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**Proposals for *Principles and Recommendations for a Vital Statistics System*, Rev. 3 –**

**Part One, Chapter 1**

**Definition and uses of vital statistics**

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## **A. Introduction**

(a) *What is covered in this paper?*

1. The paper presents the structure and annotated outline for Chapter I of the *Principles and Recommendations for a Vital Statistics System, Rev 3* – the Vital Statistics System. Chapter I addresses the definition of vital statistics and vital events; and followed by uses of vital statistics.

(b) *What are the changes from the last revision?*

2. In the *Principles and Recommendations for a Vital Statistics System - Rev 2*, the uses of vital statistics obtained from different sources are described briefly. It is proposed that the section on uses of vital statistics to be expanded so that it is more elaborated and comprehensive. The text will be structured by the different uses of vital statistics, which could be grouped as follows: (1) uses in population estimates and projections; (2) uses in cohort and period studies; (3) uses in constructing life tables; (4) uses in preparing MDGs and other health indicators; (5) uses in epidemiological studies; (6) uses in public health programmes; (7) uses in maternal and child health services; (8) uses in family planning services; (9) uses in social and demographic studies; (10) uses in local and national programmes; and (11) other uses.

## **B. Definitions of vital statistics and vital events**

3. Vital statistics is defined as a collection of statistics on vital events in a lifetime of a person as well as relevant characteristics of the events themselves and of the person and persons concerned. Vital statistics provide crucial and critical information on the population in a country.

4. For vital statistics purpose, the vital events of interest are: live births, adoptions, legitimations, recognitions; deaths and foetal deaths; and marriages, divorces, separations and annulments of marriage. The recommended definitions of each event on which data are to be collected for vital statistics purposes are as given in paragraph 57 of the *Principles and Recommendations for a Vital Statistics System, Revision 2*.<sup>2</sup>

- LIVE BIRTH is the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy, which after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached; each product of such a birth is considered live born (all live-born infants should be registered and counted as such, irrespective of gestational age or whether alive or dead at the time of registration, and if they die at any time following birth they should also be registered and counted as deaths).

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<sup>2</sup> *Principles and Recommendations for a Vital Statistics System, Rev 2*, United Nations Publication, Sales No. E.01.XVII.10, United Nations, New York, 2001.

- DEATH is the permanent disappearance of all evidence of life at any time after live birth has taken place (postnatal cessation of vital functions without capability of resuscitation) (This definition excludes foetal deaths, which are defined separately below).
- FOETAL DEATH [DEADBORN FOETUS] is death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy; the death is indicated by the fact that after such separation the foetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles (note that this definition broadly includes all terminations of pregnancy other than live births, as defined above).<sup>3</sup>
- MARRIAGE is the act, ceremony or process by which the legal relationship of husband and wife is constituted. The legality of the union may be established by civil, religious or other means as recognized by the laws of each country.
- DIVORCE is a final legal dissolution of a marriage, that is, that separation of husband and wife which confers on the parties the right to remarriage under civil, religious and/or other provisions, according to the laws of each country.
- ANNULMENT is the invalidation or voiding of a marriage by a competent authority, according to the laws of each country, which confers on the parties the status of never having been married to each other.
- SEPARATION, JUDICIAL is the disunion of married persons, according to the laws of each country, without conferring on the parties the right to remarry.
- ADOPTION is the legal and voluntary taking and treating of the child of other parents as one's own, in so far as provided by the laws of each country.
- LEGITIMATION is the formal investing of a person with the status and rights of a person born in wedlock, according to the laws of each country.
- RECOGNITION is the legal acknowledgment, either voluntarily or compulsorily, of the paternity of a child born out of wedlock.

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<sup>3</sup> The legal requirements for the registration of foetal deaths vary from country to country. It is recommended that dead foetuses weighing 500 or more grams at birth (or those of 22 completed weeks of gestation or crown-heel body length of 25 or more centimetres if weight is not known) be registered. In addition, for statistical purposes, it is recommended that such terminology as “abortion”, “early foetal death”, and “late foetal death” be replaced by the use of weight-specific measures, e.g., the foetal death rate for foetuses of 1,000 or more grams or the foetal death rate for foetuses weighing between 500 and 1,000 grams etc.); see WHO, *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision* (Geneva, 1992) vol. 2.

### C. Uses of vital statistics

5. Knowledge of the size and characteristics of a country's population on a timely basis is a prerequisite to socioeconomic planning and informed decision making. Vital statistics and their subsequent analysis and interpretation are essential for setting targets and evaluating social and economic plans, including the monitoring of health and population intervention programmes, and the measurement of important demographic indicators of levels of living or quality of life, such as the expectation of life at birth and the infant mortality rate.

6. Vital statistics are also invaluable for planning, monitoring and evaluating various programmes such as those dealing with primary health care, social security, family planning, maternal and child health, nutrition, education, public housing and so forth. Among the demographic uses of vital statistics are the preparation of population estimates and projections, studies of mortality, fertility and nuptiality and the construction of life tables.

7. There are various sources of vital statistics: records of vital events from civil registration, specific retrospective questions on fertility and mortality in population censuses and household sample surveys, vital records from sample registration and health records. It is important that different sources of vital statistics employ the same concept and definitions of vital events to ensure national and international comparability.

8. Vital statistics is preferably obtained through a civil registration system as it is the ideal source from which to derive accurate, complete, timely and continuous information on vital events. In addition, vital statistics derived from the civil registration system (and the population registers) can provide the flow statistics from the smallest civil divisions, a characteristic that no other data collection system can provide. When civil registration data do not exist or are deficient, some countries may have to recourse to population census or a household sample survey to estimate the necessary vital statistics through retrospective questions on fertility, mortality and nuptiality. Fertility, mortality and nuptiality statistics may also be collected through sample registration areas. In some countries, vital statistics needed for planning purposes rely on these other sources of data, together with the application of indirect techniques of demographic estimation. It must be stressed that even though population censuses, sample surveys, sample registration may provide estimates of the current levels of fertility, mortality, foetal mortality, marriage and divorce, they are not a substitute for a civil registration system since they cannot provide such details as estimates of mortality by cause of death, other epidemiological information. In addition, these sources provide very limited data on vital events themselves since their investigations focus on the household as a unit and not on individuals, so that vital events are merely collected as characteristics of household members.

9. The different sources of data on vital events will be provided in details in Part II Chapter I of the proposed revision of the *Principles and Recommendations for a Vital Statistics System* (see ESA/STAT/AC.233/1; Annex I). This section provides an overview of the uses of vital statistics.

**(a) *Uses in population estimates and projections***

10. Data on births and deaths obtained through the civil registration system can be used with population census data to prepare population estimates and projections for different areas of a country. Depending on how detailed the vital statistics are, population by various subgroups such as age, sex and other characteristics may also be estimated.

11. The analyses of the trends of fertility, mortality, nuptiality and divorce obtained from vital statistics provide inputs for the formulation of population projections assumptions. Live birth order (i.e., the order of the present live birth in relation to all previous live births), a characteristic that is usually collected in the vital record (or in its statistical report) for each registered live birth, can be cross-tabulated with the age of the mother to allow a more refined analysis of fertility patterns and changes to be made and to prepare special fertility projections.

**(b) *Uses in cohort and period studies***

12. Vital statistics form the basis of cohort analysis. Statistics derived from the civil registration system are used to study various characteristics of the population from either the period point of view or the cohort point of view. Estimation derived from registration data are direct estimates which do not depend, or depend very little, on assumptions. In particular, the estimation of the infant mortality rate can be made directly using registration data. Vital statistics can be used for longitudinal studies, such as the follow-up of cohorts of children to determine the effects of diet, environment, socio-economic conditions or genetic makeup on growth and health status; longitudinal studies of the health status and needs of the elderly; or of follow-back of decedents to determine the relationship of exposure to environmental hazards or to unhealthy lifestyle practices on the causes of mortality.

**(c) *Uses in constructing life tables***

13. An important tool in mortality analysis is the life table that summarizes the mortality experience of a population independent of its age composition. Information on deaths, classified by various characteristics of the deceased, especially age and sex, is necessary for calculating life-tables and estimating the probability of dying at various ages. It has, in turn, a variety of uses in demography, public health and actuarial work. Both the standard life table, which deals only with the mortality experience of a population and the multiple decrement table, which describes the separate and combined effects of other factors in addition to mortality, can be calculated. The first calculation, of deaths by age and sex produced by the civil registration system, is straightforward. The second requires death statistics by age and sex and specific rates by other social variables, such as the labour force participation rate. For example, the attrition of the married population can be studied through divorce and mortality.

14. There are two kinds of life tables, the current or period life table and the generation or cohort life table. The current life table is based on the registered mortality data for a given period of time, usually one to three years, and on the population relating to the

middle of the period. The generation life table is based on the mortality experience of a specific birth cohort, that is, persons born during a particular period of time.

15. The construction of life tables for smaller geographical areas must depend on vital statistics derived from the civil registration system as it is difficult to use sample data to represent certain small areas.

***(d) Uses in preparing Millennium Development Goals and other health-related indicators***

16. Continuity in the availability of good quality vital statistics and their subsequent analysis and interpretation are essential for setting targets and evaluating social and economic plans, including the monitoring of health and population intervention programmes, and the measurement of important demographic indicators of levels of living or quality of life.

17. Vital statistics are the basic data for the calculation of various indicators of mortality, among which the infant mortality rate, under-five mortality rate and the maternal mortality ratio are three of the indicators to measure progress towards the internationally agreed Millennium Development Goals (MDG). Infant mortality rate and under-five mortality rate are two indicators under Goal 4 - Reduce child mortality - of the MDGs. The target is to reduce by two-thirds between 1990 and 2015 the under-five mortality rate (target 4.A of the MDG). Maternal mortality ratio is one of the indicators under the MDG Goal 5 - improve maternal health. Target 5.A states that the maternal mortality ratio shall reduce by three quarters between 1990 and 2015. Without reliable, continuous and timely vital statistics on births, deaths by age and causes, it is difficult to progress on the commitment made in the year 2000 in the United Nations Millennium Declaration.<sup>4</sup>

18. Another important use of birth and death statistics, with additional information on migration, is to produce annual population estimates. Those population estimates are the basis for compiling most of the indicators for monitoring MDG progress. For example, total population figure is needed to calculate the proportion of population below \$1 (PPP) per day - an indicator under the MDG Goal 1 (Eradicate extreme poverty and hunger). Vital statistics based population estimates are also required for calculation of several indicators, including the literacy rate of 15 to 24 year-olds (Goal 2 - Achieve universal primary education); adolescent birth rate (Goal 5 - Improve maternal health); HIV prevalence among population aged 15 to 24 (Goal 6 - Combat HIV/AIDS, malaria and other diseases); and proportion of population using an improved drinking water source (Goal 7 - ensure environmental sustainability).

19. Additional health indicator include the life expectancy at birth, the crude death rate the proportionate mortality rate at ages 50 years and over, and neonatal and post-neonatal mortality rates. For an understanding of specific health problems, mortality statistics by cause of death, which are mainly obtained from civil registration data, are essential.

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<sup>4</sup> Report of the Secretary-General, Road map towards the implementation of the United Nations Millennium Declaration, A/56/326; [http://mdgs.un.org/unsd/mdg/Resources/Static/Products/SGReports/56\\_326/a\\_56\\_326e.pdf](http://mdgs.un.org/unsd/mdg/Resources/Static/Products/SGReports/56_326/a_56_326e.pdf)

*(e) Uses in epidemiological studies*

20. Vital statistics as generated from civil registration data are the only source providing the basis for a variety of in-depth epidemiological studies, including the estimation of risks of premature death by sex and age, the estimation of relative risks of death among different subpopulations and the analysis of trends in the risk of dying because of particular causes.

21. Epidemiological approaches to studying the association between low-birth-weight children and infant mortality can be done by linking all live births weighing less than 1.5 kg (or any other lower limit) to the corresponding infant death records. Similar approaches can be taken to study neonatal mortality (infant deaths under four weeks of age) or post-neonatal mortality differentials (infant deaths above four weeks of age and up to one year). Other types of epidemiological research include the use of the records of two control groups to learn the effects of certain causes of death, either retrospectively or prospectively.

22. Mortality data by the characteristics of the deceased such as age, sex, occupation, education, place of usual residence, place of occurrence and causes of death can be used to (1) characterize causes of death for selected population sub-group; (2) provide additional information on health conditions in specific locations; (3) assess disease conditions elevating mortality rates in certain area; (4) assess linkage of certain occupation group with mortality level and provide intervention; (5) evaluate health service providers; (5) provide relevant input to agencies or programmes directed at reducing mortality levels.

23. Mortality rates by age, sex, occupation, education, income, type of family, and urban and rural residence characteristics could be better studied by matching death records for persons who died after the date of the census to their census enumeration schedule. The information about the deceased reported on the death record is supplemented by any additional demographic and socioeconomic information required about the deceased and other persons reported in his or her household in the census schedule.

*(f) Uses in public health programmes*

24. In the absence of morbidity data, public health programmes rely on mortality statistics to learn the magnitude and the distribution of major disease problems. Although certain infective and parasitic diseases may be reported, morbidity reports on communicable diseases are generally incomplete and they do not accomplish more than indicate the seasonality of diseases. Mortality records collected on a regular basis can serve as a useful source of data in dealing with problems of public health.

25. Reliable and timely death data also make it possible to provide real-time public health alert on deaths caused by rare diseases. Information on unusual patterns of deaths and deaths by causes may suggest the need for intervention to public health officials.

26. Statistics on deaths from drug use and poison have been instrumental in obtaining passage of legislation to protect the individual. In some countries, poison control centres

have been established. Public health education programmes have been launched utilizing data on various kinds of poisons as the base mortality cause at different ages.

27. Live birth records are the basis for many community-based public health programmes for post-natal care of mother and child, and may be used, when needed, for programmes of vaccination and immunization, premature-baby care, assistance to disabled persons, etc.

**(g) *Uses in maternal and child health services***

28. Maternal care and child health programmes can be carried out effectively by the availability of statistics on births, foetal deaths, maternal and infant deaths. These data, classified by place of occurrence (hospital, home and urban/rural places), birth weight, gestation age, parity, age of mother and the like, will provide useful information for planning, operating and evaluating services to prevent maternal and infant deaths.

29. Birth outcomes such as birth weight and malformation of the birth, classified by delivery method, place of occurrence, prenatal care and maternal characteristics can be used to study the impact of delivery method, experience of physicians, level of prenatal care and maternal characteristics on malformations and birth injuries. Follow-up interventions can be made in terms of providing training to physicians and pregnant women.

30. The increasing importance given to the registration of foetal deaths is in recognition of their value in measuring perinatal mortality and pregnancy outcomes. The matching of birth to infant death records will provide additional characteristics of the mother, such as age, marital status and socio-economic status, for intensive studies of pregnancy and birth outcomes.

31. Information from death records have been used in some countries in setting preventive control measures of maternal deaths. After special investigations of maternal death records have been carried out in selected areas to learn the causes of deaths, programmes of prevention may then be introduced. A similar approach has been taken with respect to infant deaths to determine the preventable factors of infant deaths.

32. By linking vital statistics with health service provision, one can assess the quality of service provision provided. For example, analysis can be done on the impact of different types of health service such as public versus private practices on birth outcomes.

**(h) *Uses in family planning services***

33. Family planning services require fertility data by age of mother and parity for the planning, implementation, monitoring and evaluation of family planning programmes. Marriage rates and age at first marriage are also useful data for an understanding of the dynamics of fertility. For example, it is known that the age at marriage has a close bearing on total fertility and is therefore a potential policy instrument to limit family size.



***(i) Uses in social and demographic studies and programmes***

34. Data on marriages and divorces allow analysis on the impact of divorces on mother and children. Single mothers and their children constitute a particularly vulnerable group in most populations. Such information may be useful to make legal provisions to protect the rights of mother and children at divorces and also to allocate resource accordingly.

35. Linking of fertility data with other administrative data such as education statistics provides opportunity to study the impact of maternal characteristics on early childhood development. Vital statistics derived from a civil registration system, can also be used as sample frame to conduct in-depth sample surveys to study the social wellbeing of mother and children.

36. Vital statistics from civil registration also has significance in other societal areas of interest, especially with regard to the study of the establishment and maintenance of families as units of society. The registration of births, marriages and divorces, for instance, provides tangible proof of the official recognition of the family formation process, and can yield valuable insights about the evolution of that process through time. A related issue is an assessment of the incidence of out-of-wedlock births.

***(j) Uses in local and national programmes***

37. One of the advantages of vital statistics generated from civil registration is the geographical and small-population group coverage. Adequate civil registration data that achieve a high level of coverage at the national level also have the potential of allowing the estimation of differentials at the regional level, thus providing invaluable information for regional planning and the appropriate allocation of resources in such areas as education, health care and social security at the appropriate administrative level.

38. Similarly it is possible for certain programmes to focus on particular sub-population groups that need special attention.

***(k) Other uses of vital statistics***

39. Birth, death and marriage rates and data on family size and composition are important information in planning for public housing. The trends of the birth and marriage rates are indicators of the future house needs, size of school population and are essential in planning and providing school facilities, as well as in the training of teachers.

40. Vital statistics are useful in planning for future markets of consumer goods such as medicine, food, clothing and furniture. If the birth rate remains high, it may be expected that the demand for maternity clothing will remain high, that medicine, food, clothing, equipment and furniture will continue to be in demand and that housing and house furnishings will be at a premium price. Statistics on births and projections are useful for commercial firms and enterprises to plan for stocks of clothing, toys and play equipment and the like, for growing children.

41. The number of marriages has importance for the building industry and the trend in marriage rate will influence the business prospects of clothing and furniture manufacturers among others. These are some of the commercial uses of vital statistics that are available at local level.

42. In conclusion, vital statistics from different sources need to be of highest quality to serve as better information for better decisions. Any vital statistics produced should be aiming for highest quality in terms of completeness, correctness, availability and timeliness. For example, use of vital statistics for local and regional planning requires that such data have achieved a high level of coverage at local level. Real time alert on mortality that can be provided to public health officials requires that death data are timely and accurate. It is also highly desirable that different sources of vital statistics employ the same concept and definitions of vital events to enhance complementarities of the different sources and to ensure national and international comparability.