

MEASUREMENT OF BIRTH AND DEATH REGISTRATION COMPLETENESS¹

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Introduction

The completeness with which births and deaths are registered is an important determinant of the usefulness of vital statistics derived from these vital records. Because of this, the United Nations *Demographic Yearbook* publishes estimates of the completeness of birth registration for various countries made by the national authorities responsible for civil registration or for the national compilation of vital statistics. In some cases, the evaluation is based on completeness checks made by identifying individual births and deaths in the population census or in demographic sample surveys and matching them against registered events. In other cases, estimates of the number of vital events are derived by various methods, direct or indirect, and these are compared with the aggregate number of vital events registered in the same area in the same period of time. Often the reported level of completeness represents the best guess of the national authorities. By and large, these assessments can be accepted at their face value. It is not likely that the registration of births and deaths will be complete in countries that are rated unsatisfactory nor in countries for which information on completeness is unavailable. On the other hand, there may be some countries rated complete which do not actually meet the U.N. criterion of completeness of 90 percent or more. The problem in the latter case is that there is no easy way of validating the rating in the absence of a simple test of registration.

Special Problems in Measurement of Registration Completeness

Vital events occur in space and time to individuals. In virtually every country, there are laws that require the registration of these events at their place of occurrence within a specified period of time. The problem in a registration study is to identify these vital events through an independent source such as a census or survey and to ascertain if they have been registered.

In some cases, an event may not be reported at all in the census or survey because of a deliberate attempt to conceal it, because proxy respondents are unaware of it, or because of memory lapses. Errors also arise when some vital events are erroneously reported inside the time period of the study while others which actually occurred in the period are placed outside of the time frame and not reported. Other vital events may be reported in the census or survey but actually occurred outside of the geographic area in which the household is located. These are some of the problems of census or survey data which need to be addressed.

There are separate files for recording births and deaths that occurred in the registration district (primary registration unit) and registered during the year. Because registration is by place of occurrence of the event, the files include events occurring to members of households living outside of the registration district as well as to those residing in the area. In addition, because registration is by date of registration rather than by date of occurrence of the event, registration records include events that occurred in previous years as well as during the current year. In some countries, large increases in late registrations occur when parents find that proof of age is needed to enroll their children in grade school.

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Because the geographic and time coverage of vital events reported from the two sources differ, every effort has to be made to eliminate out-of-scope cases. To accomplish this, the matching operation needs to be as accurate and reliable as possible, and a thorough field investigation must be made of at least a sample of potential out-of-scope events to minimize this source of bias.

Considerations in Designing Registration Completeness Tests

Many methods are now available to measure the completeness with which births and deaths are registered. They provide estimates of varying precision, and they differ considerably in complexity and cost. Therefore, an important consideration in deciding on a registration completeness check is the current state of development of the civil registration system. For areas where registration is poor, a precise method for measuring completeness cannot be justified, and almost any procedure for detecting incomplete registration may be used. For areas where registration of births and deaths is close to complete, it would be inappropriate, as well as a waste of time and effort, to resort to any but the most precise method available.

For a large number of developing countries, any reasonably good vital statistics estimation method should provide more accurate estimates of the number of vital events than the registration system (1). Also, a number of useful procedures can be routinely followed to detect incomplete registration. One of these is to tabulate the numbers of birth and death records registered each year by the year of occurrence of the events to provide an index of current registration which may be compared from year to year and from area to area. Another possibility is to prepare a checklist of the number of birth and death records received from each local registration office to be compared with the numbers received in previous years. Except for epidemics and other unusual events, there should be a certain degree of consistency in the number of records filed each year in each local office. Still another possibility is to compare the numbers filed locally with expected numbers based on some assumption of the birth and death rates for the population served by the local registration office.

Routine matching of infant death records to the corresponding birth records has been useful in identifying missing birth records. One can also compile lists from various sources such as churches (baptisms), hospitals and schools to match against the birth registration file. For deaths, similar lists of events may be compiled from hospital records, funeral services, and burials in cemeteries. These and other evaluation techniques suggested by the United Nations (2) serve as a useful starting point for detecting and studying the problem of incomplete registration of births and deaths in an area.

Although, as mentioned above, any reasonably good estimation method should provide an adequate basis for evaluating the completeness of registration for a poor registration system, it is not easy to find a source of data that can outperform a good registration system for producing information on births and deaths. For a test of birth registration completeness, a well-conducted population census has been found to be effective, provided the recall period is only 3 or 4 months and the matching operation is performed accurately with reconciliation of questionable matches and nonmatches. Also, provisions need to be made to identify babies whose birth and death both occurred during the period of the study. To include a birth registration completeness test in a population census should not add too much to the relative cost of the census. However, population censuses are usually conducted only once every 10 years, so the timing of any test has to be adapted to the census cycle.

Single-round demographic surveys have much the same problems as censuses in identifying births, but they have the advantage that they can be conducted at any time. Shortening the recall

period makes it necessary to enlarge the sample size, which impinges on the cost of the survey. The magnitude of sampling error is another consideration.

Experience has shown that it is difficult to achieve complete enumeration of infants and young children in a household. It is even more difficult to determine deaths that occurred in the household because this involves identifying an individual no longer present. Another problem arises when the death of a head of household results in the dissolution of the household. To deal with these problems as well as others inherent in retrospective inquiries, multi-round surveys have been suggested to follow a cohort of individuals. Such prospective studies, when coupled with an independent data collection procedure, would be a form of a dual records system which is, at present, the most powerful statistical method available for the measurement of birth and death rates.

In a dual records system, coverage or completion estimates are based on matching reports from two different sources to obtain reports of vital events in the same population. One source is a registration system, which may be the official system or a special one for canvassing the population for information on vital events. The other source is a household survey. In preparing estimates for developing countries where registration of births and deaths is poor, a special canvass of the population is usually made in search of vital events because more events can be identified in the special search than in the official registration system, resulting in better estimates. However, if a dual system is used in countries where the registration of vital events is close to complete, the official registration system is the preferred source of registration data. Another important advantage of this latter source is that it eliminates the field cost of a special canvass. This saving can be used to advantage in conducting multi-round household surveys and in matching and reconciling the records obtained from the two sources.

The primary purpose of the dual records survey is to produce estimates of vital events, but in matching the records from the two sources, it is possible to estimate the proportion of events missed by each source as well as the events missed by both sources by the Chandra Sekar-Deming method (3).

The study design should take a number of factors into consideration. First, a cluster sample should be used because it is prohibitively expensive to follow the total population over the course of a year. Second, the sampling unit must be the primary registration unit or a group of primary registration units so the survey area and the registration area coverage can be identical. Furthermore, it should be kept in mind that vital events reported in the survey will include events occurring both in the sample area and outside the sample area. Registration records will include events occurring to members of the household and to residents outside of the sample area. The registration completeness study will have to be limited to vital events occurring in a primary registration unit of the selected sample to members of the sample households. Third, every household and resident institution in the cluster must be included in the survey. Special care should be taken to identify household members in short-stay institutions in the same area (hospitals, health centers, jails, etc.). Lastly, whenever a household moves out of the sample area, there should be an inquiry to make sure that no vital event occurred before the move, and the vacated household must be replaced by the new household in the dwelling unit. Periodically, a systematic canvass should be made of all vacant and newly built dwelling units in the sample area, and new occupants of these dwelling units must be added to the study population.

The first step of the household survey is a census to identify the members of the cohort to be followed. For a birth registration test, the population at risk consists of women of childbearing age, for whom identifying information such as name, age and relationship to head of household should be collected. Most of the women scheduled to be delivered in the first quarter of the study should show physical signs of pregnancy, and all of them should know of their pregnancy status,

including approximate date of expected delivery. For proxy respondents, special probes should be made about the pregnancy status of other women of childbearing age in the household. In subsequent interviews, women of childbearing age not pregnant in the previous interview should be asked for information such as the date of their last menses to flag women for subsequent follow-up. The follow-up is terminated with the ascertainment of the pregnancy outcome of a live birth or fetal death.

For deaths, the entire population is at risk. In developing countries, children under 5 years of age are at special risk. Therefore, in the initial visit to the household, special probes should be made about infants and young children, as this group is frequently overlooked in enumerations. Pregnant women, young adult males and elderly people are also at special risk of death in developing countries.

Intense follow-up should be made of the at-risk population using every means to uncover the occurrence of births and deaths in the survey population at quarterly intervals. In anticipation of the possible movement of the population, it is well to obtain in the initial interview the name and address of several close friends or relatives not living in the same household, in the event that the sample household should break up or move out of the area. By recording the changes in the population composition of the households, it will be possible to determine individuals added to the cohort through birth and in-migration and those deleted through death and out-migration. Registration records can then be compared with the events identified in the survey.

New members of the household identified at subsequent visits are added to the household roster and followed to the end of the survey. Information about births, such as name of child, name of father and mother, place and time of birth is recorded on a special form for matching with the file of birth records. Members of the cohort not present at any subsequent round are identified and their whereabouts ascertained. If the loss is through death, the name of the individual with other identifying information and facts about the death such as place and time of death are recorded for subsequent matching against the registration records.

Because of common names and possible name changes, the name of a child or of a decedent frequently is not sufficiently unique. Therefore, the person's name must be supplemented by other information, such as name and age of father, maiden name and age of mother, place of birth or death, place of registration, etc. It is important that a set of reasonable criteria exists to determine if there is a match of two records. This is more easily said than done because the more rigorous the matching rules, the fewer the matches, and vice versa.

The dual record system assumes that the two sources of record are independent. This assumption poses no problem unless the survey in some way encourages registration of the event. Therefore, it is important to keep the true purpose of the study hidden from the interviewers. The study should not be labelled as a registration completeness test nor should the interviewers reveal to household members how the information being collected will ultimately be used.

The registration completeness study should cover a period of 12 months to remove the effects of seasonality of births and deaths. Also, reasonable allowances should be made for some delay in registration. Although registration laws specify when the event should be registered (for example, 7 days after the event for deaths, and 14 days or a month for births), events occurring during the study period but registered 2 or 3 months after the 12-month period of the study should probably be accepted as a registered event.

Discussion

The dual records system was devised for the estimation of vital rates in developing countries, and dual records surveys have been conducted with success in a number of them. For estimation purposes, the demographic survey may be a series of single-round surveys or a multi-round survey. In the former, a different sample of households is visited in each succeeding round. In the latter, as in the proposed registration completeness test, the same household is interviewed in successive rounds. In areas where there is no system of street addresses, it may be difficult to identify and cover every household in the sample in every round. In the event that any household is missed, a special effort must be made to obtain information on the members on the household roster in the final round of the survey.

One of the criticisms of multi-round surveys is that repeated visits to the same households may result in interviewer and respondent fatigue, but four visits to a household over a period of a year should not place an undue burden on the interviewer or the respondent. With each visit, there should be opportunities to build rapport and interest in the study. Certainly, the longitudinal studies on record for 20 years or more could not have been achieved if such fatigue were a factor.

Perhaps a more relevant problem is the follow-up in succeeding rounds of the survey. Follow-up can be done in one of two ways. One way is to provide the interviewer with the location of the household and a list of household members and instruct the interviewer to check the whereabouts of the members. The other is to provide the interviewer with the location of the household and the name of the household head and instruct the interviewer to make an independent listing of household members, which is later checked against household rosters obtained in previous interviews. The second method is more complex and costly than the first, but it rules out the possibility of curbside interviews. A solution to the latter problem is stricter field supervision of the interviewers with possible reinterview of a sample of households.

Suitable interviewers must be recruited and trained to elicit appropriate responses to questions regarding pregnancy and pregnancy outcome and to maintain good rapport with the respondents throughout the study. Sufficient information should be collected about each event to be used in the matching operation. Suitable criteria must be developed to determine a match when records from the two subsystems are compared. All unmatched records should be brought back to the field and adjudications made after discussion with a knowledgeable member of the household and/or the local registrar.

The prospective follow-up of a cohort of individuals is an important but not unique feature of the proposed study. This type of follow-up has been conducted in an urban community of New Delhi (4) and in the urban and rural areas of South India (5) where censuses were taken to identify cohorts of women of childbearing age who were then followed to pregnancy and delivery to determine pregnancy outcome. A special problem was encountered in New Delhi, where a significant number of women left the study area to be at their mothers' home at the time of delivery. Because the resulting birth is registered at the place of occurrence of the event, this kind of movement does not affect birth registration completeness tests as long as the delivery does not take place in another area of the sample.

References

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