Suggestions to improve the collection of data on adult mortality in DHS surveys

In recent years, the growing importance of information on maternal and AIDS-related mortality has reignited interest in the collection of data on the survival of close relatives. In many DHSs, a complete list of all brothers and sisters is collected from (generally female) respondents aged 15-49, with information on their gender and survival status, their current age (for surviving siblings) or ages at death and years since death (for the deceased). Siblings' survival histories (SSH) are now one of the primary sources of information on adult mortality in countries with limited vital registration. For example, in the Global Burden of Disease 2010 Study, SSHs were the main source of information on adult survival in sub-Saharan Africa [24]. They are also increasingly used to estimate pregnancy-related mortality [25, 26], to evaluate the mortality impact of large global health initiatives such as PEPFAR [1] or to estimate mortality due to conflict or genocide [12, 6]. However, sibling histories tend to under-estimate adult mortality [21, 15, 8]. We propose to add a limited set of questions to the existing standard questionnaire with the aim of (i) reducing the omission of siblings and (ii) collecting data necessary for complementary mortality estimates. These would greatly improve DHS-based estimates of adult mortality and expand their utility. These suggestions are specific to countries where the registration of deaths is incomplete.

1. **Collecting parental life histories in the "Maternal and adult mortality" module, by adding 4 questions on the survival status, ages at survey, years of death and ages at death (for both parents of the respondent).**
   The following questions could be asked prior to eliciting the list of siblings:
   - Is your mother still alive?
     - If YES > How old is your mother?
     - If NO > How many years ago did she die?
     - If NO > How old was she when she died?

   The same questions would be asked for the respondent's father to estimate male mortality. Both sets of questions should be included in the men's questionnaire as well.

   At present, the DHS questionnaire makes it possible to estimate adult mortality from questions on the survival and residence of parents in the household questionnaire [7, 21], but these questions are currently restricted to children up to age 17, which greatly limits their use for mortality estimation. The proposed set of questions is minimal, the data are easy to collect, and the mortality estimates can be obtained using both direct and indirect techniques [13].

   Asking these questions would have the following advantages:

   i. It provides mortality estimates up to age 75. Currently, DHS surveys can only provide mortality estimates up to age 50 or 60, because adults who respond to the maternal mortality module are aged 15 to 49 and they report on siblings of the same age on average. Questions on the survival of parents currently included in the household questionnaire can only provide mortality estimates between ages 25 and 40. As a result, little information is available on old-age mortality [2]. In 2005-10, 49% of deaths in less developed countries occurred at age 60 and above, and this proportion is expected to rise to 80% in 2050-55 [23].

ii. Because the questions on parental survival would be asked of respondents aged 15-49, one could obtain a trend in mortality over the last 35 years. By contrast, sibling histories are only useful for the last 15 years because the number of adult siblings of the respondents diminishes rapidly when the reference period extends further back in time.

iii. It would yield more reliable estimates of adult mortality than those obtained from the parental survival data collected among children in the household questionnaire. Among children, a large proportion of fostered orphans are misclassified as non-orphans [4, 18, 20, 19, 14]. In the presence of adults, some interviewers do not always probe whether they are the true biological parents of the children observed in the households and automatically record all children as non-orphans [3]. Foster parents may also inadvertently underreport orphans, for instance if they do not understand that the questions concern biological parents [16]. This "adoption bias" is less pronounced among adult respondents.

iv. In countries where HIV prevalence is high, adult mortality estimates derived from parental survival are biased by the transmission of HIV from mothers to children and the lower fertility of seropositive mothers. It is possible to adjust for these biases [22]. However, estimates derived from parental survivorship statistics collected among adults are less biased than those obtained from young respondents.

v. Most censuses collecting data on orphanhood do not restrict the question to children. Asking adults about the survival of their parents in DHS could facilitate the comparisons and the reconstruction of trends in mortality. Censuses alone are often too far apart to provide frequent and up-to-date mortality estimates.

The date of the mother's death has been included in several sample surveys in the 1970s and 1980s in Latin America, and in one DHS conducted in 1987 in Burundi. Chackiel and Orellana (1985) showed that this question provides more accurate estimates of the period to which these estimates apply than when this moment has to be estimated indirectly from the respondent's age [5]. This question is particularly useful in countries where mortality trends have been irregular, such as in Eastern and Southern Africa.

In addition to questions on the date of the parents' death, questions on the ages at survey or at deaths of parents were included in the 1991 Vietnam Life History Survey [11]. Mortality estimates from the parental life histories were consistent with sibling histories, and collecting both types of data resulted in estimates across a wider age spectrum.

If it is thought that an important proportion of respondents will not know the year of death of their parents, an additional question for those unable to provide a date would be: 'Was your mother/father alive when your first child was born?'. A similar question was asked in nine DHS surveys conducted in 1986-1988 including Senegal in 1986, Burundi in 1987, Ghana and Uganda in 1988: 'Was your mother/father alive at the time of your first marriage?'. Timæus (1991) showed that the resulting mortality estimates are more accurate than those obtained without any information on the timing of deaths; they provide more recent mortality than lifetime data and are less plagued by the adoption effect [19]. Our suggestion to use the first birth as an anchor (rather than the first marriage) aims to avoid problems related to the definition of the marriages.

2. **Adding a question to collect the household line number of adult siblings of the respondent.**

   Because all women aged 15-49 are eligible to the individual questionnaire, in many households questions on sibling survival are asked to several members of the same sibship. In some DHS surveys (e.g. Niger 1992 and Senegal 1992), a question was asked at the end of the maternal mortality module to identify the respondent's sisters who lived in the same household (through their household line number). This question allowed identifying duplicate sibships. Adding this question to all DHS surveys with a maternal mortality module could help evaluate the quality of the data through the inter-sister agreement in reports of their siblings' survival histories.

3. **Adding 4 recall cues prior to eliciting the list of siblings.**

   Several studies have evaluated mortality rates based on sibling survival data in comparison with estimates of the World Population Prospects (WPP) [15, 17] or with prospective mortality data from demographic surveillance sites [8]. They all conclude that sibling histories tend to underestimate adult mortality, partly because of omissions siblings. A recent validation study demonstrated that it is possible to improve the quality of the data with some modifications to the questionnaire [9]. The following 4 recall cues could be added after MM3 ('How many births did your mother have before you were born?'):

   1. "Has your mother ever given birth to a boy or a girl who was born alive but later died?" YES/NO
   2. "How many brothers/sisters have died?"
   3. "Sometimes we forget to mention a brother or sister because we did not reside with them for a long time or we do not see them very often. Is there any brother or sister who did not live with you for long or with whom you have few contacts that you have not mentioned so far?" If Yes, correct MM3.
   4. "We sometimes omit to mention a brother or sister because they were born from another union, that is to say, they have the same biological mother, but not the same father as you. Is there a sibling born from another biological father that you have not mentioned so far?" If Yes, correct MM3.

4. **Including a question on violent mortality for each deceased person aged 12 or more.**

   In some surveys, a question is asked about violent mortality. For instance, in the DHS conducted in Zimbabwe in 2005-06, the following question was asked for all sisters who had died after age 12: "Was (NAME)'s death due to an accident or violence?" We propose to systematically include this question in the maternal mortality module and for all siblings who died above age 12 (males included). Violent or accidental deaths are easier to identify than pregnancy-related mortality. According to estimates from the Global Burden of Disease 2010 Study, road injuries, self-harm and interpersonal violence were the second, fourth and sixth leading causes of deaths in developing countries among adults aged 15-49 in 2010 (http://www.healthmetricsandevaluation.org/gbd/visualizations/gbd-arrow-diagram)

5. **Including questions on recent household deaths more systematically in surveys with large sample sizes (more than 15-20 000 households).**

   A section on recent household deaths was included in the Afghanistan 2010 Mortality Survey, in the Ghana Special 2007 DHS and the Bangladesh Special 2001 DHS. Questions on recent household deaths are seldom included in standard DHS, expect in the module entitled "Support for persons who have died" (such as in Côte d'Ivoire (2005) and Nigeria (2008)) [2].

In Bangladesh in 2001, the rates from household deaths and sibling deaths were remarkably similar [10]. By contrast, in Afghanistan in 2010 and Ghana in 2007, there were substantial differences between estimates derived from sibling histories and those obtained from household deaths. Collecting both sibling histories and reports on recent household deaths can greatly facilitate the diagnostic investigations into the quality of the data. A minimal set of questions (name, gender and age at death of all deaths in the household in the past 12 months) should be included in all DHS with large sample sizes.

Additionally, for surveys that collect information on recent household deaths, we suggest a question to ascertain whether or not the death occurred in a health facility (including hospitals and health centers). There is growing interest in health facility reporting on numbers of deaths, as it is an important intermediate step towards the adoption of a comprehensive civil registration and vital statistics system. However, total deaths from a health facility reporting system are of limited utility for estimating mortality rates in countries where many individuals die without being able to obtain medical care at a facility. Including one follow-up question in surveys that collect information on recent household deaths to determine whether or not an individual died at a health facility would allow for the adjustment of reported deaths from health facility systems so that they are representative of mortality in the general population.

"Did (NAME) die in a health facility (for example…)?" [where example provides country-specific example of hospitals and health centers]
- Yes
- No
- Don't know

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