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PRODUCING POPULATION ESTIMATES ON AN ANNUAL BASIS: THE CENTRAL ROLE OF VITAL STATISTICAL SYSTEMS

(Item 7 of the provisional agenda)

TOOLS AND SOLUTIONS FOR BETTER DATA ON BIRTHS, DEATHS AND CAUSES OF DEATH

Note by the secretariat

Corrigendum

The dates of the session *should read* as above.

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PRODUCING POPULATION ESTIMATES ON AN ANNUAL BASIS: THE CENTRAL ROLE OF VITAL STATISTICAL SYSTEMS

(Item 7 of the provisional agenda)

TOOLS AND SOLUTIONS FOR BETTER DATA ON BIRTHS, DEATHS AND CAUSES OF DEATH

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SUMMARY

Many developing countries in the Asia-Pacific region encounter major challenges in producing reliable annual population estimates. The huge need for reliable and timely population and cause of death data by age and sex stands in stark contrast to the limited information available in many countries, where even the total number of births and deaths is not known. The lack of progress over decades in improving the coverage of civil registration systems has compelled many developing countries to organize specialized household surveys to obtain the data required to produce the annual population estimates needed for the development process. These ad hoc surveys can deliver approximate measures for birth and death but, due to their costs, do not represent a sustainable tool for generating annual population estimates and give little or no information on cause of death. The improvement of civil registration and vital statistics systems is the only sustainable solution in the long run and the only one that benefits both individuals and society.

This document introduces new tools and emerging solutions towards achieving better and more complete data on births, deaths and causes of death. The document discusses innovative work by WHO, the Health Metrics Network (HMN) and other partners to assist countries in improving their vital statistics. In particular, it introduces a tool for assessing the quality of vital statistics derived from civil registration and some interim measures that countries could use for meeting their needs for information on births, deaths and causes of death.

The Committee may wish to provide guidance concerning the secretariat's involvement in regional and global initiatives for improving vital statistics and on the feasibility of using the WHO/HMN guidelines and methods to strengthen national statistical systems.

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Introduction

1. In many countries, it is a legal requirement that the national statistical office (NSO) should periodically produce national and subnational population estimates and projections. These estimates, which are usually prepared on an annual or quarterly basis, become the official population figures that are used by the Government to determine the allocation of resources. Reliable population statistics are needed at all levels of government for most programmes and policies, particularly those involving the delivery of services. They are also needed in order to monitor existing government programmes and policies and to produce population projections for forward planning. Applications in private enterprise and other non-governmental activities are too numerous to be described here.

2. Many statistical indices and rates have population estimates as their denominator. It is therefore not surprising that statistical offices all over the world invest considerable efforts to produce reliable population estimates and continuously search for better methodologies and improved sources of data on which to base estimates.

3. Population estimates—preliminary, revised and final—are traditionally produced using the balance equation method. This involves taking population data by age, sex and area, from the most recent census and adding or subtracting the number of births, deaths and internal and international migration flows. The extent to which countries are able to produce reliable population estimates at the national and subnational levels depends very much on the availability of the two main ingredients: a population census adjusted for undercount and a civil registration system that records all birth and deaths in the country. The focus of the present document is on the need for improved birth and death registration.

4. Official statistics on the number of births and deaths and the causes of death (in addition to marriages and divorces) are usually referred to as vital statistics. Historically, and still today, the most important source of information on these events has been the continuous recording of births and deaths. Traditionally, therefore, efforts to improve the quality of vital statistics have been closely related to the development and improvement of civil registration systems. However, since civil registration systems cannot be strengthened overnight, there are interim measures, strategies and tools that countries can and should use to meet their needs for statistics on births, deaths and causes of death. They are very useful for generating vital statistics but do not provide individuals or communities with all the additional benefits associated with comprehensive civil registration.

5. It has long been recognized that continuous and well-maintained civil registration systems provide numerous benefits for the individual, the country that operates such systems, regions and communities within the country, and the international community. Without exception, high-income countries have national civil registration systems.

6. For the *individual*, the registration process provides legal status and official documentation of important events. For instance, birth registration certifies identity and provides legal proof of a person’s name and date and place of birth as well as the names of the parents. As a legal document, a

birth certificate serves to define and protect a person's human and civil rights in the society. The United Nations Children's Fund (UNICEF) has extensively documented the impact of non-registration of births and was instrumented in having the right to birth registration enshrined in the 1989 Convention on the Rights of the Child.[1,2] The agency has a special programme to assist countries in achieving universal registration of children.

7. For *countries*, effective civil registration provides the vital statistics that are essential at all levels of government to inform social and economic development and planning. In developed countries, vital statistics derived from civil registration have long been the cornerstone of public planning and resource allocation and are used for designing and implementing programmes on maternal and child care, family planning, social security, education, health and housing. At the local level, accurate population data are even more essential: they are used for planning the needs of the community properly, for establishing electoral lists and for monitoring population growth.

8. At the international level, comprehensive vital statistics are also crucial for measuring the success of efforts to control specific diseases, which often are measured in terms of the reduction in deaths that follows a specific programme intervention. Major global initiatives, such as the Millennium Development Goals, rely on accurate data about mortality and causes of death for monitoring progress with six of its eight goals.[3] Since these goals were established, all national statistical offices in low-income countries have experienced a strong growth in demand for data on fertility, mortality and causes of death. Not only health policies but also general economic and social policies are constrained by the simple absence of information about the distribution and other characteristics of populations.

9. While the number of births and deaths can be obtained by enumeration at certain points in time (e.g. censuses and surveys), civil registration is the only source of continuous and timely data on deaths according to age and sex for small areas. Many civil registration systems also collect information on causes of death and on birth weights. Statistics based on these death and birth records are of particular importance in public health for identifying the magnitude and distribution of major disease problems, and are essential for the design, implementation, monitoring and assessment of health programmes and policies. For instance, statistics on deaths from lung cancer, alcoholic liver diseases and alcohol-related traffic deaths have been critical in establishing legislation to reduce exposure to the harmful effects of tobacco and alcohol.

10. Using vital statistics to monitor inequalities in mortality among local areas and age groups is now routinely done in all countries with reliable registration systems. Several developing countries have used birth registration to identify spatial differentials in fertility and introduce family planning programmes where they were most needed. In India, birth monitoring has shed light on some

[1] United Nations, *Treaty Series*, vol. 1577, No. 27531.

[2] UNICEF Birth Registration: Right from the start, UNICEF, Innocenti Digest, No. 9 March 2002.

[3] Setel PW, Macfarlane SB, Szreter S, et al. A scandal of invisibility: making everyone count by counting everyone. Lancet 2007, published online Oct. 20. DOI:10.1016/SO140-6736(07)61307-5.

objectionable ramifications of new medical technologies which enabled the practice of selective abortion.[4] Vital statistics therefore can effectively serve also as a surveillance tool at the subregional level by identifying populations with unexplained excess mortality, birth defects or other abnormal birth events.

11. In countries where civil registration is sufficiently complete, vital statistics derived from this source can provide essential information to the statistical offices for producing population estimates and electoral rolls as well as for monitoring changes in population health status. The ongoing nature of the data and the fact that they are collected for smaller geographic and administrative areas enables statistical offices to provide a detailed picture of the changing demographic patterns and trends at both the local and national levels. This information is essential for good governance and planning, and critical for effective allocation of resources to local government areas, health and other programmes.

I. GLOBAL AND REGIONAL SNAPSHOTS OF VITAL STATISTICS

A. Global snapshot

12. In view of the clear benefits of civil registration and vital statistics systems for individuals and governments, it is not surprising that almost all countries have some legislation requiring citizens to register important vital events and many of them use this information to derive vital statistics. However, the usefulness of the civil registration systems is often restricted due to their incompleteness and the poor quality of the data collected. Currently, only about one third of the over 200 countries in the world have systems that are considered to be complete enough to produce reliable data. In the remaining two thirds, the utility of the data generated from these systems varies because only a proportion of the total number of births and deaths are registered. Other factors that reduce the value of the data produced are lack of timeliness and difficulties in using the data.[5]

13. WHO classifies vital registration systems in three different groups according to their completeness (figure 1): “good” for those countries that register at least 90 per cent of events, incomplete for those that capture between 50 and 89 per cent of vital events and poor for the remaining countries. Because of deficient registration systems, every year almost 40 per cent (48 million) of the 128 million global births go unregistered.[6] The situation is even worse for death registration. Globally, two thirds (38 million) of 57 million annual deaths are not registered and WHO receives reliable cause-of-death statistics from only 31 of its 193 Member States.[7] Although all persons may be equal in death, this is not true when it comes to birth and death registration. Those born in developing countries have a much higher probability of living and dying without leaving a trace in any legal record or statistic.

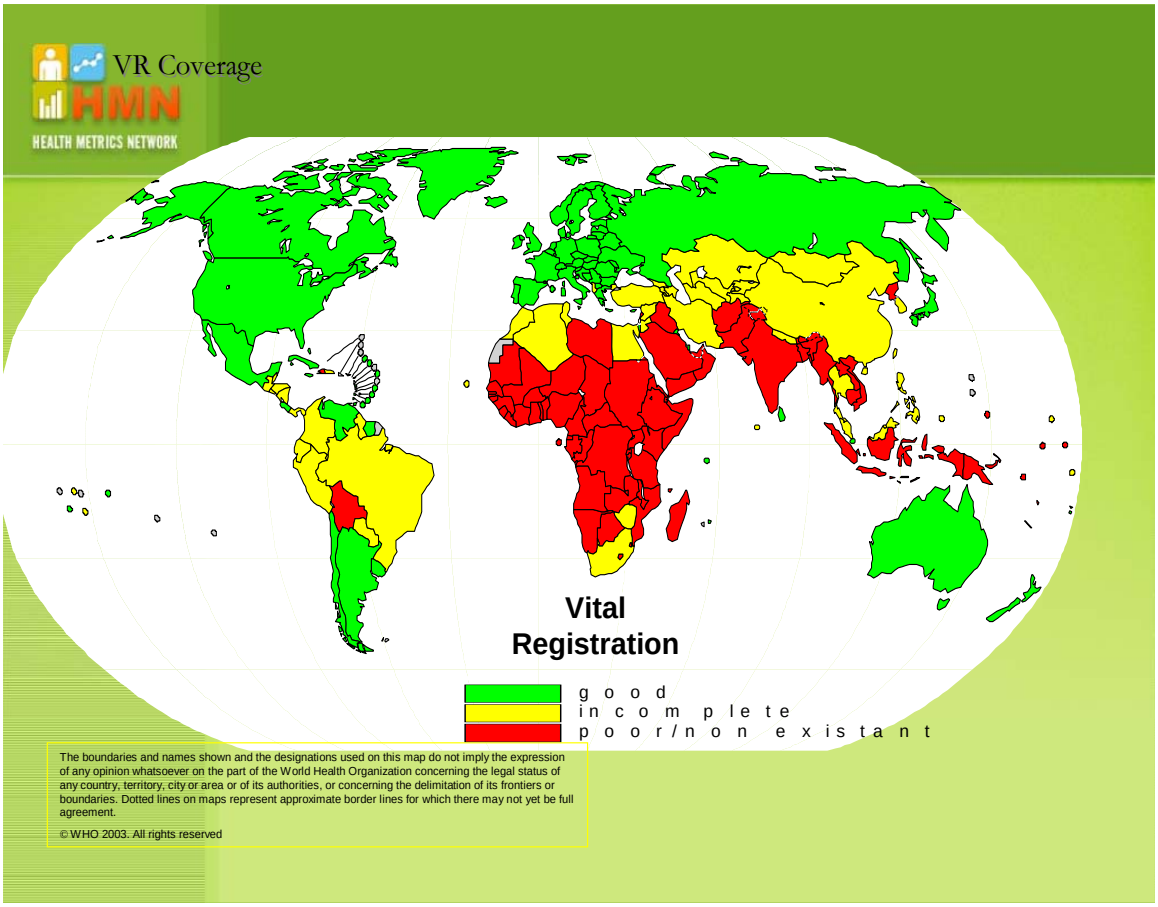
[4] Jha P, Kumar R, Vasa P, et al. Low female-to-male sex ratio of children born in India: national survey of 1.1 million households. *Lancet* 2006; 367:211-18.

[5] Mahapatra P, Shibuya K, Lopez AD, et al. Civil registration systems and vita statistics: successes and missed opportunities. Lancet 2007, published online Oct. 20. DOI:10.1016/SO140-6736(07)61307-5.

[6] UNICEF *Birth Registration: Right from the start,* UNICEF, Innocenti Digest, No. 9 March 2002.

[7] Mathers CD, Ma Fat D, Inoue C, et al. Counting the dead and what they died of : an assessment of the global status of cause of death data. Bull World Health Organ 2005; 83: 171-77.

Figure 1. Global vital registration coverage around 2000



14. At the global level, a cause of death is assigned for just one third of total deaths[8] and even for these there is often considerable uncertainty about the diagnosis. Global and regional epidemiological estimates produced by WHO have led to a better understanding of probable levels of mortality and key health indicators in countries, but these estimates are no substitute for actual causes of death data collected in countries. Levels and patterns of adult mortality for countries that do not have reliable death registration are frequently derived from known levels of child mortality, or from other methods using survivorshop techniques, for example, sibling survival or sisterhood technique. Each of these methods, however, has its drawbacks and is no substitute for reliable directly-obtained data for mortality.[9,10] With the large gains in child survival in recent decades, it is increasingly important for countries to be able to measure changes in adult mortality in order to design better policies for health development. This requires a civil registration system that registers all deaths.

15. Regarding current and future mortality patterns, it is interesting to look at the estimated top 20 causes of death in the world in 2004, shown in table, and compare them to the WHO predictions for 2030. Such global mortality projections are based on historically observed relationships between

[8] Lopez AD, AbouZahr C, Shibuya K , Gollogly L. Keeping count: births, deaths and causes of death. Lancet 2007, published online Oct. 20. DOI:10.1016/SO140-6736(07)61307-5.

[9] Gakidou E, Hogan M, Lopez AD. Adult mortality: time for a reappraisal. Int. J Epidemiology 2004; 33: 710-17.

[10] Stanton C, Abderrahim N, Hill K. An Assessment of DHS Maternal Mortality Indicators. Stud Fam Plann 2000; 31: 111-23.

trends in economic and social development and whatever cause specific mortality data that can be obtained from vital registration and verbal autopsy methods. Despite the fact that these projections were based on the assumption of "business as usual", and hence do not take into account possible changes in underlying risk factors (with the exception of tobacco consumption), it is striking to observe that, apart from ischemic heart disease (heart attacks), cerebrovascular disease (stroke) and cirrhosis of the liver, all other diseases shown are expected to change ranks. Diarrhoea will move from 5th to 23rd position and tuberculosis from 7th to 20th place due to expected further advances in the detection and treatment of these conditions.

Table. Leading causes of death in 2004 and projected to 2030

Diseases or injuries	2004		2030	
	Death rate (%)	Rank	Death rate (%)	Rank
Ischaemic heart disease	12.2	1	14.2	1
Cerebrovascular disease	9.7	2	12.1	2
Lower respiratory infections	7.0	3	3.8	4
Chronic obstructive pulmonary disease	5.1	4	8.6	3
Diarrhoeal diseases	3.6	5	0.9	23
HIV/AIDS	3.5	6	1.8	10
Tuberculosis	2.5	7	1.0	20
Trachea, bronchus, lung cancers	2.3	8	3.4	6
Road traffic accidents	2.2	9	3.6	5
Prematurely and low birth rate	2.0	10	0.9	22
Neonatal infections and other	1.9	11	1.0	21
Diabetes mellitus	1.9	12	3.3	7
Malaria	1.7	13	0.4	41
Hypertensive heart disease	1.7	14	2.1	8
Birth asphyxia and birth trauma	1.5	15	0.7	29
Self-inflicted injuries	1.4	16	1.5	12
Stomach cancer	1.4	17	1.9	9
Cirrhosis of the liver	1.3	18	1.2	18
Nephritis and nephrosis	1.3	19	1.6	11
Colorectal cancers	1.1	20	1.4	14
Violence	1.0	22	1.2	16
Breast cancer	0.9	23	1.1	19
Oesophageal cancer	0.9	24	1.3	15
Alzheimer's disease and other dementias	0.8	25	1.2	17

Source: World Health Organization, World Health Statistics 2008 (Geneva, 2008).

16. This dramatic predicted change in death patterns is a clear indication that many countries are, or will be, going through a rapid epidemiological transition over the next 25 years. Hence, it becomes even more urgent that countries improve their collection of data on causes of death from civil registration record (and use verbal autopsy[11] for those deaths which take place outside hospitals) in order to ensure that health policies and planning are based on up-to-date, reliable information about causes of death.

B. Regional snapshot

17. From the global overview (figure 1), it is clear that many countries in the Asia-Pacific region do not have fully functional civil registration systems and are struggling to produce timely and reliable information on births, deaths and causes of death. Out of the 58 countries and territories in the ESCAP region, 24 have either (a) no civil registration, (b) a civil registration system but do not compile statistics from it, or (c) one that is too incomplete to produce reliable statistics.

18. This means that almost half (41 per cent) of the countries in the region have to resort to what are called “interim measures” to obtain the information needed on annual births, deaths and causes of death.[12] It is interesting to note that both China and India, the region’s two largest countries, have a functioning sample registration system that allows them to calculate reasonably reliable birth and death rates on an annual basis, and through verbal autopsy, to obtain information on causes of death outside hospitals. In most of the Pacific islands, despite their relatively small populations, the recording of births and deaths are too incomplete to be used for computing fertility and mortality indicators.[13]

19. Several countries in the region have also used the Population census to collect some information on mortality by asking women aged 15-49 years about the number of children that they have had and the number still alive. This kind of summary birth history allows the under-five mortality rate to be calculated, one of the Millennium Development Goal indicators, although it does not give the age pattern of child deaths. Another question which some countries have used in their censuses asks about the number of deaths that occurred in the households in the last 12 months. This can be very useful for obtaining some insight into levels of adult mortality in the year preceding the census. The results obtained with this method, however, always need to be adjusted due to underreporting and household dissolution following death.

20. Many countries in the region have also implemented internationally coordinated demographic and health surveys (DHS) or multiple indicator cluster surveys (MICS), both of which also measure fertility and child mortality rates at the national level.

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[11] See annex for glossary.

[12] Hill K, Lopez AD, Shibuya K, et al. Interim measures for meeting health sector data needs: births, deaths and causes of death. *Lancet* 2007, published online Oct. 20. DOI:10.1016/SO140-6736(07)61307-5.

[13] Haberkorn G, Monograph on Public Health Surveillance in the Pacific, Secretariat of the Pacific Community, 2001 Noumea.

21. Finally, there are indirect demographic techniques which can be used to estimate adult deaths from civil registration data with at least 60 per cent coverage, taking underreporting properly into account. Applying these methods, however, requires expertise which is not always available in developing countries.[14]

22. Apart from sample registration, none of the interim methods described above produces continuous estimates and none gives information about causes of death. Moreover, all the interim methods are prone to selection bias and telescoping as they rely on retrospective reports of events. Similarly, retrospective reports cannot give timely warning of mortality crises as, by the time the census or survey has been conducted and analysed, the crises (for example, famine or war) is usually over. Therefore, they should not be viewed as long-term alternatives to civil registration, but rather as complementary sources to such systems in countries working on improving their civil registration systems.

23. For those countries that provide data on causes of death, WHO evaluates the quality of the data on the basis of criteria such as "the completeness of death registration" and "the proportion of ill-defined deaths". To be graded as "high-quality" a country needs to show a registration completeness of 90 per cent or above and have less than 10 per cent of deaths classified to "ill-defined" codes; while "medium-quality" is defined as 70-90 per cent complete and "ill-defined codes" appearing in no more than 10-20 per cent of registrations. Finally, the category of "low-quality" is reserved for countries where death registration is less than 70 per cent complete and where ill-defined causes of death constitutes more than 20 per cent of all registrations.[15]

24. In the ESCAP region, 31 countries and territories, including Hong Kong, China, and Macau, China, collect some information on causes of death through their civil registration systems and report these data to WHO. China and India collect this information via sample registration. According to this grading system, only 6 countries and territories are deemed to have high-quality cause of death data, 14 of medium quality and 11 of low quality or incomplete. Almost half (25) of the countries and territories in the ESCAP region appear to have no systems that record the cause of death of deceased persons, which means that, for these countries, health planning and priority setting are essentially based on partial information from surveillance systems and hospital data that only covers a small part of the population. The picture of the vital statistics situation in the ESCAP region contrasts starkly with the huge demand for basic population and health data.

II. KEY CHALLENGES IN PRODUCING VITAL STATISTICS

25. Most existing civil registration systems are adaptations of administrative procedures and infrastructures which were already in place, sometimes from colonial times, and which have been

[14] Hill K, Lopez AD, Shibuya K, et al. Interim measures for meeting health sector data needs: births, deaths and causes of death. Lancet 2007, published online Oct. 20. DOI:10.1016/SO140-6736(07)61307-5.

[15] Mathers CD, Ma Fat D, Inoue C, et al. Counting the dead and what they died of: an assessment of the global status of cause of death data. Bull World Health Organ 2005; 83: 171-77.

adapted to be used for this function. This explains the considerable variation that can be found in the organizational structures of different civil registration and vital statistics systems and also shows that there is no single model that works and suits everyone. Introducing a civil registration system clearly is a major undertaking for any country and it makes sense to establish procedures and processes for its operation that are consistent with existing organizational structures and practices. In many countries, the process of registering vital events and issuing birth and death certificates is carried out by one administration, while the processing of the data and the production of statistics is mostly done by the national statistical office. A prerequisite for a sound, efficient and effective vital statistics system is that there is close collaboration among all the agencies involved so that they function as a system. Good management at each functional level within each part of the system is not enough. Good collaboration between the different components as well as a seamless interface between the civil registration and vital statistics systems are major challenges for many countries, and the absence of these things is often the reason for failure.

26. A well-functioning and effective civil registration system that registers all births and deaths depends upon both supply and demand factors. On the supply side, there are the financial resources, which can hinder or facilitate the development of an adequate infrastructure. Although costs certainly are an important consideration, they are not a crucial barrier as evidenced by the fact that there are low-income countries with well-functioning and almost complete systems, for example, Sri Lanka and, more recently, Thailand. Malaysia, the Republic of Korea and Singapore also have good registration systems and their practices may be useful examples for other countries in the region. Perhaps a greater challenge to civil registration development in many countries has been the lack of a supporting environment, namely the absence of political commitment, lack of a strong legal framework to underpin the system, and lack of public awareness of the need for and benefits of registration. Some of the more common problems and challenges in relation to these issues are briefly covered in this section.

A. Lack of awareness of the importance of civil registration

27. Both internationally and in many countries, there has been little understanding of the importance of building civil registration systems as part of a country’s development process. Civil registration systems in many low-income countries have remained disorganized and underfunded, and have been unable to deliver the expected outcome. As stated above, unlike other information systems, civil registration has a dual function in that it promotes social inclusion and establishes the legal identity of individuals, while for society it provides continuous information on population size and structure which is needed for multiple decisions on planning and resource allocation. Many Governments have wrongly thought that their needs for vital statistics could be met by continued reliance on enumeration by surveys and econometric modelling. Hence, there has been little demand from those who would benefit the most from the information—the Governments and populations of

developing countries themselves. This explains the generally low investment in civil registration infrastructure in many developing countries.

28. Another common problem in many countries is the lack of a strong supporting legal framework, or poor implementation of existing laws on civil registration and vital statistics systems. No civil registration system can function well without a legal basis that makes registration compulsory, determines the functions, duties and responsibilities of local registrars and of citizens, and details, among other things, the registration procedures, fees, time limits, penalties for non-registration and evidentiary requirements. The basis for any civil registration system should be custom-designed legislation that adheres to a set of minimum standards and suits the society and institutional arrangements. It is important to include regulations making it mandatory for hospitals and health institutions to report information on vital events and cause of death. Where appropriate, cemeteries and funeral parlours should also be covered by the law and included as reporting units for death registration.

B. Lack of incentives to improve civil registration

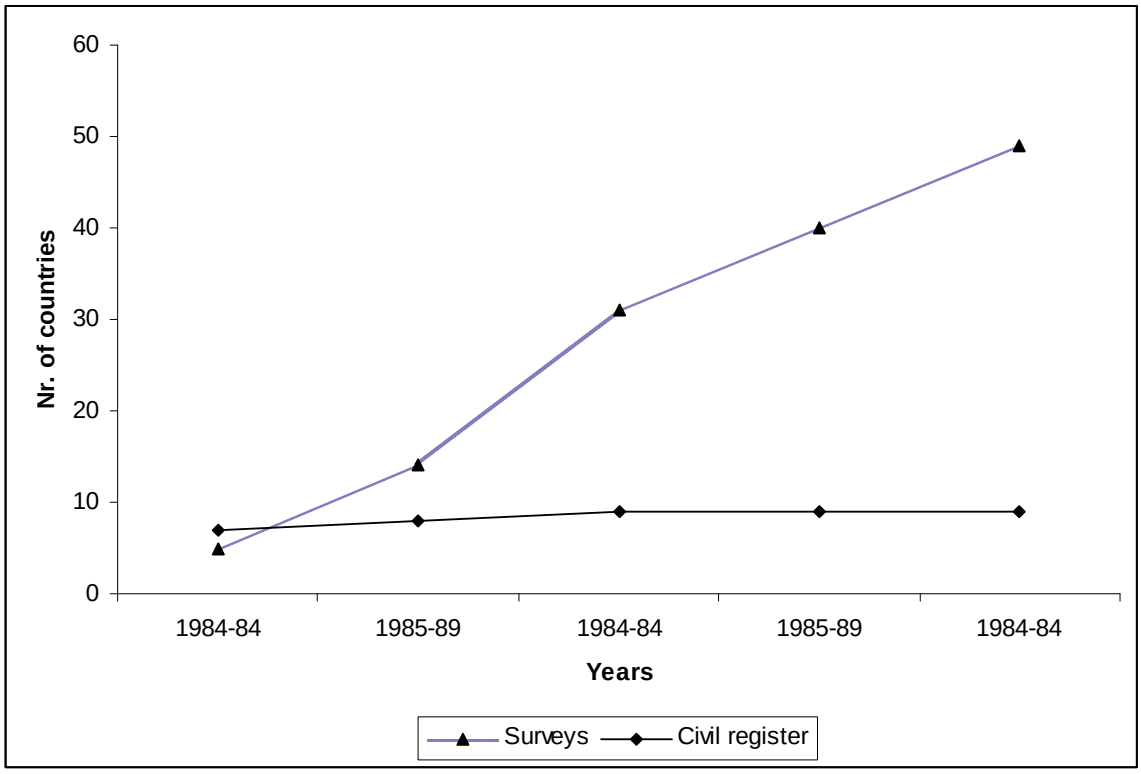
29. Apart from the preparation of United Nations manuals, over the past 30 years there has not been sufficient systemic support from the international development community to help countries produce reliable vital statistics from civil registration system. Alternative strategies to generate needed information on births and deaths that rely largely on survey enumeration and expensive and unsustainable technical assistance have been promoted instead.[16] As a result, dependence on these sources of information has grown, and national Governments have lost incentives to invest in civil registration systems. Fertility and mortality figures for countries without reliable birth and death registration continues to be generated from suboptimum sources.[17] Figure 2 starkly illustrates this trend towards using survey data rather than civil registration data to measure mortality.

30. A major challenge in producing vital statistics from civil registration is to make sure that all events are registered. This is particularly difficult in countries with a high proportion of births and deaths that take place at home. Hence, even with sufficient coverage of registration facilities, if people are not aware of the benefits of registration or know that it is compulsory to register, they are unlikely to cooperate, and registration will remain incomplete. It clearly rests on governments and local authorities to explain to citizens the benefits of legal proof of identity and to enforce requirements regarding the use of birth and death documents in order to obtain services and benefits. The type of incentives and the kind of communication strategy that should be used to encourage people to register births and deaths is likely to vary according to the country. It is in the interests of government to rapidly improve the civil registration system since the system's utility in generating vital statistics is highly dependent on the extent to which it captures all births and deaths.

[16] Setel PW, Macfarlane SB, Szreter S, et al. A scandal of invisibility: making everyone count by counting everyone. Lancet 2007, published online Oct. 20. DOI:10.1016/SO140-6736(07)61307-5.

[17] Walker N, Bryce J, Black Re. Interpreting health statistics for policymaking: the story behind the headlines. Lancet 2007; 369: 956-63.

Figure 2. Source of mortality data for 50 low-income countries, 1980-2004



Source: Boerma JT, Stansfield SK. Health statistics now: are we making the right investments? Lancet, 2007: 369: 779-86.

31. Even in countries with very incomplete registration, there may be certain areas or certain populations that have high registration coverage, for example, main cities and people living in urban areas. A campaign to encourage registration will be more successful if it targets the segment of the population that is missing. In India, where civil registration is decentralized, there are vast differences in registration completeness between the states. For example, in the state of Goa, there is almost complete registration (94 per cent), while in Utter Pradesh it is as low as 1 per cent, with the overall level of registration estimated at 50 per cent.[18] Coverage of registration differs not only by geography but also by sex and age. For instance, it is well known that, in many developing countries, newborn infants who die within the first month are the most likely to be missed by the system.

C. Quality control of the data

32. Even if civil registration is essentially complete, poor quality of the information on the causes of death can severely limit the use of these statistics. As with all data collection, practices and procedures used in local registration offices are the foundation of a good civil registration system, and it is there that a lack of standards and checking procedures will irreversibly corrupt the value of the data. Regular training of registrars and monitoring of the quality of the procedures used for data collection and transmission to the next administrative level is important. Badly designed forms and

[18] India, Central Bureau of Health Intelligence (CBHI), Mortality Statistics in India 2006, March 2007.

tedious bureaucratic procedures, together with a heavy workload of registrars, also contribute to poor statistical outcomes.

33. In the case of cause of death statistics, the two most important factors to ensure good data quality are the use of the international form of medical certificate of cause of death and the availability, capability and willingness of doctors to certify the event according to the rules and principles of the International Statistical Classification of Diseases and Related Health Problems (ICD).[19] Even if these factors are fulfilled, incorrect cause of death statistics can still be generated by poorly trained mortality coders. Almost all health information assessment reports that the Health Metrics Network (HMN) has facilitated in developing countries demonstrate a strong need for training in ICD certification and coding.

D. Timely availability of data

34. Data not only have to be correct and complete; they also have to be accessible to those who need them and be sufficiently timely for their intended purpose. In order to be used for producing annual population estimates, vital statistics need to be compiled and made available on an annual (or even better, quarterly) basis with the same geographical detail used for the estimates. Hence, standard procedures for dealing with late and delayed registrations should be implemented so that preliminary figures can be produced and used until the revised ones are ready. The use of vital registration data is also influenced by the way these statistics are compiled and presented, including the availability of metadata to avoid incorrect interpretation by users. National statistical offices are likely to be more aware of these matters and to have more experience in publishing statistics than any other national agency, which explains why the task of publishing vital statistics is often delegated to them.

35. Given the numerous challenges to be overcome by countries before they can fully benefit from their vital statistics, it is important that they carefully assess the key problems in their civil registration system and develop a strategy for gradually addressing them. Very few countries have done this and without a full understanding of where the weaknesses are in their system, attempts to improve them have failed or have been given low priority because they seemed too daunting. Finally, because vital statistics is usually a collaborative effort involving more than one government agency, any strategy to be effective has to involve all the players and will only succeed if there is government support and collaboration. Unfortunately, for the moment there is no forum where countries can exchange experiences on these matters and learn about new initiatives, tools and strategies for improving vital statistics. In this respect, the regional commissions can play a critical role.

III. RECENT INTERNATIONAL INITIATIVES

36. The establishment of a proper civil registration system that can provide the necessary input to the vital statistics system should be an integral part of a country's development process and is likely to

[19] World Health Organization, *International Statistical Classification of Diseases and Related Health Problems* (ICD-10) 2nd Edition (Geneva, 2004).

be critical for further socio-economic development. Hence, countries with poorly functioning vital statistics systems should view their improvement as a necessary long-term investment, which, however daunting, can be achieved provided there is sustained political commitment.

37. Since 1968, the international mandate for strengthening vital statistics has been assigned to the statistical community, led by the United Nations Statistical Commission and the Statistics Division of the Department of Economic and Social Affairs. Together with the United Nations Population Fund (UNFPA), WHO and the now defunct International Institute for Vital Registration and Statistics (IIVRS), they have been the main actors working to promote vital statistics and civil registration systems globally. The United Nations has produced a series of excellent handbooks on civil registration and vital statistics systems which have been instrumental in setting standards and norms and laying down best practices globally. It is therefore regrettable that, apart from a couple of regional workshops, no specific budget has been allocated for active promotion of these standards or for providing training for countries in the management and operation of civil registration systems. A similar situation in WHO has meant that, apart from carrying out decennial updates to the International Statistical Classification of Diseases and Related Health Problems (ICD), training in certification and classification of causes of death has been left up to a handful of collaborating centres in developed countries. As a result, there are few developing countries today that have the knowledge needed to train their registrars and their doctors in correct ICD certification procedures. Building capacity in these areas will be crucial for improving the civil and vital registration systems in these countries. Even UNFPA, the agency that traditionally gave much support to vital registration, scaled down its support following the 1994 International Conference on Population and Development.

38. More recently, there has been a growing awareness that the world's vital statistics compare poorly with the detailed information available on other statistical areas and that neither governments nor multilateral organizations can monitor changes in the population or its health without reliable vital statistics. It has also become clear that, without improved vital statistics, it will be considerably more difficult to demonstrate whether the US$ 8 billion spent each year in official development assistance to improve health is achieving the desired goal. The fact that two regional commissions (ECLAC and ESCWA) have recently carried out training workshops in civil registration and vital statistics is a sign that more countries are recognizing the need to improve their civil registration systems.

39. At the 2007 Beijing Global Forum for Health Research, the Health Metrics Network launched "Who Counts?", a series of four papers published by the *Lancet*; the papers strongly argue for keeping count of births, deaths and causes of death and for the donor community to invest in civil registration systems rather than sponsoring household surveys.

40. In 2007, HMN produced a resource kit for vital events monitoring[20] aimed at countries which are starting to build systems to monitor birth and deaths continuously. Currently, HMN is working on

[20] The Monitoring Vital Events Resource Kit is available on the HMN website www.healthmetricsnetwork.org and as a CD-ROM from HMN.

an assessment tool for evaluating vital registration systems in countries where the civil registration system is already established but is incomplete, not functioning well or producing cause of death statistics of poor quality. The tool, which will be piloted in a limited number of countries early in 2009, will assist them in diagnosing which parts of the vital statistics system are deficient and which remedies can be introduced to solve the problems progressively. The text box below outlines the five components of the proposed framework for the assessment of civil and vital statistics systems. The framework is comprehensive in that it covers the "input" to the system, the "processes" used to compile the information and the "output" of the system, as well as the potential use of the data. From the analysis conducted in section II.B above, it would seem that many countries in the Asia-Pacific region would benefit from carrying out a systematic and thorough assessment of their vital statistics systems using this tool, and then working with the United Nations, WHO, HMN and other partners to develop an improvement strategy.

Box. Framework for vital statistics assessment

A. Legal basis and resources for civil registration
    1. National legal framework
    2. Registration infrastructure and resources
B. Registration practices, coverage and completeness
    1. Organisation and functioning
    2. Review of forms used
    3. Coverage and completeness of registration
    4. Data storage and transmission
C. Death certification and cause of death
    1. ICD compliant practices
    2. Hospital certification
    3. Outside hospital deaths
    4. Practices affecting data quality
D. ICD coding practices
    1. Coding practices
    2. Coder qualification and training
    3. Quality of coding
E. Data access, use and quality checks
    1. Data quality and plausibility checks
    2. Data tabulation
    3. Data access and dissemination

41. For those countries in the region where most people die at home and no medically certified cause of death is available, verbal autopsy methods would be a good interim solution. In settings where deaths are not generally certified by a doctor, verbal autopsy combined with nationally

representative sample registration is the only way to obtain useful cause of death statistics until a permanent registration system can be established.

42. In the past two decades, there has been a proliferation of research and development in all aspects of the verbal autopsy process, and the need for consensus on a core set of technical standards and guidelines has therefore become urgent. In 2007, the World Health Organization published a manual that compiles best practices for collecting data and attributing causes of death using verbal autopsy methods.[21] The new standards, which were developed by WHO in collaboration with researchers, data users and other stakeholders, are of critical importance for improving the availability of mortality information globally and for ensuring that data derived with verbal autopsy methods are consistent among themselves and comparable to those produced from vital registration (being both based on the ICD). The manual includes detailed guidelines on symptoms for three age groups (neonates, children and adults). It also gives guidelines on how to certify and code causes of death and contains a correspondence table for ICD-10 codes.

43. While there may still remain questions about the accuracy of the information on less frequent causes of death, the benefits of applying a standardized verbal autopsy process to obtain representative mortality statistics in countries with inadequate vital registration systems cannot be overstated. Verbal autopsy has become an essential public health tool for obtaining realistic direct estimates of the causes of death at the local and national levels.

44. For the benefit of the many countries that need to improve their capacity in using ICD coding and certification, HMN in collaboration with WHO is preparing an interactive training tool that will be launched in 2009. The tool can train both groups and individuals in implementing the rules and principles of the International Statistical Classification of diseases and related health problems.

IV. A STEPWISE APPROACH TO IMPROVING VITAL STATISTICS SYSTEMS

45. Civil registration is a long-term investment and there is no single blueprint for how best to arrive there. However, as described in the previous section, some resources and tools have recently been made available. Applying these tools will greatly assist countries in delivering some of the data they need and in building capacity for a sustainable civil registration system. Whatever the individual situation, each country should, as a first step, undertake a comprehensive assessment of its civil and vital statistics system. Based on the outcome of such an assessment, a strategic development plan can be drafted which is specifically tailored to the country. Guidelines to assist countries in carrying out such an assessment have recently been developed by HMN and its partners.

46. More generally, at least three different strategic approaches can be followed according to the individual situation in each country. Countries with very limited registration of vital events and with very few deaths being medically certified are best off using a “stepping stone” approach that involves

[21] World Health Organization. Verbal Autopsy Standards: ascertaining and attributing cause of death. WHO Geneva, 2007.

several sequential interim measures. Censuses and surveys can be undertaken in conjunction with the establishment of selected demographic surveillance sites (DSS) to collect information on vital events for defined, smaller populations. The information from these sites, although not necessarily representative for the whole country, can nonetheless provide valuable insights into fertility and mortality rates by age and sex and, if coupled with verbal autopsy, can yield useful information on causes of death. At the same time, skills and capacity useful for building sustainable registration systems are being created.

47. Countries that are more advanced, that might already have experience with demographic surveillance, and where more deaths are being medically certified may want to move straight into building a nationally representative sample registration system (SRS). Or they may want to concentrate on improving existing registration systems by campaigning to raise registration awareness in rural areas and perhaps enrol health workers as data suppliers and introduce mobile registration systems for remote areas. At the same time, all countries should work on expanding the use of the data and ensure proper training for physicians in correctly certifying deaths according to the ICD.

48. For those countries with almost-complete registration but with problems of cause of death certification, a strategy focusing on improving birth and death registration among the missing segments of the population, and on improving quality and reliability of cause of death data, could be envisaged. An evaluation of the quality of the current death certification practices is an essential first step and will help determine exactly where improvements are needed. Thailand has recently undertaken a comprehensive research programme to identify problems with its vital registration system based on a sample of medical records and by carrying out verbal autopsies of home deaths to correct their cause of death distribution. Computerization of various data handling and checking procedures may also be used to improve the timeliness and quality of the data. Countries whose systems are at an advanced stage of computerization may want to begin building a central population register which gathers all information in one database that can satisfy both administrative and statistical demands.

V. CONCLUSIONS AND RECOMMENDATIONS

49. While demand has never been greater, many national statistical systems in the ESCAP region are unable to regularly produce reliable statistics on births, deaths and causes of death at the national and subnational levels. Unlike other areas of official statistics, which have improved tremendously, civil registration systems in the region have essentially stagnated over the last 30 years. As a consequence, alternative strategies that rely largely on surveys and expensive international technical assistance to generate information on fertility and mortality rates have been developed. The data derived from these strategies are no substitute for the detailed, continuous data that civil registration systems deliver and do not provide individuals with birth certificates, proof of identity to access services or proof of death.

50. Establishing and maintaining civil registration and vital statistics systems is certainly a long-term and challenging task. Not having one, or having one that does not produce data of sufficient quality, is likely to be even more costly. Indeed, without a system that registers all births and deaths, a country has no sustainable source to produce annual population estimates. Resource allocation and planning, therefore, must be done without solid evidence, greatly increasing the likelihood that it will be inefficient and ineffective. In addition, there is increasing evidence that undertaking a long-term programme of improvements to civil registration systems is a more cost-effective way of measuring progress in mortality reduction than separate, disease-focused approaches, set up to collect data on specific diseases of interest, such as HIV/AIDS, malaria or TB. [22]

51. Although most Asian and Pacific countries have a well-established civil registration system, half of them are not able to produce reliable estimates of births and deaths using the system, and only 20 can report data on causes of death of adequate quality. WHO and other international agencies have not done enough to advocate for better causes of death data or to provide the training needed for more effective implementation of the International Statistical Classification of Diseases and Related Health Problems. At the same time, many sectoral disease-control programmes and initiatives have collected their own data, thereby promoting a culture of competition for resources. This has led to fragmentation and lack of investment in the basic statistical infrastructure of developing countries. Yet, without the mortality data continuously generated from civil registration, disease-specific programmes, whether global or national, cannot validate estimates of progress towards their targets. As a result, in many countries in the region, there is very limited evidence from which to assess the impact of programmes and policies on health outcomes and social development.

52. The reasons why vital statistics are so “vital” for countries and for statistical offices have been explained in the present document. To overcome decades of stagnation and low priority, however, countries will need to make clear long-term commitment to develop a comprehensive civil registration system. In the interim, they should make intensive use of the methods, resources and tools described above. Certainly, no country can correct its civil and vital statistics systems overnight – it needs political will, stewardship by national authorities, technical guidance, and the trust and collaboration of civil society, households and the medical profession.

53. Expertise is available in the region with regard to the establishment and maintenance of demographic surveillance sites, sample registration systems, verbal autopsy, the systematic assessment of vital statistics systems, ICD certification and coding and in the analysis of mortality and cause of death data. In this regard, a recent noteworthy initiative is the Health Information Knowledge Hub established at the University of Queensland in Australia and funded by the Australian Agency for International Development (see E/ESCAP/CST/INF/14). Member States may draw from this and from

[22] AbouZahr C, Cleland J, Coullare F, et al. The way forward. Lancet 2007, published online Oct. 20. DOI:10.1016/SO140-6736(07)61307-5.

other expertise in the region, including the HMN, to receive assistance for their assessments, capacity-building and long-term development plans.

54. The Committee may wish to recommend that the secretariat provide member States with critical assistance in improving civil and vital statistics systems and in facilitating access to capacity-building networks or development partners concerned with vital statistics, such as WHO and HMN. In this regard, the Committee may wish to request the secretariat to include the provision of such assistance in its future work programme.

55. As a subsidiary body of ESCAP, the Committee on Statistics has a critical role to play in this endeavour; it can provide a regional platform for statisticians, registrars and public health officials to share experiences and formulate strategies related to vital statistics development. The Committee may wish to provide guidance concerning the feasibility of using the WHO/HMN guidelines and methods to strengthen national statistical systems.

Annex

Glossary

Civil registration: defined as the continuous, permanent, compulsory and universal recording of the occurrence and characteristics of vital events (live births, deaths, fetal deaths, marriages and divorces) and other civil status events pertaining to the population as provided by decree, law or regulation, in accordance with the legal requirements in each country.

Coverage of registration: coverage is a measure of which population groups within a country are covered by some form of vital registration (e.g. those living in urban areas, certain districts, etc.), usually expressed as a percentage of the total population.

Delayed registration: the registration of a vital event after the prescribed period specified in existing laws, rules or regulations usually one year or more after the vital event has occurred.

Demographic surveillance: the practice of registering on a continuous basis all demographic events, including cause of death, in one or more geographically defined populations. Cause of death is usually assessed by verbal autopsy.

Ill-defined category: Chapter XIII of ICD-10 “Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified” is a collection of vague diagnosis that should not be used as the underlying cause of death.

International Statistical Classification of Diseases and Related Health Problems (ICD) : the International Statistical Classification of Diseases and Related Health Problems, Tenth revision, is a classification maintained by WHO for coding diseases, signs, symptoms and other factors causing morbidity and mortality.

Late registration: registration of a vital event after the prescribed time period, but within a specified period (usually one year) after the vital event occurred (grace period).

Sample vital registration: registration of all demographic events on a continuous basis, as in full civil registration, but only for a nationally representative sample of administrative areas for which a baseline census has been taken. Cause of death is assessed from hospital records where these are available. In all other cases, death is first notified to the sample registration office and sometime later the household is visited and a verbal autopsy is conducted to determine the cause of death.

Verbal autopsy: a structured interview with caregivers or family members after a death occurs; used to determine the probable cause(s) of death in populations in which most deaths occur outside health facilities, and in which direct medical certification is rare.

Vital statistics system: process of (a) collecting information by civil registration or enumeration on the frequency or occurrence of specified and defined vital events, as well as relevant characteristics of the events themselves and the person or persons concerned, and (b) compiling, processing, analysing, evaluating, presenting and disseminating these data in statistical form.

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