that a census can collect very little information about each vital event, thus limiting any in-depth study. The most common errors found in population censuses relating to data on fertility may be listed as follows:[12/]

Errors of omission:
Children who died
Children who left home

Children born of a husband other than the current one
Children given out in adoption

Errors of inclusion:
Foetal deaths reported as children who died in infancy
Children borne by another wife to current husband
Adopted children
Grandchildren

In addition to the above errors of complete count, there are, as noted earlier, problems of memory e and of age misstatements in many developing countries where people do not know their correct age. ;e structure is distorted, the specific fertility and mortality rates and derived indicators are affected. Even gh there are a number of methods for smoothing the age distribution, they are mostly suited for closed ılations, thus making very difficult the adjustment of age-sex structure at the subnational levels; or else nternal migration should be known.

Finally, as a census is a very costly operation and requires long advance planning, it is taken only)dically at about 10-year intervals. Therefore, a series of assumptions and population projections are ıtial in the post-censal period.

These are some of the reasons for seeking other methods of data collection to measure recent changes ertility and mortality, assess population growth and evaluate a number of population programmes. sehold sample surveys provide an important vehicle for the collection of fertility, nuptiality and mortality offering more flexibility for asking a series of questions and combining different techniques for in-depth view by a small well trained staff.

C. Household sample surveys for collecting data on fertility, nuptiality and mortality

Developments in sampling theory and household survey methods in the last three decades have led e growing use of sample surveys to collect required data on fertility, nuptiality and mortality. Shortly the Second World War, retrospective surveys began to be used in developing countries. In the nning, these surveys approached the problem in the same way as the population censuses, through spective questions. In the period of 1960-1980, 81 developing countries conducted at least one major ey: 33 countries in Africa, 24 in Asia and 24 in Latin America. More than one half of the 81 fertility eys were conducted as part of or in association with the World Fertility Survey programme.[13/] Follow-up)le surveys (named also prospective survey, multi-round survey, household change technique) were ertaken by a number of countries to better assess their current levels and patterns of fertility and mortality the population growth. This approach has eliminated the problems posed by misunderstanding the ence period commonly implied in retrospective questions and has minimized the effect of the recall lapse. ore complex approach of data collection, namely, the dual-records system that combines a multi-round ey with a continuous recording of vital events in the sample areas, has gained considerable importance ıly in Asian countries, for example in India.

The various methods devised to collect birth, death, civil status and other relevant data for the mation of basic demographic measures in sample surveys are broadly discussed in this section.

1. Single-round retrospective survey methods

Countries have conducted two types of single-round retrospective surveys. One type has made use of a shorter questionnaire similar to the census type. The other has used an individual extended questionnaire combined with a shorter, or extended, household questionnaire. The individual extended questionnaire was intended for a subsample of the population only, usually women of child-bearing age. In both, the households in the sample were interviewed once. The adoption of an extended household questionnaire with retrospective questions on fertility and mortality, has given the opportunity for mutual evaluation and plausibility of the parameters they yield.

In fact, most of the single-round retrospective surveys using a short questionnaire have included retrospective questions similar to those in population censuses to obtain the number of children ever born alive, the surviving children up to the date of the interview, the date of the most recent child born alive and whether or not the child is alive at the time of the inquiry (or births and deaths in the past twelve months), data on orphanhood from mother and father and data on survival of the first spouse. Another similarity is that the information is obtained from a responsible adult member of the household. The main difference stems from the fact that a survey is in a better position than a census to gather better quality data. This is so because it is related to a small part of the population, and thus the interviewers are less numerous compared to those required for a population census. The latter allows for a better training of the staff and a closer supervision of the field-work. Furthermore, all the subsequent stages up to the dissemination of the data can be closely controlled.

A retrospective survey of this type is also more suitable than a census to paraphrase the questions in a most desirable way. This is the case, for example, of children still living and children who have died for whom the following questions can be addressed for each sex:

Of all sons that you have ever borne alive:

How many sons are living with you in this household?
How many sons are living elsewhere in another household?
How many sons have died?

Similar inquiries have to be made for daughters.

The most common question asked on lifetime fertility in single-round surveys has been the number of children ever born alive. Although this is a straightforward question posed by better trained enumerators, it is subject to the same different kinds of response errors as the census method. They have resulted in overcounts as well as undercounts of the number of children ever born alive, particularly owing to errors of memory lapse. The undercount of infants and young children mentioned in the case of census is generally not different in retrospective surveys of this type (see the listed errors on children ever born alive and the problems of misstatement of age in reconstructing personal histories of individuals referred to earlier). High quality of data are difficult to obtain, especially when large numbers of individuals are sampled. Even if highly skilled personnel are used and the training and organization of the field-work staff are adequate, social conditions of the population can still distort such simple facts as age, historical data regarding births and deaths and so on.

The experience with retrospective surveys of this kind in obtaining complete counts of vital events has not been encouraging. For instance, the estimated median percentage of births covered in seven Asian

population growth estimation studies, involving single-round surveys, was 67 per cent, and the range was 28 to 96 per cent when compared with estimates from the dual-records system. The median percentage of deaths covered was 51 per cent and range was 23 to 90 per cent.[14/]

Despite all the limitations of the data, single-round retrospective surveys of the type commented here have been the main sources of data for mortality and fertility estimates in developing countries. Still further, it has been suggested that the value of this type of survey could be greatly enhanced if they were repeated at regular intervals. Such repetition does not imply re-interviewing the same households, but the successive samples should all be representative either of the country as a whole or of the same subdivisions within it.[15/]

The main advantages of the single-round approach can be found in cost-effectiveness and timeliness. Survey data of this kind could be available in about two years, including the length of advance planning, pre-testing, field-work, data processing and dissemination of the data compared to the longest period for a population census, a follow-up survey or a dual-records system.

A list of recommended topics for use in demographic sample surveys is given below. This list includes topics for investigation concerning the appropriate population base and information on births and deaths, from which population estimates can be developed at the level of detail needed for the calculation of the various vital rates. The list also contains a minimum of basic items required for the measurement of population change, and of patterns of fertility and mortality, as well as items on socio-economic background for studies of differentials in fertility and mortality.

Items to be collected from all members of the household:

Name and surname
Relationship to the head of the household
Relationship among the members of the family
Sex
Date of birth
Age
Ethnic (and or national group)
Place of birth
Place of usual residence
Orphanhood from mother/father and identification of the mother/father if living in the household

Items to be collected from selected members of the household:

For persons 15 years of age and over

Widowhood status (Is your first husband/first wife still alive) (only for ever-married population)
Civil status
Time in marriage (date of first marriage)
Occupation; status in employment and type of economic activity

For women 15 years of age and over

Total number of children ever born alive, by sex
Total number of children ever born alive and still living, by sex
Date of birth of the last child born alive
Survival of the last child born alive at the time of the survey, and sex
Date of death of the last child born alive

Items to be collected from all households in the sample

Deaths in the previous twelve months (or 24 months, etc.) in the household
Names and surname, sex, date of birth (or age) and date of death of each deceased
Population-at-risk:
Household members present
Household members temporarily absent
Household visitors
Geographical location of the household

Examples of the other type of single-round retrospective survey that had used extended individual questionnaires, including a birth history and/or pregnancy history (maternity history) are those of the World Fertility Survey programme (WFS) and of the Demographic and Health Survey programme (DHS).[16/] Questionnaires were designed in the participating countries using the core documents as the starting point and modifying or adding modules to suit the country needs. During the 1970s, 38 countries participated in the WFS and during the 1980s, 31 countries in the DHS programme.

A birth history or a pregnancy history has been included and completed, for each ever-married woman or other well defined sub-universe of women in the above-mentioned surveys undertaken to measure, inter alia, the patterns, trends and levels of fertility and infant and child mortality. Extended questionnaires were coupled either with shorter household schedules or extended household schedules. The shorter house schedule provided a list of all household members, usually including visitors, by sex, age, relationship, and (in some cases) marital status. Its purposes were to serve as a document for the listing of persons and to provide base data for computation of demographic rates.

Extended household schedules included the foregoing information and also asked each woman of child-bearing age, the number and survival of children ever born alive and the date, survival and sex of the last live birth. The purpose of these questions was to provide estimates of lifetime fertility, recent fertility and child mortality via indirect methods. The household schedule has sometimes been used to provide aggregate fertility data on marginal groups not eligible for in-depth interview: single women, for example.

The approaches made in WFS and DHS surveys through maternity histories have overcome the lack of information about timing in estimates of fertility and mortality derived from lifetime fertility, thus avoiding reliance on theoretical demographic models to estimate the basic measures. It also minimizes the errors generally found when traditional retrospective questions were made in single-round surveys and population censuses. In fact, the maternity history approach has collected from each ever-married woman, the following information for each birth: name, date of birth, sex, survivorship status, and age at last birthday, or age at death as appropriate. Because of the more detailed information collected in the birth history, it offers a richer set of data for analysis. For instance, infant and child mortality rates can be calculated from these data for about 20 years prior to the survey. Both, the numerators and denominators of the rates are built-in in the maternity history. Similarly, age-specific fertility rates can be calculated for a number of years prior to the survey.

Along with a maternity history, the WFS and DHS surveys have included a wider range of social, economical and other variables, namely, respondent's background, contraceptive knowledge and use, marriage history, fertility regulation, work history, husband's background, and so on. They have largely contributed to a better understanding of differentials in fertility and mortality.

It is worth noting that the interviewers for this type of survey need to be far more skilled and better trained than those for censuses and regular retrospective surveys; and interviewers are preferably women

owing to the nature of the questions asked. The field-work also requires closer supervision. Furthermore, the primary respondent must be the woman herself and not a proxy respondent, because of the large amount of personal and historical data that have to be provided, namely a series of questions on pregnancies, contraception, early child deaths and so on. And not only must the respondent be the woman herself, but it is also important that she be isolated from other members of the family during the interview so that the quality of data reported is accurate. It is well known that accuracy of data, in cultures where women play a traditional protected role within the community, depends largely on the presence of women as survey interviewers.

Experience drawn from analysing these data have shown, however, that even maternity histories are subject to several sources of error arising from dating births and deaths and age misstatements and underreporting of children.[17] Systematic errors persisted even when detailed questionnaires were used. The most important disadvantage of the birth history approach is in the difficulty of obtaining accurate data on the timing of all births. Another potential drawback concerns the universe from which data are gathered. First of all, only those women surviving up to the survey date were interviewed, there is no record of the fertility of the women who did not survive. A second issue has to do with limitation of the respondents to the ever-married women.

Among the other limitations is the longer time required for each interview compared with that for a population census or a regular retrospective survey. A study conducted among countries participating in the WFS programme revealed that the time per interview (with ever-married women only) ranged from 25 minutes in Thailand to 57 minutes in Bangladesh;[18] this increased significantly the cost of the survey. Furthermore, the complexity of data collected for every woman called for very skilled personnel at the data processing stage.

2. Follow-up survey method

A prospective survey approach was developed to collect current data on fertility, nuptiality and mortality in order to avoid as much as possible memory lapse and misunderstanding of the reference period. In this approach, cluster samples of households are interviewed repeatedly within certain periods of time. For instance, three or more rounds were conducted by countries at more or less six-month intervals so that vital events could be easily recalled. An inventory of all resident members of the household and certain basic particulars are recorded in the first round. At each subsequent round, changes in the household composition since the last interview are recorded including information on births, marital status, deaths, and in- and out-migration among members of the household. Special instructions are given to the interviewers to record emigrations and also to be sure that a death is not omitted. The latter is intended to minimize the well-known problem of omissions of deaths in this kind of field inquiry, especially since the death of a member of the household frequently leads to the dissolution of the household and present problems of locating individuals in the sample household in subsequent follow-up inquiries.

To improve the reports on infant deaths, a question on whether or not the interviewed woman in her childbearing period is pregnant at the time of each interview is sometimes recorded. Thus, in the subsequent rounds, the outcome of those pregnancies can be obtained and infant deaths, neonatal deaths and maternal deaths registered.[19]

A perfect consistency of numerators and denominators can be secured with this approach in terms of age and place of residence, and other characteristics, such as births, deaths, marriages and in- and out-migrants, are obtained on a prospective basis. Current levels, structure and differentials on fertility and mortality can be directly calculated from these data without relying upon any demographic model. The

follow-up approach can produce mean annual vital rates and natural and total population growth rates at the subnational as well as the national level, provided that the size of the sample is large enough to secure a sufficient number of vital events and that high quality data are gathered. Unlike retrospective questions on mortality this method allows for the calculation of mortality parameters for each age group in the population.

Moreover, information on the population at risk is obtained directly from the survey; the reference period is readily fixed by the date of the first and the last rounds in which each person is covered by the survey; and the effect of in- and out-migration is controlled for every sampled subdivision within the country.

The follow-up survey method, which involves re-interviewing, permits correction of inconsistent data found in previous rounds. It also allows the inclusion of a retrospective survey, for example, in the last round of the follow-up survey, so that two different approaches can be made to measure fertility and mortality without significantly increasing the cost. Peru used this method to evaluate two approaches for measuring fertility and mortality.[20/]

Among its disadvantages is the need for a large sample in order to secure a sufficient number of births and deaths, as they have low frequency of occurrence in the population, especially when differentials are to be studied. Other drawbacks of this method are those concerned with timing, cost and administration. The field-work itself is never less than two years, to which the time required for advance planning and data processing must be added. The cost is larger compared to that of a single-round retrospective survey, because of the need to maintain the well trained staff during the whole period of the field-work. On the administrative side, a number of surveys taken in various countries have proved that such exercises are difficult to keep at high standards of quality, as commitment of the interviewers, enthusiasm and supervision are inevitably lowered with the passing of time.[21/]

To these factors, one has to add that the results from these types of surveys have also been unsatisfactory. For example, the follow-up sample should be particularly helpful in the enumeration of deaths. However, deaths are likely to be omitted for reasons that have been explained earlier, especially as those occurring to heads of households often lead to the dissolution of the households and present problems of locating individuals in the sample household in subsequent rounds. The median completeness for deaths in the 13 follow-up surveys conducted in Asian countries was 72 per cent and the range was between 50 and 89 per cent. The median completeness for births was 83 per cent and the range was between 66 to 92 per cent.[22/]

3. Dual-records system approach

The dual-records system was devised to obtain further refinements in the measurement of current fertility and mortality and thus of the natural population growth rate. Data on vital events in this system are obtained in a defined area by two independent data collection methods, a periodic household survey and a separate reporting method. The latter records vital events on a current basis in the sample households, which may involve regular visits to the household, or it may rely on a network of informers, the recorder verifying the occurrence of the events. It also can be the civil registration system itself.

The first round of the household survey is very much like the initial visit in the multi-round surveys, as all resident members of the household are identified and their particulars recorded. In the subsequent rounds of the survey, the changes in the household's composition that have taken place since the last visit are recorded. After each household interview survey, the births and deaths observed independently in the two subsystems of data are matched to ascertain the events reported by both data collection methods, the events

reported by the special recording subsystem only, and the events identified in the household survey only. An estimate of the vital events missed by both subsystems is made using the Chandrasekaran-Deming formula,[23] which permits an estimate of total events as well as provides an internal check on the completeness of the continuous recording system.

In the dual-records system, every event recorded by either of the subsystems is counted as an event. Therefore, it is crucial that the matching of records from the two subsystems should be of high quality so that the unmatched out-of-scope events can be deleted after a thorough field check. This will be a problem in the developing countries where manual matching is more likely to be used. Manual matching is a difficult and laborious process despite the identifying information on the two sets of records being fairly clear. Matching is difficult even if this is done by computer assisted methods. Further, in some countries, the primary match cannot be by the name of the child, because babies are not given a name until they are past the new-born stage. In some countries, nicknames are used freely and the name used may vary, depending on the occasion.

In addition to the various cultural factors that complicate matching, the process itself is not easy to carry out because there are no clear criteria to determine what is a match. In general, if the matching criteria are too rigid, an overcount will result. If the matching criteria are too loose, there will be an underestimate of the vital events.

Adding to the cost of the matching procedure are the necessary field checks of the unmatched records. Unless the facts are verified, it is possible that the counts will be inflated by the inclusion of events that are out of scope in terms of time and defined population.

Experiments with the dual-records system have been conducted, for instance, in Colombia, India, Kenya, Liberia, Morocco, Pakistan, the Philippines, Thailand, and Turkey. These studies have been well documented.[24] The Sample Registration Scheme of India, which is basically a dual-records system, has been operating on a continuous basis for more than twenty years to provide data for the estimation of vital rates for the country as a whole and for the states.

Lastly, this is also a good data collection approach for estimating current levels and patterns of fertility and mortality and natural and total population growth rate at both national and subnational levels by the direct method, that is, without relying upon indirect techniques for estimation. But the cost and the matching problems are factors that have to be carefully considered.

D. Indirect techniques for estimation of vital rates

Problems found in data from population censuses and surveys, especially those from single-round surveys, have led to the development of indirect techniques of demographic estimation. These methods are based on mathematical models and utilize data from surveys and censuses concerning children ever born alive, children surviving, date of most recent child born alive and its survival status, survival of mother and father, survival of the first spouse, age, sex and marital status and so on, to generate different kinds of fertility and mortality estimates.

As stated earlier, a manual on indirect techniques of demographic estimation has been published by the United Nations.[25] This manual is the most complete compilation to date of methods suitable for application to incomplete or defective demographic data and estimation of demographic measures. It includes the basic

hypothesis underlying the various indirect methods and presents examples of how to apply the methods, including some guidance on the interpretation of the results. A broad description of some of these techniques follows.

1. Estimates of fertility

Fertility estimates can be made based on data on the number of children ever born alive obtained from surveys and censuses. This measure, in conjunction with data on the age of women or the duration of marriage, yields estimates of total fertility and age-specific fertility rates or birth rates by duration of marriage. Because of the nature of the data used, these are measures of the average lifetime fertility experience of women in the population, and have no precise time reference.

Data on children born alive in the previous year(s) from censuses and surveys are used to estimate current age-specific fertility rates, birth rate, general and total fertility rates, the gross and net reproduction rates. The quality of data is improved by asking all women of reproductive ages about the date of their last child born alive instead of the traditional question on births in the past year. In the former case, births in the previous year are singled out at the processing stage and are cross-tabulated by five-year age groups of women in the child-bearing period. As such data always contain errors, a number of methods for adjusting the data have been proposed. For instance, it was proposed that the pattern of the specific fertility rates could be assumed correct but the level must be adjusted upwards to correspond with the level of the experience of fertility of all women in their younger ages, that is, under 35 years of age. This group is regarded as providing the most accurate information.

A number of other extensions to the original method have been proposed, for example, the first-births technique. Another method, requiring information on average parity from two censuses or two surveys taken five or ten years apart, permits the calculation of cohort parity increments and of age-specific fertility rates.

2. Estimates of mortality

Mortality estimates for different age and sex groups can be made by the indirect method, using retrospective data on children ever born alive and surviving, survival of mother and father, and survival of first spouse. The number of children ever born alive and the number of surviving children (or the number of children who have died up to the census or survey date) may be transformed into estimates of mortality in infancy and childhood. For estimates of adult mortality, data collected from retrospective surveys on orphanhood and widowhood may be used. The combination of those estimates then can led to the estimation of a complete pattern of mortality by age and sex.

In using the data on child survivorship to estimate childhood mortality, the proportion of children that died among the children ever borne by women in the various age groups is converted into the probability of dying before attaining certain childhood ages. A set of multipliers were calculated representing certain fertility and mortality patterns. The calculation assumes a stable or stationary population, that is, there have been no changes in fertility and mortality levels over the years. Subsequent modifications in the model have, however, made it possible to take into account changes in the levels of fertility and mortality. Another assumption is that the children of women in the different age groups experience the same level of mortality. The mortality estimates for the various childhood ages represent average death rates for children of mothers in the different age groups. Therefore, no timing can be assigned to the estimates so derived. However, methods are now available for estimating the time period before the census or survey in which death occurred.

Answers to questions of the survival status of mother and father, or of the first spouse, form the basis of estimation of adult mortality rates. Information on the survival of parents or spouses is usually obtained from single-round retrospective surveys, although a number of countries have included that in their censuses too.

The orphanhood and widowhood data may be converted into the probability of dying before the attainment of certain adult ages starting in adulthood. These estimates represent averages of mortality over the period of time that the relatives were exposed to the risk of dying. The reference period is "some years in the past". However, if the same data were available from two consecutive surveys, 5 or 10 years apart, it would be possible to produce estimates for the intersurvey period.

3. Advantages and limitations of indirect techniques

The major advantage of the indirect methods of estimation is the relative ease with which fertility and mortality rates can be derived once the required demographic data are available from censuses or surveys. Questions on children ever born alive, children still living, current births, infant deaths among current births are frequently included in censuses and surveys, but those on orphanhood and widowhood are questions specific for estimating adult survival probabilities and less likely to be readily available. Conducting a field survey to obtain needed data to estimate mortality by indirect methods adds substantially to the cost of estimation. Consideration should be given to the usefulness of the estimates to justify the cost. The indirect method has been tested with success by applying data from countries with a well developed civil registration system.[26] This, however, does not mean that the method will work in the case of countries with poor survey or census data.

(a) Fertility estimates

The availability of data on children ever born alive or on the age distribution of children under 10 years of age from the censuses will make possible fertility studies using indirect methods. Although it is possible to obtain cumulative fertility histories of females more accurately than information on current fertility, pregnancy history inquiries are not without difficulty in the developing countries. The question needs to be asked of the woman herself, and by a female interviewer. Even so, errors of omission and overcount occur. The misreporting of age of women is another problem that will distort the fertility estimates.

In addition to these reporting problems, there will be children that are missed because the mother died prior to the census or the survey. Unless the fertility pattern of mothers who did not survive is similar to that of those who were enumerated, the results will be biased. Another important limitation of this method is that the fertility rates represent averages without any time reference. Unless fertility has been constant over the long period, these estimates will overstate the fertility level during the period of its decline and understate the situation in the period of increasing fertility.

(b) Mortality estimates

Data by age of mother on children ever born alive and still living are available from a number of population censuses and single-round retrospective surveys, which provide mortality estimates for the childhood period. The advantage of using census data for this purpose is that data are available for the country as a whole as well as for the major political subdivisions to satisfy some of the public health programme needs. The same data from single-round retrospective sample surveys will usually not permit estimates below the national level.

The underlying conditions of the model used should be considered, as well as the inaccuracies in the demographic information used as a basis for the mortality estimates. Also, inherent in estimates based on cumulative histories is the problem of location of estimates in time.

For the estimation of mortality in adulthood, data on survivorship of parents or of spouses may be used. Because these data are generally obtained from sample surveys, the estimates will be feasible for the country as a whole but generally not for the geographical subdivisions.

Questions such as "Is your mother (or father) still alive?" are questions of fact which the respondent should be able to answer accurately for the orphanhood method. There are, however, exceptions where, for example, the child was abandoned early in life and the whereabouts of the father or the mother is not known. A child born out of wedlock may not know the identity of the father. An adopted child may respond in terms of the adopted parents rather than the natural parents. Deaths of childless couples will be missed as well as those of persons who were never married. There may arise overcounts in the case of parents with more than one child among the respondents. In addition, there is a real problem in putting the events in the proper time frame.

The questions of surviving spouses in the widowhood method applies only to the ever-married population. Therefore, implicit in the method is the assumption that the mortality risk of the never-married population is similar to that of the ever-married. The model also assumes that there has not been a change in the levels of mortality and nuptiality, and the survival of the respondent is independent of that of the spouse. These assumptions do not generally hold in the real situation. There are other problems, such as obtaining information on spouses from the first marriage in case of remarriage, and on eliciting accurate age information. In the latter case, it may be possible to use duration of marriage for the inference of the length of exposure to the risk of dying, if it is determined that the information on the duration of marriage can be obtained more accurately than the age of spouse. However, like other indirect methods, specific time references are lacking in the widowhood approach.

E. Conclusions

The national data requirements concerning fertility and mortality include, as a minimum levels and patterns of fertility and mortality for the country as a whole and its major geographical subdivisions, on a continuous basis. Data on causes of death, and seasonal data, particularly of deaths, at both subnational, national and local levels, are highly desirable for public health purposes. The importance of this type of data being available on a continuous basis is of paramount importance. Annual data are needed for monitoring changes in birth and death patterns. Of course, for major subdivisions of the country and cities with relatively small frequencies of events, it may be necessary to group data for a number of years for analytical purposes.

The question of using indirect methods as approaches to estimating vital rates in countries without adequate birth and death registration systems depends on how well the estimates derived from such techniques can meet national requirements for vital statistics. Actually, the problem is more complex in that registration data are intertwined with the administrative process of birth and death registration, which will continue to operate, and in that the official vital statistics will be compiled, processed, published and disseminated from civil registration even though the quality is unsatisfactory.

All the indirect techniques of demographic estimation now available are capable of producing birth and death rates by age and sex for the country as a whole with varying degrees of precision. Indirect methods utilizing data from the population census can also make vital rates available for subnational levels. However, sample survey data will not usually go beyond the national level without a considerable increase in the cost of data collection.

The accuracy of estimates is an important consideration depending on how the estimates are to be used. Non-sampling errors in the collection of demographic data are almost always greater than the sampling errors, and they are difficult to assess. The indirect estimation methods pose a further problem in determining the error arising from the failure of basic assumptions underlying the models to fit the actual demographic situation.

The various measurements of fertility, mortality and other vital rates must be sensitive to changes if they are to be useful for evaluation purposes; otherwise, it will not be possible to measure the effectiveness of family planning activities or of public health interventions. Current estimates from follow-up surveys and dual-records systems can reflect annual changes in fertility and mortality, but estimates from indirect methods are averages centred on a period in some distant past and cannot be greatly useful for evaluation purposes. However, countries without any information on the fertility and mortality levels may find the results from indirect methods to be approximate indicators of the demographic situation.

Although indirect estimates of fertility, mortality and nuptiality from data collected in population censuses and surveys are valuable data, they should be regarded as complementary information to direct data recorded in the civil registration system, which is continuous, permanent and compulsory in nature. Therefore, they are not in any respect substitutes for continuous vital statistics derived from civil registration records. However, in some countries, they may be the only available sources of data at a certain point in time for generating broad estimates of vital rates in the absence of reliable and timely civil registration data.

Depending on the nature of uses, it is advisable that each data source and direct and indirect technique, should be fully exploited by countries taking into account the specific national data circumstances and demographic situation. A common practice may be to complement the results of one approach to the estimation of vital rates with those of other approaches with a view to establishing reliably, within a reasonable range, the vital rates of a country and its subdivisions.
At the same time, countries should strive to strengthen and enhance their civil registration systems.

Table 1
Types of data on fertility collected in countries where two or more population censuses have been conducted between 1965 and 1984

Types of data on fertility collected	TOTAL 1965-1974	TOTAL 1975-1984	AFRICA 1965-1974	AFRICA 1975-1984	N. AMERICA 1965-1974	N. AMERICA 1975-1984	S. AMERICA 1965-1974	S. AMERICA 1975-1984	ASIA 1965-1974	ASIA 1976-1984	EUROPE 1965-1974	EUROPE 1975-1984	OCEANIA 1965-1974	OCEANIA 1975-1984	1974 1984
Total Censuses	108	105	19	23	28	28	9	8	19	19	21	16	12	11	
1. CEBA [a]	50	27	4	3	9	6	4		13	7	13	9	7	2	
2. CBA [b] within a period preceding the census date (asked each woman in her child-bearing age)	2				1				1						
3. CEBA, CBA, within a period preceding the census date	13	23	8	8	3		1	3	1	9				3	
4. Maternity history	9	7	1	1							8	6			
5. CEBA, date of birth of the last child born alive	12	20	6	5	1	5	2	4	3	3				3	
6. CEBA, date of birth of the first child	2	1											2	1	
7. CEBA, dates of birth of the first and the last child	2	4		2									2	2	
8. CEBA, date of birth of CEBA, CBA, within a period preceding the census date, dates of birth of the first and the last child	15	15			14	14	1	1							
9. CEBA, CBA within a period preceding the census date, date of birth of the first child	2						1						1		
10. CEBA, date of birth of the last child, live births in household within a period preceding the census date	1	1		1					1						

Table 1 (cont'd.)

Types of data on fertility collected	TOTAL 1965-1975	AFRICA 1965-1974	AFRICA 1975-1984	N. AMERICA 1965-1974	N. AMERICA 1975-1984	S. AMERICA 1965-1974	S. AMERICA 1975-1984	ASIA 1965-1974	ASIA 1975-1984	EUROPE 1965-1974	EUROPE 1975-1984	OCEANIA 1965-1974	OCEANIA 1975-1984
11. CEBA, live births in household within a period preceding the census date	2		2										
12. CBA, within a period preceding the census date; CEBA and live births in household within a period preceding the census date	1		1										
13. CEBA, live births in household within a period preceding the census date	2				2								
14. CBA and live births in household within a period preceding the census date	1				1								
15. CEBA, CBA, within a period preceding the census date; date of birth of the first child; live births in household within a period preceding the census date	1										1		

Source: Handbook of Population and Housing Censuses (Part II). Studies in Methods, Series F, No.54 (United Nations publication).

a/ CEBA: Children ever born alive

b/ CBA: Children born alive

Table 2

Types of data on current mortality collected in population censuses: between 1965 and 1984 (household approach)

Types of data collected	TOTAL		AFRICA		N. AMERICA		S. AMERICA		ASIA		EUROPE		OCEANIA	
	1965-1974	1975-1984	1965-1974	1975-1984	1965-1974	1975-1984	1965-1974	1975-1984	1965-1974	1976-1984	1965-1974	1975-1984	1965-1974	1975-1984
Total censuses	11	28	5	22	2	1	1	1	3	3				1
1. Total number of deaths, a/	2		1				1							
2. Total number of deaths, a/ by sex		3		2										1
3. Total number of deaths, a/ by sex, age (or age groups) or date of birth	6	14	4	14	2									
4. Total number of deaths, a/ by sex, age (or age groups) or date of birth and date of death (or age)	3	11		6		1		1	3	3				

Source: Handbook of Population and Housing Censuses (Part II). Studies in Methods, Series F, No.54 (United Nations publication).

a/ Deaths in the 12 months (or 24 months) preceding the census date.

Table 3

Types of data on indirect estimations of mortality collected in population censuses between 1965 and 1984

Types of data collected on indirect estimation of mortality	TOTAL 1965-1974	TOTAL 1975-1984	AFRICA 1965-1974	AFRICA 1975-1984	N. AMERICA 1965-1974	N. AMERICA 1975-1984	S. AMERICA 1965-1974	S. AMERICA 1975-1984	ASIA 1965-1974	ASIA 1976-1984	EUROPE 1965-1974	EUROPE 1975-1984	OCEANIA 1965-1974	OCEANIA 1975-1984
Total number of censuses	174	201	36	55	36	35	12	16	35	40	36	34	19	21
1. CEBA [a], CL [b]	42	33	7	2	2	4	4	5	14	16	5	2	10	4
2. CBA [c] within a period preceding the census date, CEBA, CL; deaths among CBA within a period preceding the census date or survival of the last CBA	7	10	2	4	2		1	1		3			2	2
3. CEBA, CL; orphanhood	3	8	2	2		1			1					5
4. CEBA, CL; deaths among CBA within a period preceding the census date or survival of the last CBA; orphanhood	6	11	2	5	2	3	1	2					1	1
5. Date of birth of the last CBA and survival	15	25	7	7	2	5	3	5	3	3		2		3
6. CEBA, CL; deaths among CBA within a period preceding the census date or survival of the last CBA; deaths in household within a period preceding the census date		12		9						3				
7. CEBA, CL; deaths in household within a period preceding the census date	5	8	3	4		1			2	3				
8. CEBA, CL; deaths in household within a period preceding the census date orphanhood	3	4	1	3	1		1	1						

Table 3 (cont'd)

Types of data on indirect estimations of mortality collected in population censuses between 1965 and 1984

Types of data collected on indirect estimation of mortality	TOTAL		AFRICA		N. AMERICA		S. AMERICA		ASIA		EUROPE		OCEANIA			
	1965-1974	1975-1984	1965-1974	1975-1984	1965-1974	1975-1984	1965-1974	1975-1984	1965-1974	1976-1984	1965-1974	1975-1984	1965-1974	1975-1984	1974	1984
9. CEBA, Date of deaths in household	1	6		5	1					1						
10. CEBA, CL; death among CBA within a period preceding the census date; orphanhood; deaths in household within a period preceding the census date	1	2	1	2												
11. Maternity history	2	2	1	1							1	1				
12. Live births in household with other combinations of data on indirect estimations of mortality	4	4	1	1	1				1	1	1	1		1		
13. No questions on indirect estimation of mortality	85	76	9	10	25	21	2	2	14	10	29	28	6	5		

Source: Handbook of Population and Housing Censuses (Part II). Studies in Methods, Series F, No.54 (United Nations publication).

a/ CEBA: Children ever born alive

b/ CL: Children still living

c/ CBA: Children born alive

FOOTNOTES

1/ A comprehensive study on how these approaches have evolved in population censuses is presented in the Handbook of Population and Housing Censuses (Part II), United Nations, Studies in Methods, Series F, No. 54. As used in this chapter, the terms "1970s" or "1980s" refer, respectively, to the 1970 census decade (1965 to 1974) and the 1980 census decade (1975 to 1984).

2/ For a more indepth discussion see: Handbook of Household Surveys (Revised Edition) Studies in Methods, Series F, No. 31 (United Nations publication, (Sales No. E.83.XVII.13).

3/ Manual IV (Methods of Estimating . . .); and Manual X (Indirect Techniques for...)

4/ Manual X (Demographic Estimation . . .).

5/ John G. C. Blacker, "Experiences in the use of special mortality questions in multi-purpose surveys: the single round approach", in Data Bases for Mortality Measures (United Nations publication, Sales No. E.83.XIII.3).

6/ William Brass, Methods for Estimating . . .,

7/ William Brass and others, The Demography of Tropical Africa (Princeton, New Jersey, Princeton University Press, 1968); Jeremiah M. Sullivan, "Models for the estimation of the probability of dying between birth and exact ages of early childhood", Population Studies, vol. 26, No.1 (March 1972) pp. 79-97; James Trussell, "A re-estimation of the multiplying factors for the Brass technique for determining childhood survival rates", Population Studies, vol. 29, No.1 (March 1975), pp. 97-108. Griffith Feeney: "Estimating infant mortality rates from child survivorship data by age of mother". Asian and Pacific Census Newsletter, vol.3, No.2 (November 1976) pp. 12-16; "Estimating infant mortality trends from child survivorship data". Population Studies, vol. XXXIV, No. 1 (March 1980), pp. 109-128.

8/ Manual X: (Demographic Estimation . . .).

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