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Evaluating the quality of vital statistics: paper for discussion[1]

Australian Bureau of Statistics

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[1] The text is presented without formal editing.

Introduction

1.   Since the publication of the 2nd revision of the United Nations Principles and Recommendations for a Vital Statistics System in 2001, there has been a growing emphasis placed on the value of vital statistics in strategically informing services, infrastructure and health planning and policy development as well as progress monitoring. The Millennium Development Goals (MDGs), especially those relating to child and maternal health and those addressing burdens of diseases such as HIV/AIDS, rely heavily on a fully functioning civil registration system (CRS).

2.   Ensuring all countries produce high quality vital statistics is cornerstone to governments' and communities' capability to effectively support and strategically guide strong human development. Vital statistics that meet international standards also allow for comparison of global progress toward achievement of a better quality of life and future for people living in developing countries (but not only) as well as of the MDGs.

3.   The review of the United Nations (UN) Principles and Recommendations presents a timely opportunity to consider key learnings from the past decade and capture emerging best/good practice in the evaluation of the quality of vital statistics. This paper draws heavily on work led by the World Health Organisation (WHO) and the University of Queensland Health Information Systems Knowledge Hub (UQ HIS-Hub) (with the active support of ESCAP) to improve CRS and, as a result, the quality of vital statistics.

4.   In light of compelling evidence that developing countries face significant challenges in establishing and maintaining effective CRS which produce quality vital statistics, the paper discusses some key success factors underpinning the progress that has been made in the Asia-Pacific region. In particular, attention is drawn to the value of:

- an overarching quality assessment framework and suite of supporting tools to assist countries to identify strengths and areas for improvement in CRs and develop a feasible action plan to progress improvements;
- built-in quality gates and collaborative internal review as a key complement to independent evaluation of a country's vital statistics;
- ensuring key evaluation criteria are sufficiently comprehensive;
- ensuring international comparability of statistics; and
- ensuring a balance between the needs of data users and the maintenance of confidentiality of individuals is achieved.

Overarching Assessment/Evaluation Framework

5.   Modelling the strong co-ordination and collaboration required between a range of stakeholders to ensure the effective functioning of civil registration systems, the work of the WHO and UQ HIS-Hub has been actively supported by the UN's ESCAP's Committee of Statistics (and its regional programme of work) as well as a range of international agencies including the Asian Development Bank, Australian Bureau of Statistics, the United Nations Development Program and UNICEF. Most importantly, this work has been significantly informed by the experiences and efforts of more than 26 countries[1] in addressing the challenges of developing effective and efficient CRS.

6.   In 2010, the WHO and UQ HIS-Hub jointly published a paper which detail an assessment tool that could be used to guide review of country practices in the production, management and use of birth, death and cause-of-death information (core vital statistics)[2] derived from civil registration. This tool had been developed over a number of years in light of the slow progress made in a number of countries in strengthening their CRS. Mikkelsen (2009) states:

> Currently vital statistics data collections in most developing countries are too incomplete, inconsistent and of too poor quality to be reliably used. A major factor contributing to the stagnation of the development of civil registration systems has been the belief that alternative sources (such as surveys and censuses) would adequately meet planning needs for information on vital events. The Lancet series (2007) "Who Counts?" clearly demonstrated the poor state of vital statistics in most developing countries and the urgent need for a global effort to support countries to improve their civil registration and vital statistics systems.[3]

7.   While this assertion was made two years ago, it still adequately describes the current status of CRS in many developing countries. In late 2010, UQ HIS-Hub reported on an initial rapid assessment of the CRS of 26 of the 53 countries in the ESCAP region (see paragraphs 24-25 for more detail of the assessment process). The majority of the countries were assessed as having either dysfunctional/weak systems or functioning but inadequate CRS were developing countries[4].

8.   That said, following an initial pilot of the WHO/US HIS-Hub guidance tool by the Philippines and Sri-Lanka[5], across the past 4 years the WHO, UQ HIS-Hub and ESCAP with the support of the aforementioned international agencies (see paragraph 5) have actively sought to support countries in the Asia Pacific region to understand and apply this tool in order to develop and implement CRS improvement plans.   The tool assists in identifying strengths and weaknesses in countries' CRS and subsequent vital statistics. It then provides guidance about how to prioritise areas for improvement and develop an action plan to address those issues.

9.   The guidance tool is built on previous research into vital statistics and particularly work that has proposed and/or trialled varying assessment frameworks and indicators of system functioning including the quality of statistics[6,7,8,9,10,11]. The tool comprises:

- an *introduction* to civil registration and vital statistics systems;
- a *roadmap*, which outlines the process for reviewing current systems;
- an *assessment framework*, which provides a structure for the detailed review itself; and
- a set of *criteria* that can be used *to prioritise areas of action*.

10.   The assessment framework is divided into a series of components and sub-components broadly equated with Inputs, Processes and Outputs (see Table 1). As opposed to solely focussing on the quality of the statistical outputs, this assessment framework takes a holistic view of the key enablers (inputs and processes) required to ensure high quality civil registration data are collected and vital statistics are produced. As a result, the process includes review of the appropriateness and adequacy of national legal frameworks, infrastructure and resources assigned to CRS, the organisation and functioning of the civil registration and vital statistics

systems as well as the extent to which births and deaths forms capture relevant information (mapped back to international standards).

11.   Component E of the assessment framework (Data access, use and quality checks) provides a set of questions which aim to assess the extent to which a CRS has quality checks in place. However, parts of Component B (Registration practices, coverage and completeness), Component C (Death certification and cause-of-death) and Component D (ICD mortality coding practices) also assist in the review of the quality of cause-of-death and mortality coding.

12.   A review team, operating as a working group of an overarching Review Committee, are required to gather a set of relevant evidence (specified in the introduction to each component) which will assist in answering the questions posed by the guidance tool against each sub-component – see Box 1 for an example of the detailed criteria proposed to support quality checking and Box 2 for an example of the guidance provided in making an assessment of the plausibility and consistency of births and deaths data.

13.   Component E is based upon an assumption that data evaluation and critical assessment should be an integral part of all civil registration and vital statistics systems. It proposes that:

> A cost-effective way to do this is to use simple consistency and plausibility checks such as those proposed in subcomponent E1, and to regularly compare the data produced by the vital statistics system to information from other sources. Hence, it is essential for countries to know what other sources of information on fertility or mortality levels are available. Indeed, all existing sources, whether continuous or not, should be used to help evaluate the quality of the data produced by the vital registration system[12].

14.   Development of the assessment framework was informed by the UN guidelines and recommendations on the establishment and operation of civil registration and vital statistics systems including the Principles and Recommendations currently under review, and is fully aligned with these guidelines and recommendations.

15.   Both the assessment framework and the guidance tool, when effectively implemented, assist countries to ground the various UN guidelines and recommendations through a comprehensive assessment of a CRS' inputs, processes and outputs. As a result, it broadens the focus of country assessments or evaluations from a focus on coverage or completeness of a country's vital statistics to ensure a sufficient balance of emphasis is achieved with consideration of overall data quality[13].

16.   Most importantly, the review roadmap included in the guidance tool requires specification of what are the key problems being experienced and possible strategies to address those problems. This step is followed by a prioritisation process in order to identify what are the key short-, medium- and potentially long-term actions required to improve the CRS and vital statistics. This prioritisation process includes analysis of the urgency by which an issue needs to be addressed, alongside an assessment of the feasibility, cost and timing of implementing the proposed solution.

17.   A rapid assessment tool has also been developed to assist countries in preparing to undertake the comprehensive assessment required by the WHO/UQ HIS-Hub guidance tool. During the guidance tool's development and field-testing phase, countries suggested that, before undertaking the detailed review, it would be useful to first carry out a rapid assessment to quickly evaluate the strengths and weaknesses of the current system. The results of this rapid

assessment can then be used to make the case for a more detailed assessment as well as assisting in focussing efforts of any detailed review on issues of identified concern.

18.   The use of the rapid assessment tool before undertaking a full review of a country's CRS is now actively promoted.   As many of the developing countries have limited resources, completion of the rapid assessment has assisted in focussing the comprehensive assessment process.   The rapid assessment tool is available as both text and a spreadsheet, for ease of compilation of data. Both the rapid assessment and comprehensive guidance tools have been extensively peer reviewed by technical experts, and field tested in three countries.

19.   The focus of the WHO/UQ HIS-HUB Guidance tool on births, deaths and causes of deaths reflects the fact that these events are the fundamental events that countries need to know about to guide health programs, monitor population dynamics and measure key health indicators. Although registration of foetal deaths is clearly important in measuring perinatal mortality, pregnancy outcome and the quality of prenatal health services, foetal deaths are not included in the tool because few countries are currently able to satisfactorily collect the necessary data[14]. However, the tool has been designed to be expandable. For example, WHO and UQ HIS-Hub suggest that in countries where data on foetal deaths and perinatal mortality are routinely collected, additional questions could be included in the review of civil registration and vital statistics systems, to address issues of data quality and reliability.

20.   The two countries that have completed both the rapid and comprehensive assessments of their civil registration and vital statistics systems (Sri Lanka and the Philippines) have developed and are in the process of actively implementing system improvement plans[15,16]. Both countries report very positively on the immediate improvements that have been delivered through the review process as well as on the noticeable improvements in collaboration between and co-ordination across the key stakeholders involved in both civil registration processes and the production and analysis of vital statistics. In the Sri-Lankan instance a key recommendation from the review was the establishment of a National Data Committee on mortality statistics under the Ministry of Health in recognition of the need for improved co-ordination.

21.   Further, in March 2011 a range of developing countries across the Asia Pacific region considered reports from eight countries[17] regarding progress with completion of initial rapid assessments. Both the outcome of the assessments and the utility of the assessment process were discussed. Supported by ESCAP, the workshop highlighted the similarities and differences in the challenges experienced by various countries in the development of CRS and the improvement of vital statistics, the different developmental pathways for CRS that would need to be followed as well as the utility of the process and the assessment tool. In recognition of the value of this approach, continuing to support completion of both the rapid and more comprehensive assessments is a key part of ESCAP's proposed regional program for the improvement of civil registration and vital statistics in Asia and the Pacific.

22.   While Chapter IV of the UN Principles and Recommendations usefully provides a comprehensive overview of the different types of approaches and methods (direct and indirect) that can be used to check the quality of civil registration-based vital statistics, it could clearly be strengthened by reference to an overarching assessment framework such as that provided through the WHO/UQ HIS-Hub guidance tool.   Chapter IV is also very technical and dense – the provision of a set of guiding questions (such as those tested and captured in the WHO-UQ HIS-Hub assessment framework and supporting tools) would assist countries to understand when and how to use the quality checks detailed in the Principles and Recommendations.

Cross-cutting versus country-specific challenges

23.   Application of the rapid assessment tool also has value in identifying cross-cutting 'global' versus country-specific challenges in the further development of CRS and subsequent vital statistics. UQ HIS-Hub's analysis of different countries' results is instructive in this regard[18].

24.   The rapid assessment tool consists of 25 questions about the functioning of national civil registration and vital statistics systems. The questions are grouped into 11 subject areas[19] and each question asks the assessors to select one of four scenarios which they consider most closely reflects the country situation. A numeric value (0-3) is attached to each scenario that indicates how well this aspect of the system functions, and scores can be added across the 25 questions. The overall score obtained is considered to be a reasonable indication of the functionality and quality of the national civil and vital statistics systems.

25.   Countries were then grouped according to the following categories:

- Dysfunctional (score <34%) – system requires substantial improvement in all areas;
- Weak (score 35-64%) – many aspects of the system do not function well and multiples issues require attention;
- Functional but inadequate (65-84%) – system works but some elements function poorly and require attention; and
- Satisfactory (85-100%) – minor adjustments may be required in an otherwise well-functioning system.

26.   Analysing the data from two perspectives—the distribution of scores across all countries and analysis of the strengths and areas for improvement of countries grouped under the same categories—Mikkelson (2010) identified a number of cross-cutting issues that could benefit from regional versus country-specific intervention.

27.   Looking across all countries, the subject area that obtained the lowest average score (1.54) was coder qualification and training alongside the quality of coding:

> Few countries it seems have formal training programmes for coders and even fewer have procedures in place to check the quality of the coding currently done. Despite the many years that WHO-FIC [WHO Collaborating Centres for the Family of International Classification] has annually gathered experts in the International Statistical Classification of Diseases and Related Health Problems (ICD) to discuss the classification, and promote its implementation and use in countries for certification and coding, progress in developing national coding capacity and training centres has been disappointingly slow.[20]

28.   The second weakest area across all countries (with an average score of 1.85) was the development and application of routine procedures to check the quality of the fertility and mortality data produced. Within the context of review of the UN Principles and Recommendations this is an important but concerning finding as UQ HIS-Hub report that only a few of the 26 countries assessed seemed to have built plausibility and consistency checks into their systems to ensure that all vital statistics data were routinely checked and evaluated before

being released. This result provides support for the view that development of quality monitoring and improvement plans is complex and challenging and the provision of supporting tools and specialist technical assistance would not only be useful but strategic.

29.   Two more areas scored less than 2 out of 3: one relates to certification practices and the other to lack of collaboration between government departments responsible for collecting, coding and publishing the vital statistics data. Mikkelson (2010) proposes that the most likely reason for the low scores on ICD practices is the fact that cause-of-death is not routinely collected in all countries, especially for deaths that occur outside hospitals. The finding that so many countries reported poor or inadequate collaboration between government agencies re-affirms the scope for substantial improvement in collaboration and co-ordination.

30.   The distribution of country results (see Box 3) within the three broad categories of system functioning ('dysfunctional' and 'weak' categories were collapsed due to small cell sizes), identified distinct patterns of responses for each group of countries. It also assisted in distilling different priorities for specific countries whose systems were at different levels of maturity as well as potentially different system development pathways for different categories of countries.

Built-in quality checks and collaborative reviews

31.   Quality checking of vital statistics occurs at a number of levels of the statistical system – at the points of collection, production and analysis/use.   While there is clearly value in independent evaluation of a country's vital statistics, there is also a strong case for investment in development of CRS in a way that builds quality checks (referred to as 'quality gates') into the system as well as adopting a collaborative approach to evaluation and review of a CRS.

32.   As noted above (see paragraph 13), building quality gates into the design of any CRS is a cost-effective way to improve data quality. As well as assisting data collection managers to more regularly review data quality, an outcome of the effective inclusion of such quality gates in any CRS will be improved statistical capability of staff.

33.   Further, there is value in a collaborative program of quality checking by key stakeholders involved in the production of vital statistics. As stated previously, the WHO/UQ HIS-Hub guidance tool has been developed to be collaboratively implemented by a team of reviewers drawn from different stakeholder groups involved in the operation of a CRS. This approach aims to address one of the key challenges consistently identified as a barrier to the effective functioning and monitoring of CRS (as evidenced in paragraph 29)—siloed ways of working across a complex stakeholder base resulting in fragmented or disconnected roles and responsibilities that ultimately undermine the quality (and, in particular, the consistency) of a country's vital statistics.

34.   The key stakeholder group involved in the establishment and functioning of a CRS generally includes (as a minimum) ministries of health, civil registrations agencies and offices which may include local government offices and national statistical organisations.   Without good co-ordination emanating from strong governance and effective communication, quality vital statistics with comprehensive national coverage will not be achieved.   In the rapid assessment tool developed by WHO and UQ HIS-Hub, the gold standard in collaboration is considered to be attained where an inter-agency committee operates to ensure that the civil registration and vital statistics systems interact seamlessly. The end result? Little duplication of work and consistency in estimates derived from vital statistics by each agency.

35.   Given that independent evaluation is not without its resource implications, it can be effectively complemented by a vital statistics quality monitoring and improvement plan developed in collaboration with key stakeholders including data providers and users (at both a national and international level). Not only does such an approach ensure an informed and practical plan is put in place, it also assists in obtaining the buy-in of key stakeholders, that is, it supports the development of partnerships for success.

36.   Notwithstanding, the value of independent evaluations should not be understated, particularly to support addressing any complex and technically challenging areas for improvement. Leveraging external expertise is often key to understanding the causes of a complex problem and helping to identify solutions.

Ensuring relevance, international comparability of vital statistics and confidentiality of individuals

37.   The four key criteria detailed in Chapter IV of the current version of Principles and Recommendations as the most appropriate against which the quality of civil registration data and vital statistics derived from this source (register-based vital statistics) should be measured are completeness, correctness, availability and timeliness. These key quality criteria continue to be relevant. Chapter IV also proposes that at a minimum 'completeness' and 'correctness' of civil registration data should be the focus of any quality evaluation or review. In closing, an additional criterion (relevance) is posed for consideration as is the inclusion of a stronger statement regarding the importance of the international comparability of data as well as ensuring the confidentiality of individuals.

38.   Criterion of 'relevance': Any quality assessment of data and vital statistics should arguably include an analysis of the extent to which the data continues to be conceptually relevant.   The UN Principles and Recommendations seek to specify the elements of civil registration data that are core to the production of vital statistics. Over time it would be expected, however, that as national and international understanding of factors effecting human development mature, other data items (most appropriately collected at the time of a vital event i.e. birth, death, marriage or divorce) would need to be captured. For example, over the past ten years, the need to improve understanding of maternal health and infant mortality has been highlighted as has the dearth of relevant data and statistics, particularly in developing countries. Addition of a quality criterion of 'relevance' could assist in further enabling the continuous improvement of civil registration data and vital statistics.

39.   Ensuring international comparability of data: The need to ensure that the data collected by CRS and the vital statistics produced meet international standards (while implicit), is not clearly stated in the UN Principles and Recommendations.   In order for progress against the Millennium Development Goals to be adequately monitored, international comparability of vital statistics is key. The capability of agencies such as the WHO to produce meaningful analyses of the progress of different countries in improving health outcomes is also reliant on the sharing of data and statistics that are directly comparable. The revised Principles and Recommendations may be strengthened by making this requirement explicit.

40.   Ensuring confidentiality of individuals: Confidentiality of individuals in the analysis and reporting of vital statistics is also cornerstone to quality assessment. The discussion of the measure of data availability does not currently require that protocols be put in place to ensure the confidentiality of individuals.   Mortality analysis often covers highly sensitive issues, for

example, of suicides, infant mortality and communicable diseases that are stigmatised, for example, HIV/AIDS. The importance of CRS putting in place measures that ensure data are sufficiently confidentialised prior to release to data users and/or require data users to ensure the confidentiality of individuals in the analysis and reporting of any data provided to them should be emphasised.

Table 1 - WHO assessment framework (2010)

Component	Details
Inputs **A**	**Legal basis and resources for civil registration** • **A1** – National legal framework for civil registration and vital statistics systems • **A2** – Registration infrastructure and resources
Processes **B**	**Registration practices, coverage and completeness** • **B1 –** Organization and functioning of the civil registration and vital statistics systems • **B2 –** Review of forms used for birth and death registration • **B3 –** Coverage and "completeness of registration" • **B4 –** Data storage and transmission
C	**Death certification and cause of death** • **C1** – ICD-compliant practices for death certification (24) • **C2** – Hospital death certification • **C3** – Deaths occurring outside hospital • **C4** – Practices affecting the quality of cause-of-death data
D	**ICD mortality coding practices** • **D1** – Mortality coding practices • **D2** – Mortality coder qualification and training • **D3** – Quality of mortality coding
E	**Data access, use and quality checks** • **E1** – Data quality and plausibility checks • **E2** – Data tabulation • **E3** – Data access and dissemination

Box 1: Evidence required and questions to be answered to support analysis of the quality and plausibility checks of births and deaths data emanating from civil registration systems, WHO-UQ HIS-Hub CRS Assessment Framework (2010), pp. 57-58.

Subcomponent E1: Data quality and plausibility checks

Supporting material to be prepared in advance:

- Tabulations of relevant vital event data from other sources (e.g. censuses with birth and death questions, demographic and health surveys (DHS) and other national surveys). Calculations of birth and death rates from these sources compared with birth and death rates derived from civil registration (see Box 3.8).
- Calculations of the percentage distribution of deaths for the latest available year according to three broad cause-of-death groups I, II and III, as shown in Box 3.10.
- Calculations of the percentage distribution of deaths for the latest available year according to cause-of-death groups I, II and III within 5-year or 10-year age intervals (see Box 3.11).
- Calculation of the percentage of deaths by age and sex being assigned to ill-defined cause-of-death categories.

Subcomponent E1 (A): Levels of fertility and mortality

The best way to check the plausibility of vital statistics is to convert them into birth and death rates or ratios. Consistency checks should always be carried out both on the raw data and on key indicators (e.g. birth and death rates) before they are used or made more widely available. This can be done simply by comparing the raw data, and the rates derived from them, to corresponding figures from previous years. Major changes in numbers or rates are unlikely from year to year and should be investigated.

- **E1.1** Are fertility indicators (e.g. crude birth or fertility rate, age-specific fertility rate and total fertility rate) routinely calculated from the civil registration and vital statistics data?
- **E1.2** If so, which indicators are calculated?
- **E1.3** Are mortality indicators (e.g. crude death or mortality rate, age-specific mortality rate, infant mortality rate, neonatal mortality rate and maternal mortality rate) routinely calculated from the civil registration and vital statistics data?
- **E1.4** If so, which indicators are calculated?
- **E1.5** What data sources are used as the denominators to calculate these rates?
- **E1.6** Describe the plausibility and consistency checks that are carried out on the data and indicators before they are released for use (see Box 3.9).

It should not be assumed that, just because a country has a vital statistics system, the data the country produces are accurate. There are many potential sources of error in the vital statistics, including underregistration, age misreporting of deaths, and incorrect certification and coding of the underlying cause of death. Therefore, countries should carry out a range of consistency checks to identify possible sources of error in the data. This knowledge (e.g. about underregistration of deaths) will guide efforts to redress the problems.

- **E1.7** Are the civil registration and vital statistics data used to investigate variations in fertility and mortality within the country? If so, describe how this is being done.
- **E1.8** Are fertility rates derived from civil registration and vital statistics compared with rates derived from other sources?
- **E1.9** Are mortality rates derived from civil registration and vital statistics compared with rates derived from other sources?

Subcomponent E1 (A): Levels of fertility and mortality (cont.)

In countries lacking reliable vital statistics systems the investigation of fertility and mortality is particularly important. If the completeness of vital registration data is less than about 90%, the UN advises countries to include both fertility and mortality questions in the census. Estimates of fertility and mortality derived from census data, however, are approximate and subject to various errors, and should be adjusted using standard demographic techniques (*19*). Nonetheless, these data can be useful for estimating the completeness and overall performance of vital registration.

E1.10 Did the last census include a question on births or deaths; for example:
- Number of children ever born alive and still alive?
- Date of birth of last child born alive?
- Whether the last birth was registered?
- Whether the last death was registered?
- Deaths in the household in the past 12–24 months?

E1.11 If so, have the data been analysed and compared with the vital statistics data?

Other sources (e.g. church, cemetery, police, village records and different administrative databases) can be used to complete and verify vital registration data, through matching of births and deaths.

E1.12 Are other sources used to complete and verify birth and death data?

E1.13 If so, describe these.

Box 2: An excerpt summarising standard plausibility and consistency checks of core vital
statistics taken from the WHO-UQ HIS-Hub CRS Assessment Framework (2010), p. 58.

Box 3.9   Standard plausibility and consistency checks

It is useful to carry out standard plausibility or consistency checks on the vital statistics by combining or aggregating the data into standard 5-year age groups. For fertility, births should be grouped according to age of mother, namely <15 years, 15–19 years, 20–24 years, ... , 45–49 years and 50+ years.

For mortality, deaths should be aggregated into the following age groups: <1 year (i.e. died before reaching the first birthday), 1–4 years, 5–9 years, 10–14 years, ... , 80–84 years and 85+ years. Wherever possible, deaths should be tabulated up to age 100 in 5-year age groups.

Age-specific fertility rates (for ages of the mother shown above) and age-specific mortality rates (for the ages at death shown above) should be calculated separately for males and females. An estimate of the mid-year population by age and sex is required to calculate the rates.

Based on these aggregate numbers of deaths (and births) by age, and on the age-specific birth and death rates, countries should calculate the metrics listed below from their vital statistics data, and should carefully review their findings to make a preliminary assessment of the quality of their vital statistics data.

Calculate the ratio of male births (B (m)) to female births (B (f)). This ratio should be about 1.05. Significant departures indicate underreporting of births for either males or females, with the latter being the more likely. The pattern of age-specific fertility rates should show a peak level for women aged 25–29 or 30–34 years, and decline thereafter.

Calculate the crude death rate (reported deaths × 1000/total population size). The rate should be about 5–10 per 1000. Crude death rates below 5 per 1000 should be viewed with suspicion. (Note: the crude death rate should not vary by more than about 3–5% each year. Annual variations greater than this amount should be investigated.)

Plot the log of the age-specific death rate at each age. The graph should show a high rate at ages 1 year and 1–4 years, a trough at ages 5–14 years, a small bump at ages 15–34 years (due to accidents in males, and to maternal mortality and accidents in females), and a consistent increase (seen as a straight line) from about the age of 35 years onwards. Departures from this linear trend with age suggest underreporting or misreporting of age at death.

For comparisons of fertility and mortality rates within and between countries, it is important to standardize for differences in age distributions (24).[8]

All opportunities should be used to further check the plausibility of the vital statistics data, by comparing the fertility and mortality rates from civil registration data with those derived from other sources. Major differences in rates or ratios should be investigated. Rates derived from other sources (such as DHS or UNICEF's multiple indicator cluster surveys (MICS) or some other health or demographic survey) should be used as comparators (see Box 3.8).

Box 3: Country average scores for individual questions included in the WHO/HIS Hub Civil Registration System Rapid Assessment tool grouped according to the 11 areas (domains) of the vital statistics system, by broad country classification group.

Averages of Group 1 countries

Averages of Group 2 countries

Averages of Group 3 countries

15
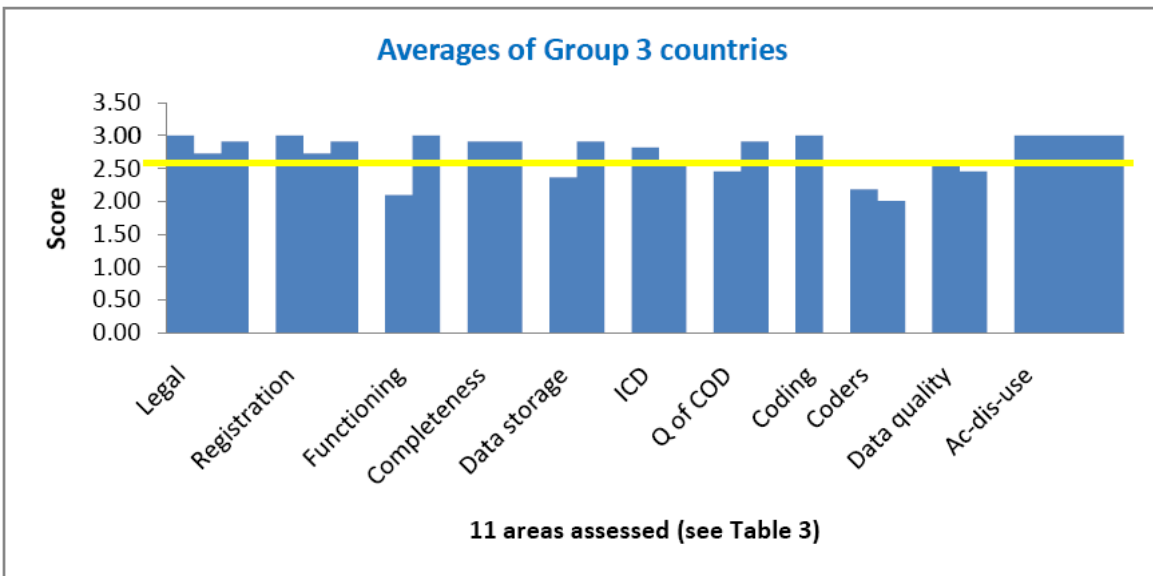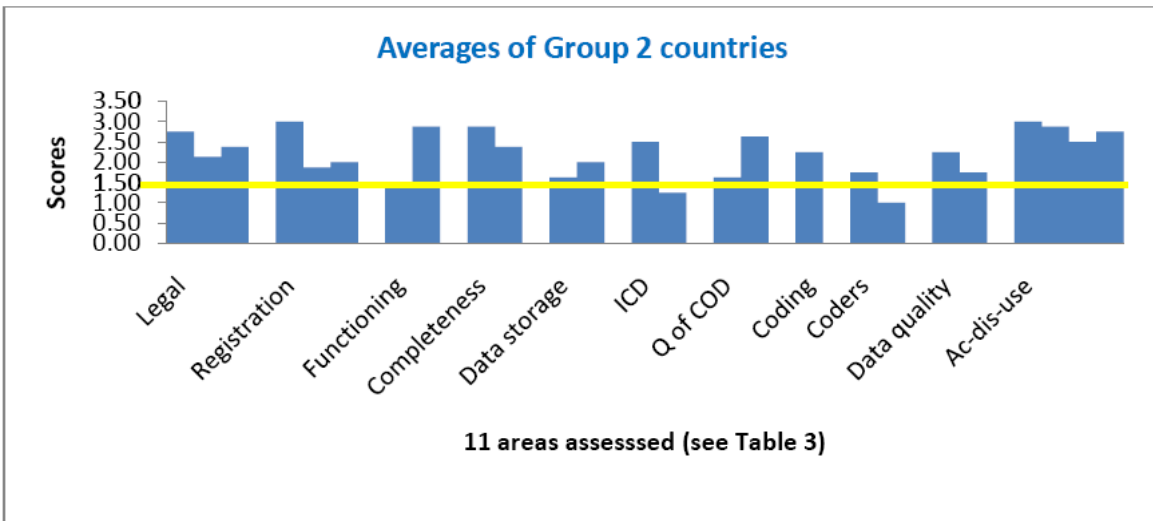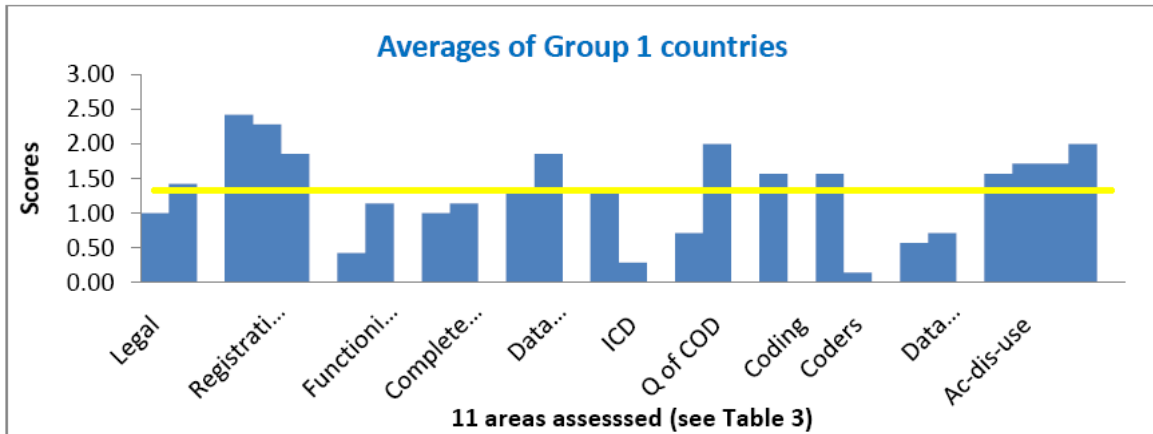
[1] These countries include Bangladesh, Bhutan, Cambodia, Fiji, India, Indonesia, Iran, Pakistan, Vietnam, Armenia, Cook Islands, Maldives, Mongolia, Philippines, Sri Lanka, Thailand, Turkey, Australia, Azerbaijan, Georgia, Hong Kong, Japan, Kyrgyzstan, Macau, New Zealand, Russia, South Korea and Uzbekistan.

[2] World Health Organisation and University of Queensland Health Information Systems Knowledge Hub (2010) "Improving the quality and use of birth, death and cause-of-death information: guidance for a standards-based review of country practices". University of Queensland's Health Information Systems Knowledge Hub Working Paper Series No. 1– http://www.uq.edu.au/hishub.

[3] Mikkelson, L. (2009) "Assessing the quality of vital statistics systems: lessons from national evaluations in Sir Lanka and the Philippines". University of Queensland's Health Information Systems Knowledge Hub Working Paper Series No. 8 – http://www.uq.edu.au/hishub.

[4] Mikkelson, L (2010). "Rapid assessment of vital statistics systems: evaluation of the application of the WHO/HIS Hub tool in 26 countries in the Asia Pacific Region." University of Queensland's Health Information Systems Knowledge Hub Working Paper Series No. 10 – http://www.uq.edu.au/hishub.

[5] Op cit, p, 5.

[6] Mahapatra, P, shibuya K, Lopez, AD et al. (2007) "Civil registration systems and vital statistics: successes and missed opportunities". *Lancet*, 370(95990): 1652-1663.

[7] Mathers, CD, Fat DM, Innoue M et al (2005) "Counting the dead and what they died from: an assessment of the global status of cause of death data" Bulletin of the World Health Organization, 83(3):171-177.

[8] Mahapatra, P., Chalapati, Rao PV. (2001) "Cause of death reporting systems in India: a performance analysis. *National medical Journal of India*, 14(3):154-162.

[9] Rao, C., Bradshaw, D., Mathers C. (2004) "Improving death registration and statistics in developing countries: lessons from Sub-Saharan Africa". *Southern African Journal of Demography*, 9(2):79-97.

[10] Rao, C., Lopez, AD., yang, G. etal. (2005) "Evaluating national cause-of-death statistics: principles and application to the case of China". *Bulletin of the World Health Organization*, 83(8):618-625.

[11] Ruzicka, LT., Lopez, AD. (1990) "The use of cause-of-death statistics for health situation assessment: national and international experiences". *Worth Health Statistics Quarterly*, 43(4):249-258.

[12] World Health Organisation and University of Queensland Health Information Systems Knowledge Hub (2010), p.56.

[13] Ibid.

[14] World Health Organisation and University of Queensland Health Information Systems Knowledge Hub (2010), p. 4.

[15] Gamage, S., Rampatige, R., Smarakoon, J., Ranadheera, S., Mikkelson, L., Aung, E. (2009) "Assessing the production, quality and use of national vital statistics: a case study of Sri Lanka". University of Queensland's Health Information Systems Knowledge Hub Documentation Note Series No. 1 – http://www.uq.edu.au/hishub.

[16] Hufana, L., Cajita, J., Morante, L., Lopez, J., Tan, C., Mikkelson, L. and Aung, E. (2009) "Assessing the production, quality and use of national vital statistics: a case study of the Philippines". University of Queensland's Health Information Systems Knowledge Hub Documentation Note Series No. 1 – http://www.uq.edu.au/hishub.

[17] Cambodia, Vietnam, Bangladesh, Bhutan, Mongolia, Turkey, Kazakhstan and Indonesia.

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