

Statistical Commission
Fifty-third session
1–4 March 2022
Item 3(a) of the provisional agenda

Background document
Available in English only

Items for discussion and decision: data and indicators for the 2030 Agenda for Sustainable Development

The Potential of Surveys and Censuses to Fill Adult Mortality Data Gaps in the Context of COVID-19: a Stocktaking Paper

Draft

Prepared by

Technical Advisory Group on COVID-19 Mortality Assessment

Working Group 2

Table of content

1	INTRODUCTION	4
1.1	The need for data on excess mortality	5
1.2	Data availability on current levels of mortality throughout the world	6
1.2.a	Inequalities in death registration: between countries	6
1.2.b	Inequalities in death registration: within countries	7
1.3	Surveys and censuses as surrogate data sources in low- to middle-income countries	8
1.3.a	Household surveys as a source of adult mortality data	8
1.3.b	The 2020 round of censuses	8
1.3.c	The limited use of surveys and censuses to measure mortality since beginning of COVID pandemic	9
2	OVERVIEW OF METHODS FOR ESTIMATING ADULT MORTALITY FROM CENSUSES AND SURVEYS	12
2.1	Introduction and background	12
2.2	Estimation methodologies – brief overview and links to resources	12
2.2.a	Death distribution methods for evaluating and adjusting recorded deaths by age and sex	12
2.2.b	Indirection estimation based on survival of parents	14
2.2.c	Direct estimation from sibling survival history	15
2.2.d	More recent techniques such as the Network Survival Method and others - Forthcoming	15
2.3	Censuses and surveys as a source of evidence for estimating mortality in other health crises - Forthcoming	15
3	COLLECTING ADULT MORTALITY DATA IN CENSUSES	16
3.1	International recommendations on collecting data on adult mortality through population and housing censuses	17
3.1.a	Household deaths	17
3.1.b	Maternal or paternal orphanhood	18
3.2	Overview of country practices in collecting information on adult mortality	18
3.2.a	Overview of national implementation in collecting adult mortality in the 2010 and 2020 round of population censuses	18
3.2.b	Detailed of national practices in collecting adult mortality data in 2010 round censuses ..	20
3.2.c	Insights of country practices in the 2020 round of censuses	30
3.3	Data quality issues	30
4	COLLECTING ADULT MORTALITY DATA IN HOUSEHOLD SURVEYS	32
4.1	Orphanhood (survival of biological parents)	33

4.1.a	Question formulation	33
4.1.b	Country coverage	35
4.1.c	Quality considerations.....	36
4.2	Sibling survival	37
4.2.a	Question formulation	37
4.2.b	Country coverage	38
4.2.c	Quality considerations.....	39
4.3	Household deaths	40
4.3.a	Question formulation	40
4.3.b	Country coverage	43
4.3.c	Quality consideration	43
5	EMERGING CHALLENGES AND DATA NEEDS IN THE CONTEXT OF THE COVID-19 PANDEMIC.....	43
5.1	Impact of COVID-19 on survey data collection	44
5.1.a	Data collection	44
5.1.b	Field organization	45
5.1.c	Data quality	45
5.1.d	Government funding	46
5.1.e	Collecting data from institutions – forthcoming	46
5.1.f	Collecting data on death: stigmatize – forthcoming.....	46
5.2	Estimation challenges – forthcoming.....	46
5.2.a	Correlation of survival within families	46
5.2.b	Single households, and the residence of older adults.....	46
5.3	New data needs to estimate COVID-related excess mortality – forthcoming	46
5.3.a	Longer reference periods	46
5.3.b	Detailed reporting of date of death.....	46
5.3.c	Older age groups	46
5.3.d	Circumstances and causes of deaths	46
6	USING ADULT MORTALITY DATA COLLECTED FROM CENSUSES AND SURVEYS AT THE NATIONAL AND INTERNATIONAL LEVEL.....	47
6.1	Selected national examples:	47
6.1.a	Country case studies on use/analysis of adult mortality data (Structured outline for input request to countries is in Annex 2) - Forthcoming.....	47
6.1.b	Sample registration systems.....	47
6.2	International examples	47

6.2.a Population Division – use of census and survey estimates in overall analysis of adult mortality for population estimates.	47
6.2.b CELADE.....	49
6.2.c Maternal mortality estimation in MMEIG.....	49
Annex 1. A compilation of non-DHS/MICS national surveys with questions on adult mortality, 2005 and later	51
Annex 2: Draft questionnaire to countries for Chapter 6, part A.....	55

1 INTRODUCTION

1. Population censuses and household surveys have been the main sources of data for estimating mortality among both children and adults in countries with incomplete or unreliable systems for civil registration and vital statistics (CRVS). While there is a long history of directly and indirectly estimating adult mortality level based on relevant questions included in censuses and surveys (e.g., household deaths, survival of parents and survival of sisters), such methods might not be suitable for measuring the impact of COVID-19 on population mortality levels.

2. Under the Technical Advisory Group on COVID-19 Mortality Assessment established jointly by the United Nations Department of Economic and Social Affairs (UN-DESA) and the World Health Organization (WHO)¹, a working group was created to provide recommendations to national statistical offices (NSOs) on innovative methods in collecting time-sensitive and reliable data through censuses and surveys for use in measuring the excess mortality associated with the COVID-19 pandemic. Recommendations of the Working Group will help to fill data gaps in adult mortality estimation in the context of COVID-19 and to build a more agile and resilient statistical system in preparation for future crises (pandemics, natural disasters, etc.).

3. Members of the Working Group come from national statistical offices, academia and national and international organizations. As an initial step towards elaborating a set of recommendations, the Group is preparing a stocktaking paper on existing practices in using censuses and surveys for measuring adult mortality and on recent initiatives in various countries that aimed to increase the availability of data on adult mortality.

4. The paper consists of 6 chapters. Chapter 1 describes the data needs on adult mortality during COVID-19 and explains the rationale for working on the paper. Chapter 2 provides an overview of demographic methods that can be used to produce adult mortality estimates with data from population censuses and household surveys. Chapters 3 and 4 offer a comprehensive review of national practices in collecting adult mortality data since 2005 through censuses and surveys, respectively. Chapter 5 outlines the impact of COVID-19 on national census and survey data collection and discusses several emerging data needs for measuring COVID-related mortality. Chapter 6 provides examples on how countries, regional and international organizations use adult mortality data collected from censuses and surveys.

¹ <https://www.un.org/development/desa/pd/events/TAG>

5. As a work-in-progress, the current draft of the stocktaking paper provides a comprehensive overview of existing methods and data sources from censuses and surveys that can be used to derive estimates on adult mortality. The paper will be further developed in areas outlined below:
- a. A systematic discussion on whether the status-quo of adult mortality data collection through censuses and surveys is sufficient to provide meaningful data on COVID-19 related mortality.
 - b. A discussion on whether any modifications to the current methods could bring some potential gains in informing COVID-19 mortality data collection, without overburdening the countries. This should be discussed with input from a review of emerging data collection methods such as those currently being tested in countries (e.g., more frequent telephone surveys); and previous experiences in the field on further improving adult mortality data collection in censuses and surveys.
 - c. The current draft discusses censuses and surveys as independent sources for mortality data. The potential of data integration should be further explored. Small area estimation method has been very useful in producing data for smaller geographical areas or rare population groups when surveys do not have sufficiently large sample sizes. The use of dual frames could also be explored especially in the COVID context. This could potentially remedy the issue with undercoverage (or non-coverage) of institutional population in household surveys. Dual frames could also be potentially applied to put the household-based sampling frame and frame from the burial sites together. Integration of surveys data with data from burial sites should also be explored.
 - d. The potential of demographic surveillance sites in monitoring COVID-19 related mortality.
 - e. Sections in the draft paper that are noted as “forthcoming”.

6. Subject to availability of additional resources, the following activities would be very useful to inform formulation of recommendations on better collecting adult mortality data in the context of COVID-19:

- a. Conducting a systematic review of literatures related to quality of adult mortality data produced based on questions in censuses and surveys
- b. Carrying out analysis and study using existing survey and census data to better understand the quality aspects and whether differences in survey question formulation could potentially lead to better data
- c. Carrying out controlled experiments in countries to help better formulate adult mortality questions

7. Given the time constraints, the paper has not gone through large scale reviews. As we further develop the paper, we would like to invite all readers including colleagues from NSOs, academia and members of Working Group 2 and TAG to provide (a) comments on the draft paper; (b) additional materials to help enrich the discussion in the paper; and (c) information on national surveys that we did not cover. A revision of the paper will also be circulated for comments before the Group works towards elaborating a set of recommendations on better utilizing censuses and surveys to collect adult mortality data.

1.1 The need for data on excess mortality

8. Two years into the pandemic, COVID-19 has impacted the world profoundly including mortality. As of 31 January 2022, more than 5.6 million COVID-19 deaths have been reported globally.² There are disparities on how COVID impacted on individuals. Those who are older, smoking and with underlying

² World Health Organization, 2022. WHO Coronavirus (COVID-19) Dashboard. Available at <https://covid19.who.int/>

conditions are more likely to suffer from severe symptoms and die.³ Those from the more disadvantaged population groups also have higher risk of dying than others. For example, the proportion of Hispanic and non-Hispanic Black people are over-represented among COVID-19 deaths compared to their share among the total U.S. population.⁴

9. The true death toll of COVID-19, however, goes beyond the reported deaths. Countries without a comprehensive civil registration and vital statistics system might not be equipped to report an accurate mortality figure. With incomplete registration of deaths, those who are the most vulnerable are likely to be missed by the registration system as shown in section 1.2 with examples on death registration inequality within countries. In addition, government mitigation measures such as social distancing could discourage individuals from seeking health care, which might indirectly contribute to increased mortality from diseases other than COVID-19.

10. To properly measure the impact of COVID-19 on mortality, the concept of “excess mortality” is used. COVID-19 excess mortality is measured through comparing the number of people who died during a specific period under COVID with a historical baseline pre-COVID. For countries with data from a good civil registration and vital statistics system, excess mortality can be assessed through statistics from death registration. It is a huge challenge, however, for those without a strong CRVS system.

1.2 Data availability on current levels of mortality throughout the world

1.2.a *Inequalities in death registration: between countries*

11. Improving national civil registration and vital statistics system has been a focus of the international community and national statistical offices for many years. The first internationally-agreed standard⁵ on registration of vital events was adopted by the United Nations Statistical Commission in its 7th session in 1953. In the same year, the Economic and Social Council adopted a resolution that “Recommends that countries give attention to the importance of developing vital statistics to meet demographic, economic, public health and social needs; and suggests that governments review and appraise their procedures for registration vital events and compiling vital statistics, taking into consideration the Principles for a Vital Statistics System, and introduce such changes as are feasible to improve national statistics and their international comparability in the field.” Subsequent revisions of international standards on CRVS were published in 1973⁶, 2001⁷ and 2014⁸.

12. Accompanying the international standards, a number of handbooks have been published to provide hands-on guidance on national CRVS systems covering areas of system management, computerization, communication, and policy for archiving and release of individual records.⁹ In 1991, at its 26th session, the UN Statistical Commission welcomed the first international capacity building

³ World Health Organization. Clinical management of COVID-19. Interim guidance. Geneva: World Health Organization; 2020.

⁴ Centers for Disease Control and Prevention, 2020. Disparities in Deaths from COVID-19. Available at <https://www.cdc.gov/coronavirus/2019-ncov/community/health-equity/racial-ethnic-disparities/disparities-deaths.html>

⁵ United Nations, 1953. Principles for a Vital Statistics System. New York. Available at https://unstats.un.org/unsd/demographic-social/Standards-and-Methods/files/Principles_and_Recommendations/CRVS/Series_M19-E.pdf

⁶ Statistical Papers, Series M, No. 19, Rev.1 (United Nations publication, Sales No. E.73.XVII.9)

⁷ Statistical Papers, Series M, No. 19, Rev.2 (United Nations publication, Sales No. E.01.XVII.10).

⁸ https://unstats.un.org/unsd/demographic-social/Standards-and-Methods/files/Principles_and_Recommendations/CRVS/M19Rev3-E.pdf

⁹ More publications are available at [UNSD — Demographic and Social Statistics](#)

programme on CRVS – the International Program for Accelerating the Improvements of Vital Statistics and Civil Registration System.¹⁰

13. Almost 70 years have passed since the first international standard. Great progress has been made on national CRVS systems, but gaps still exist. Data available from 2019 showed that globally only 62 per cent of the countries have death registration data that are at least 75 per cent complete. The region with the highest death registration coverage is Europe and Northern America (98%) while sub-Saharan Africa has the lowest coverage in death registration. Only 17 per cent of the countries in the region has death registration data that are at least 75 per cent complete.

Table 1. Proportion of countries with death registration data for at least 75 per cent coverage, by region

14. Region	Proportion of countries with death registration data that are at least 75 percent complete
Sub-Saharan Africa	17.0
Oceania (exc. Australia and New Zealand)	47.8
Australia and New Zealand	50.0
Eastern and South-Eastern Asia	50.0
Northern Africa and Western Asia	60.0
Central and Southern Asia	64.3
Latin America and the Caribbean	80.4
Europe and Northern America	98.2
World	61.6

Source: United Nations Global SDG data Platform, SDG indicator 17.19.2, data assessed in January 2022.

1.2.b *Inequalities in death registration: within countries*

15. Inequalities in death registration coverage also exist within countries. Understanding those inequalities help national and local government strengthen the vital statistics systems in areas with the largest deficiencies. In the time of COVID-19, such understanding also helps researchers and public health professionals in formulating policy better, adjusting for potential under-coverage and quality deficiencies.

16. For example, a study carried out assessing the quality of death registration between 2001 and 2013 in Ecuador showed that there were large disparities in death registration coverage across regions, ranging from 21% in Galapagos to 87% in Tungurahua for women; and 35% in Galapagos and 89% in Chimborazo for men. An analysis of the cause of deaths data quality also identified that deaths of women have consistently higher proportion of “garbage cause-of-death code” than deaths of men.¹¹ Another documented disparity in death registration was recently published for India.¹² Although death registration coverage has increased steadily from 56% in 2000 to 81% in 2018 in the country, disparities still exist

¹⁰ Statistical Commission Report on the Twenty-Sixth Session, available at <https://unstats.un.org/unsd/statcom/26th-session/documents/statcom-1991-26th-report-E.pdf>

¹¹ Peralta, A., Benach, J., Borrell, C. et al. Evaluation of the mortality registry in Ecuador (2001–2013) – social and geographical inequalities in completeness and quality. *Popul Health Metrics* 17, 3 (2019). <https://doi.org/10.1186/s12963-019-0183-y>

¹² Basu JK, Adair T. Have inequalities in completeness of death registration between states in India narrowed during two decades of civil registration system strengthening?. *Int J Equity Health*. 2021;20(1):195. Published 2021 Aug 30. doi:10.1186/s12939-021-01534-y

across different regions and between women and men. For example, completeness of death registration in 2018 was 26% in the state of Bihar in the eastern region, but was around 90% in all 4 states in the Southern region. The completeness of death registration has been consistently higher in India for men than for women from 2009 to 2018.

1.3 Surveys and censuses as surrogate data sources in low- to middle-income countries

1.3.a *Household surveys as a source of adult mortality data*

17. Household surveys are an important data source for adult mortality data especially for countries without a good civil registration and vital statistics system. Because of their ability to collect a large number of variables about dwelling units, households and members of the households, household surveys are also a potential source to understand the association between demographic and social characteristics and the vital event, in this case, adult mortality.

18. Major household surveys that collect adult mortality data are Demographic and Health Surveys (DHS) supported by USAID and Multiple Indicator Cluster Surveys (MICS) supported by UNICEF. A number of other programmes also administer surveys that collect data on adult mortality. The Pan Arab Health Survey (PAPFAM) supports 16 Arab countries to collect data on family and reproductive health. Most PAPFAM surveys were carried out for earlier years (before 2007) but a number of recent surveys were also recorded (Djibouti in 2012; and Morocco in 2017-2018). A new survey programme named “Population-based HIV Impact Assessment (PHIA)” also collects adult mortality data since 2014. The programme is supported by the United States and has covered 15 countries so far, mostly in sub-Saharan Africa. There are also national household surveys outside of these survey programmes, through either ad-hoc demographic surveys or integrated household surveys that are conducted regularly.

19. Three set of questions have the potential in measuring adult mortality through household surveys: (a) household deaths; (b) sibling survival and (c) orphanhood (parental survival). There are challenges and limitations associated with each set of questions in measuring adult mortality, due to either the limitation of the questions themselves or the data collection instrument. Adult mortality is a rare event and sample survey needs to have sufficiently (maybe even prohibitively) large sample size to capture enough cases. More details will be provided in Chapter 4.

1.3.b *The 2020 round of censuses*

20. Population and housing censuses are the foundation of national statistical systems, providing benchmarks of a country's population and housing stock, and baseline information for producing other statistics and monitoring progress towards the Sustainable Development Goals. Census is also an important source of vital statistics, including mortality, for countries without a comprehensive civil registration system. Two census topics that are recommended by the UN and can be used to estimate the level of adult mortality are (a) deaths in the last 12 months; and (b) parental orphanhood.

21. Since its earliest years, the United Nations has played a pivotal role in providing a series of international principles and recommendations on population and housing censuses to assist national statistical offices and census officials, throughout the world, in planning and carrying out improved and cost-effective censuses. According to the United Nations Recommendations, a population census should be carried out at least once every ten years, and once every five years for even better data.

22. The first set of principles and recommendations for population and housing censuses was issued in 1958. The last global census recommendations were published in 2017 under the title Principles and

Recommendations for Population and Housing Censuses, Revision 3¹³. Two previous revisions of the Principles were published in 1998¹⁴ and 2008¹⁵.

1.3.c *The limited use of surveys and censuses to measure mortality since beginning of COVID pandemic*

23. COVID-19 has imposed huge challenges for population censuses and household surveys as a large proportion of countries relied on face-to-face interviewing before the pandemic. As shown in the UN Statistics Division survey of national censuses¹⁶, around 80 per cent of the respondent countries had to postpone their censuses planned for 2020 or 2021. Similarly, 96 per cent of the countries stopped face-to-face survey data collection, either fully or partially, in May 2020.¹⁷

24. For countries without comprehensive CRVS, censuses and surveys have been regularly used to collect mortality data, hence with a potential to contribute to the better understanding of deaths related to the pandemic. However, the value of these two data sources was not fully realized during the pandemic.

25. For examples, censuses to be carried out in 2022 (mostly postponed from 2020 or 2021) could be used to collect deaths occurred during the pandemic, i.e., 2020-2021 if the household death questions expand its reference period to 2 years or even longer. If the date of death is collected, it is possible to produce deaths occurred for the pre- and during-COVID period.

26. It is still unclear how countries will be collecting mortality data through their forthcoming censuses but practices in the 2010 round could shed some light given that most countries tend to keep similar questions from one census round to another for data comparability purposes. As shown in Chapter 3, 86% of the 76 countries that included household death question in their 2010 round of censuses used the 12-month reference period; and only one-third of the 76 countries included the date of death question. In a recent Expert Group Meeting carried out by the UN Statistics Division¹⁸, most NSOs were rather conservative regarding changing census questionnaires. This is of course a reasonable response as data from population censuses are for planning purpose and should not pick up short-term fluctuations as impacted by COVID-19. Any changes introduced to census questionnaire need to be thoroughly tested and could be difficult to implement during the pandemic.

27. On the other hand, even though face-to-face interviewing has stopped for most countries during the pandemic, almost all of them managed to carry out at least 1 survey with other mode of data collection such as telephone. According to a compilation of the Inter-Secretariat Working Group on Household Surveys, more than 500 surveys have been carried out in 180 countries with the support from its

¹³ United Nations (2017), Principles and Recommendations for Population and Housing Censuses, Revision 3, Statistical Papers (Ser. M), UN, New York, <https://doi.org/10.18356/bb3ea73e-en>.

¹⁴ United Nations publication, Sales No. E.98.XVII.8.

¹⁵ United Nations publication, Sales No. E.07.XVII.8.

¹⁶ Impact of COVID-19 on 2020 round population and housing censuses, <https://unstats.un.org/unsd/demographic-social/census/COVID-19/>

¹⁷ United Nations Statistics Division and World Bank. (2020a). Monitoring the State of Statistical Operations under the COVID-19 Pandemic, highlights from the third round of a global COVID-19 survey of National Statistical Offices (NSOs). Available at : <https://covid-19-response.unstatshub.org/survey/covid-19-nso-survey-report-3.pdf>

¹⁸ The Second United Nations Expert Group Meeting on the Impact of the Covid-19 Pandemic on Conducting Population and Housing Censuses and on Census Data Quality Concerns, <https://unstats.un.org/unsd/demographic-social/meetings/2021/egm-covid19-census2/>

members.¹⁹ The majority of the COVID-19 impact surveys (80%) focus on the socio-economic impact at household level. Around 30% of the surveys monitor access to health services and less than 20% address physical and mental health.²⁰

28. A survey of National Statistical Offices, jointly carried out by UN Statistics Division, Paris 21 and the World Bank in 2021, showed that out of 101 countries that responded to a question on the collection of excess COVID mortality data, 53 generated data from CRVS and 6 either carried out a survey to measure mortality or included mortality questions in existing surveys. One main challenge related to the collection of adult mortality data in surveys is the limit in sample size. Most of the COVID-19 impact surveys mentioned above are relatively small – ranging from a few hundred to a few thousand households.

Table 2. Sources of data on excess COVID-19 mortality, results of the survey of NSOs on “Cape Town Global Action Plan Implementation Review”, October 2021

Region	Total number of countries	Total number of countries reported death statistics from CRVS for 2019 and 2020	Total # responded to COVID Qs	Generated data from civil registration and vital statistics	Carried out a survey to measure mortality	Included mortality questions in existing surveys	Carried out demographic analysis to estimate the excess mortality using existing data sources	Other, including any innovative approach
Central and Southern Asia	14	3	9	1				1
Eastern and South-Eastern Asia	16	7	12	6			1	2
Europe and Northern America	45	36	31	27	1		9	4
Latin America and the Caribbean	33	7	13	6		1	3	
Northern Africa and Western Asia	23	8	14	10			2	
Oceania (excluding Australia and New Zealand)	12	0	0					
Sub-Saharan Africa	48	3	22	3	1	3	1	1
Australia and New Zealand	2	2						
All regions	193	66	101	53	2	4	16	8

¹⁹ Inter-Secretariat Working Group on Household Surveys, 2022. Updated monthly.

<https://unstats.un.org/iswghs/task-forces/covid-19-and-household-surveys/COVID-19-impact-surveys/>

²⁰ UN Statistics Division and the World Bank, August 2020. Monitoring the State of Statistical Operations under the COVID-19 Pandemic.

DRAFT

2 OVERVIEW OF METHODS FOR ESTIMATING ADULT MORTALITY FROM CENSUSES AND SURVEYS

2.1 Introduction and background

30. This chapter will briefly summarize methods available for estimating adult mortality from censuses and surveys. (to be extended)

2.2 Estimation methodologies – brief overview and links to resources

2.2.a *Death distribution methods for evaluating and adjusting recorded deaths by age and sex*

31. Tabulations of household deaths by age and sex collected in censuses or surveys can be used, together with tabulations by age and sex of the corresponding population, to calculate age-specific death rates that can be used for mortality analysis. However, mortality estimates obtained using these require careful evaluation and possible adjustment.

32. In order to obtain the expected number of deaths in the population with defective data or to test the quality of mortality data, the most common alternative is the Death Distribution Methods. These methods evaluate coverage of deaths counts age distribution relative to population age distribution (Hill, 2017; Hill, You and Choi, 2009).²¹ When mortality rates are corrected by rescaling according to the degree of under-registration, more correct mortality measures are obtained than those that have not been corrected.

33. The death distribution methods make several strong assumptions: that the population is closed to migration, that the completeness of recording of deaths is constant by age, that the completeness of recording of population is constant by age, and that ages of the living and the dead are reported without error. These are strong assumptions that should be considered and discussed in the possible application of the methods during the pandemic years (see Helleringer and Queiroz, 2021).²²

34. Two versions of these methods, the Brass Growth-Balance Method²³ and the Preston-Coale Method²⁴ are based on data from a single census. The methods to be discussed at more length here require data from two censuses: General Growth Balance (GGB), proposed by Hill (1987)²⁵, the Synthetic Extinct Generations method (SEG) proposed by Bennett and Horiuchi (1981)²⁶, and the adjusted Synthetic Extinct Generations method (SEG-adj) proposed by Hill, You and Choi (2009). For these “two-census” versions of the methods, it should be noted that the method compares the age distribution of the deaths to the intercensal population change; thus, it estimates the completeness of recording between censuses, not at the beginning or end of the intercensal period.

35. All three methods have very similar data requirements:

²¹ Hill, K., You, D., and Choi, Y. (2009). Death distribution methods for estimating adult mortality: Sensitivity analysis with simulated data errors. *Demographic Research* 21(9): 235–254. doi:10.4054/DemRes.2009.21.9.

²² Helleringer, S. and Queiroz, B. Measuring excess mortality due to the COVID-19 pandemic: progress and persistent challenges *International Journal of Epidemiology*, December 2021. DOI:10.1093/ije/dyab260

²³ <https://demographicestimation.iussp.org/content/brass-growth-balance-method>

²⁴ <https://demographicestimation.iussp.org/content/preston-coale-method>

²⁵ Hill, K. (1987). Estimating Census and Death Registration Completeness. *Asian and Pacific Population Forum* 1(3):8-13: 23-24.

²⁶ Bennett, N.G. and Horiuchi, S. (1981). Estimating the Completeness of Death Registration in a Closed Population. *Population Index* 47(2): 202-221. doi:10.2307/2736447

- a. Population counts by age and sex at two successive dates. It is preferable to have age structure obtained from census data within a reasonable period of time (i.e., around 5 or 10 years between censuses, and ideally spaced by well under 20 years).
- b. Death counts by age and sex. This information can come from, in general, two data sources.
 - i. Vital registration system: In general, it is preferable to have information from all intercensal years, but it is possible to work with fewer time points. In general, death counts are used as the intercensal average within each age group.
 - ii. From household surveys or censuses asking questions about deaths in the past 12 months, or some other fixed period of time. There are two possibilities to work with census data.

36. The first method, GGB, is derived from the basic demographic balancing equation, an identity stating that the growth rate of the population is equal to the difference between its entry rate (births) and exit rate (deaths). This is key because the population is assumed closed, making all entries due to births and exits due to deaths. The basic principle of the method is that the growth rate of the population (or a segment of the population above certain age) should be equal to the difference between the entry rate (*birthday* rates at each age) and exit rates (death rates). In a closed population, entry into the population of age x and higher is given by the population surviving until at least exact age x , and exits consist of the deaths of people of at least age x . This identity therefore holds for open-ended age segments $x+$. In a closed population entries are the number of people reaching exact age x in a particular period of time. The *birthday* rate for the age segment $x+$ minus the growth rate for the age segment $x+$ provides a residual estimate of the death rate for age $x+$. In other words, when two or more censuses are available, the growth rate for each age group can be calculated, and the stability assumption is no longer necessary. In this method, both the intercensal death registration coverage and the relative coverage of the enumeration of two censuses are estimated simultaneously.

37. The Synthetic Extinct Generation method, SEG, uses age-specific growth rates to transform an age distribution of deaths to an age distribution of a population. The basic idea is relatively straightforward: considering the number of people at a given age x in any population at time t , if these people are followed until death, it is tautologically true that the total number of future deaths in ages x and higher of this population is equal to the initial number of people who were of age x , at time t . If the population is stable and closed, the number of deaths of people currently aged x that will occur in the future can be estimated based on the current number of deaths recorded from age x , at time t . Thus, if the number of deaths above the age x in time t can be estimated by the number of deaths observed in a given year, rather than following people to death, we can approximate those future deaths using a relationship to the current number of deaths.

38. Since in a closed population, the observed deaths above age x are equal to the population of age x , adjusted by the age-specific rate of population growth, the growth-adjusted deaths in age $x+$ give an indirect estimate of the population aged x . The extent of death registration coverage is given by the ratio of deaths estimated by the population above the age x to the observed population above the age x .

39. Hill, You, and Choi (2009) consider that the GGB is more robust in simulations with errors in age declaration in the census and deaths, when the population is not closed (migration flows), or when there is differential coverage in the two censuses. However, in the simulations where census coverage varied over age, the method was very sensitive, overestimating the coverage of the death registry. The estimate is also affected when death record coverage increases with age, which also overestimates the coverage. Hill, You

and Choi (2009) observed that the SEG method is relatively robust in the presence of age declaration errors in the census and death records, and also when the difference in census coverage varies by age. On the other hand, the method produces substantially biased estimates in the presence of migration. When a population is affected by emigration, the estimated growth rate will be lower than that estimated in the absence of migration, underestimating the coverage substantially. Immigration will have the opposite effect, overestimating the calculated growth rate and increasing the estimated coverage of the death registration system.

40. Hill, You and Choi (2009) suggest that a combination of the GGB and SEG methods may be more robust than an application of the two methods separately. The adjusted method consists of two steps: 1) Estimate the change in the population enumeration (k_1/k_2) using the GGB method, and use this ratio to align the completeness of both censuses, and 2) then apply the SEG method using the adjusted population counts to estimate mortality registration coverage. The adjusted method was first suggested by Bennett and Horiuchi (1981) and involved adding a constant, derived from the censuses coverage over time, to the age specific growth rates.

41. The assumption of both the SEG and GGB methods that the population is closed to migration is also of importance for countries that have experienced net emigration or immigration in recent decades. Both the SEG and GGB methods use information on deaths and growth rates accumulated above a series of ages x . If there is some age x above which net migration is negligible, the performance of the methods above that age will be unaffected or less affected.

42. Caveats with these methods: (a) It should be noted that there is no gold-standard to be adopted and the different methods can show different results, due to violation of certain assumption and other problems; (b) assumption of closed population is more complicated to hold for sub-national level analysis; (c) there are no studies about the sensitivity of assumption during the pandemic – one main question is related to the quality of the census that took place during or just after the pandemic.

2.2.b *Indirection estimation based on survival of parents*

43. Orphanhood methods estimate the mortality of adult women and men indirectly from data on the survival of respondents' parents, gathered through the questions "Is [respondent's] mother alive?/Is [respondent's] father alive?"²⁷ Using the responses from different age groups relative to the mean age at which mothers give birth in the population, the methods produce a series of adult mortality estimates that refer to a range of dates before the census or survey. The method also requires an estimate of the number of births in the year preceding the census or survey, by five-year age group of mother, and an estimate of the difference between ages of men and women having children. In censuses, the questions on survival of parents are typically asked for household members of all ages, allowing for estimation of the full time series possible through the method. However, if an inquiry only asked about the orphanhood of children, it is possible to produce point estimates of women's and men's mortality a few years earlier.²⁸

44. The utility of orphanhood data for assessing rapid or recent changes in mortality, such as that due to COVID-19, may be limited. Because the date of death is not collected, death could have occurred any time between the respondent's birth and when they were interviewed, and the method produces a

²⁷ Timaeus, I. (2013) Indirect estimation of adult mortality from orphanhood, <https://demographicestimation.iussp.org/content/indirect-estimation-adult-mortality-orphanhood>, and United Nations (2002) Methods for Estimating adult mortality. ESA/P/WP.175.

²⁸ See, for example, analysis using DHS data on orphanhood of children in Menashe-Oren, A. and Stecklov, G. (2018). Urban–rural disparities in adult mortality in sub-Saharan Africa. *Demographic Research*, Vol. 39, pp. 136-176

smoothed time series of estimates. Thus, the orphanhood method cannot capture short-term mortality crises. In addition, the most recent time point that can be estimated is a few years before the survey, based on responses of children aged 5-14. Asking a more detailed parental survival history, as suggested by Adjiwanou et al 2020, may offer greater scope for assessing rapid changes.

2.2.c *Direct estimation from sibling survival history*

45. Estimates of adult mortality can be calculated from data supplied by adult respondents on the survival status of their sisters and brothers.²⁹ Modules on “sibling histories” ask each respondent for the name, sex, age, survival status and, if dead, age at and year of death of each of their siblings born to the same mother. The data on deaths by time period and five year age group, and on “sister-years” or “brother-years” of exposure in a given time period, permit the calculation of age-period death rates that can be used to derive other mortality indicators.

46. Because of the complexity of these questions and the required training of field staff, full sibling histories have rarely been collected apart from the Demographic and Health Surveys programme. Because a fairly small number of sibling deaths will be reported in any household survey, the estimates are subject to large sampling error. The topic of biases that could arise from issues such as mortality clusters within sibships, multiple reporting of siblings, differential mortality by sibship size, or differential reporting by sex of respondent is covered by an extensive literature.³⁰

2.2.d *More recent techniques such as the Network Survival Method and others - Forthcoming*

2.3 Censuses and surveys as a source of evidence for estimating mortality in other health crises - Forthcoming

²⁹ Timaeus, I. (2013). Estimation of adult mortality from sibling histories, <https://demographicestimation.iussp.org/content/estimation-adult-mortality-sibling-histories>, and United Nations (2002) Methods for Estimating adult mortality. ESA/P/WP.175.

³⁰ For a summary, see Timaeus, I. (2013). Estimation of adult mortality from sibling histories. <https://demographicestimation.iussp.org/content/estimation-adult-mortality-sibling-histories>

3 COLLECTING ADULT MORTALITY DATA IN CENSUSES

48. There are very few countries in low- and middle-income countries with high level of death registration systems. As shown in Chapter 1 only 62 per cent of the countries have death coverage that is of 75% or more. For countries that do not have a good death registration, public health planning is harmed by data availability and quality. In the case of the Covid-19 pandemic, data limitation affects estimating the impact of the pandemic and keeping track of it. Even countries with established CRVS system suffer with the quality of them, such as Peru and Ecuador³¹.

49. In recent years, many countries around the world have included questions related to mortality in the censuses. In these countries, it was included a question on the occurrence of death of a member of the household in the last 12 months and the sex and age of the deceased. From this information, it is possible to derive basic mortality measures and construct a life table. In all cases, however, it is important to evaluate the quality of data.

50. One of the advantages of the census is that it allows the construction of information at sub-national and for population sub-groups and processing data crossing of variables not available in vital records, such as, for example, the occupation and educational level. With these data, it is feasible to study social differentials in mortality, which is not very feasible with vital statistics data for most countries in the region.

51. Inclusion of mortality questions in census has encouraged studies of mortality in countries. [Table 3](#) below shows a list of studies in Latin America based on data from national population censuses. Despite its limitations, census data still offer an opportunity to study regional and/or socioeconomic mortality differentials, more complex to address with other sources. Census-derived mortality data have two important advantages: they open a great opportunity for mortality studies in small areas and according to socio-economic differentials and their summary measures use numerators and denominators from the same source. At the same time, the inclusion of this information in the censuses, due to its low cost and ease of application, is an important source of information, not only in the case of less developed or developing countries, which do not have a system with proper registration.

Table 3. Studies using census question to study mortality in Latin America, including information on country and research question

Authors	Country of Study	Topic
Queiroz and Sawyer (2012)	Brazil	Evaluation of data using different methods
Silva, Freire and Pereira (2016)	Brazil and regions	Mortality differentials by educational level
Queiroz (2011)	Honduras	Regional differences in maternal mortality
Hill <i>et. al.</i> (2009)	Honduras, Paraguay and Nicaragua	Estimates of maternal mortality
Leone (2014)	Honduras, Paraguay and Nicaragua	Regional differences in maternal mortality
Ribeiro, Turra and Pinto (2016)	Brazil	Mortality differentials by educational level

³¹ Impact of COVID-19 on 2020 round population and housing censuses - Responses to the 2nd UNSD survey on the impact of COVID-19 (December 2020-January 2021) - Overall impact, <https://unstats.un.org/unsd/demographic-social/census/COVID-19-SurveyT2-1/>

Pereira and Queiroz (2016)	Brazil and regions	Socioeconomic differences in Young adults mortality
Barbosa, Mendes, Queiroz y and Ventura (2017)	Brazil	Mortality differentials by ethnic groups
Castro, Fajnzylber, Fortunato (2017)	Brazil and El Salvador	Mortality differentials by socioeconomic status
Brizuela (2005)	Paraguay	Small área mortality estimates

Source: Queiroz, Bernardo Lanza, and Nicolás Sacco. "¿ Es relevante incorporar la medición de la mortalidad en los censos de América Latina y el Caribe?." *Revista Brasileira de Estudos de População* 35 (2018)

3.1 International recommendations on collecting data on adult mortality through population and housing censuses

52. Population and housing census provides an opportunity to collect data on adult mortality at national and subnational levels in a cost-effective manner, through questions on household deaths and maternal and parental orphanhood. The extent to which mortality can be adequately measured from census data is largely dependent on the inclusion of relevant questions, questionnaire design and the overall quality of censuses.

53. Household deaths in the past 12 months is a core topic³² and maternal and parental orphanhood is an additional topic in the *United Nations Principles and Recommendations for Population and Housing Censuses Revision 3* (referred to as “*P&R Revision 3*” hereafter)³³. The data collection about household members who died in the last year would be a unique opportunity for estimating the level and pattern of mortality at subnational geographic areas.

54. Information on household deaths, by date, sex and age, in the 12-month period prior to the census is collected from the head of the household (or household reference person). Information on maternal orphanhood and paternal orphanhood is collected for each person in the household regardless of age.

55. This chapter provides an overview of national practices in collecting information on adult mortality through censuses, focusing on the 2010 and 2020 round of censuses. Based on the recommendations in the *P&R Revision 3*, this chapter discusses adult mortality in two sections: household deaths in the past 12 months (or some other reference period) and maternal or paternal orphanhood.

3.1.a Household deaths

56. The *P&R Revision 3* suggests that information on household deaths be collected from the head of the household (or household reference person) with details including name, sex, age, and date of death (day, month, year) for each deceased person. Ideally, information on household deaths should be collected for the 12-month period prior to the census date with a precise reference period specified to avoid any

³² Core topics are those of common interest and value to countries and also of importance in enabling comprehensive comparisons of statistics at international level. Additional topics refer to those that are needed to meet specific national needs. United Nations (2017), *Principles and Recommendations for Population and Housing Censuses, Revision 3*, Statistical Papers (Ser. M), UN, New York, <https://doi.org/10.18356/bb3ea73e-en>. Para. 4.418.

³³ United Nations (2017), *Principles and Recommendations for Population and Housing Censuses, Revision 3*, Statistical Papers (Ser. M), UN, New York, <https://doi.org/10.18356/bb3ea73e-en>.

misinterpretation of the date. A reference period defined in terms of a festive, historic or a natural disaster date for each country is also sensible.

57. Two follow-up questions regarding the cause of death can also be asked after ascertaining the basic information about every deceased person:

- 1) Was the death due to an accident, violence, homicide or suicide?
- 2) If the deceased was a woman aged 15³⁴ to 49, did the death occur while she was pregnant or during childbirth or during the six weeks after the end of pregnancy?

58. Data derived from the household death question can help assess trends in levels, and some causes, of adult mortality. Both external and pregnancy-related deaths can provide valuable information for countries where no other sources of information to systematically obtain causes of death are available. Of course, such information is approximate and must be interpreted with caution after careful evaluation and often adjustment.

3.1.b *Maternal or paternal orphanhood*

59. The *P&R Revision 3* also suggests an additional topic on maternal or paternal orphanhood to estimate adult mortality level by sex indirectly. For countries wish to include this topic in their censuses, information on maternal or paternal orphanhood should be collected from all individuals in the household regardless of age³⁵, and thus should be included in the individual form in the census.

60. Two questions should be asked, regardless of whether the mother and father are enumerated in the same household:

- 1) Whether or not the natural/biological mother of the person enumerated in the household is still alive at the time of the census?
- 2) Whether or not the natural/biological father of the person enumerated in the household is still alive at the time of the census?

3.2 Overview of country practices in collecting information on adult mortality

3.2.a *Overview of national implementation in collecting adult mortality in the 2010 and 2020 round of population censuses*

61. Overall, 195 out of 237 countries/areas conducted population and housing censuses in the 2010 round ([Table 4](#)). A total of 76 countries have asked questions related to household deaths: 32 of these countries are in Sub-Saharan Africa and 17 are in Latin America and the Caribbean. This question is not included by countries in Europe and Northern America.

62. A total of 31 countries included orphanhood questions. A large proportion of countries in Sub-Saharan Africa and Oceania asked questions on parental orphanhood (23 and 5, respectively). Only one country in each of the three regions asked orphanhood questions – Bangladesh in Central and Southern Asia, Sudan in Northern Africa and Western Asia, and Timor-Leste in Eastern and South-Eastern Asia. Countries in Europe and Northern America, and Latin America and the Caribbean did not collect data on parental orphanhood in their 2010 round of censuses.

³⁴ It may be appropriate in some countries to reduce the lower age limit by several years.

³⁵ This recommendation varies from practices of most household surveys when the question is only asked of children aged 0-17. More discussion about the age of respondents is available in Chapter 4.

Table 4. Number of countries that asked questions on household deaths and/or on maternal and paternal orphanhood, 2010 round (2005-2014), by SDG region

Region	Total # countries and areas with census Q	Household Deaths							Orphanhood		
		Total	Sex	Name	Age at death	Date of death	Cause of death	Maternal death	Total	Maternal	Paternal
Central and Southern Asia	10	5	5	3	5	0	2	4	1	1	1
Eastern and South-Eastern Asia	19	7	7	6	7	3	2	7	1	1	1
Europe and Northern America	41	0	0	0	0	0	0	0	0	0	0
Latin America and the Caribbean	42	17	17	6	17	5	1	9	0	0	0
Northern Africa and Western Asia	18	6	6	5	6	2	1	3	1	1	1
Oceania	25	9	9	2	9	8	2	7	5	5	5
Sub-Saharan Africa	40	32	32	19	32	8	11	28	23	23	23
All countries/areas	195	76	76	41	76	26	19	58	31	31	31

Source: United Nations Statistics Division national census questionnaire collection

63. **Table 4** also presents detailed breakdowns on whether countries have included the information recommended by the *P&R Revision 3* for the household deaths question. All 76 countries have asked the sex and age of the deceased. More than half of these countries asked for the name of the deceased and whether the death was pregnancy-related. About one-third of the 76 countries also included questions on the date of death and the cause of death. All countries asked for both maternal and paternal orphanhood.

64. As for the 2020 round of censuses (2015-2024), many planned censuses for the year 2020 and 2021 were interrupted by the pandemic³⁶. A total of 55 countries/areas have completed their data collection so far in the 2020 round (**Table 5**). Out of these 55 countries, 18 countries/areas included questions related to household deaths, with 8 of them also asked about orphanhood questions. Three Oceania countries – Kiribati, Fiji, and Palau - have only asked about orphanhood questions. No adult mortality questions were covered by countries in Europe and Northern America so far.

Table 5. Number of countries that asked questions on household deaths and/or on maternal and paternal orphanhood, 2020 round (2015-2024), by SDG region

Region	Total # countries and areas with census Q	Household Deaths							Orphanhood		
		Total	Sex	Name	Age at death	Date of death	Cause of death	Maternal death	Total	Maternal	Paternal

³⁶ Impact of COVID-19 on 2020 round population and housing censuses, <https://unstats.un.org/unsd/demographic-social/census/COVID-19/>

Central and Southern Asia	4	1	1	1	1	0	1	1	0	0	0
Eastern and South-Eastern Asia	11	5	5	4	5	1	3	4	1	1	1
Europe and Northern America	11	0	0	0	0	0	0	0	0	0	0
Latin America and the Caribbean	6	1	1	0	1	0	0	0	0	0	0
Northern Africa and Western Asia	3	2	2	2	2	0	0	2	0	0	0
Oceania	10	0	0	0	0	0	0	0	3	3	3
Sub-Saharan Africa	10	9	9	6	9	3	4	9	7	7	7
All countries/areas	55	18	18	13	18	4	8	16	11	11	11

Source: United Nations Statistics Division national census questionnaire collection

3.2.b Detailed of national practices in collecting adult mortality data in 2010 round censuses

65. This section provides a detailed review of each individual question asked related to household deaths and parental orphanhood in the 2010 round of national censuses. Country examples are provided to illustrate various forms that questions were formulated; and whenever relevant, a discussion is covered on how national practices conform with or deviate from the *P&R Revision 3* recommendations.

3.2.b.1 Household deaths

66. For countries splitting the census questionnaire into Individual and Household questionnaires, questions about household deaths are included in the Household questionnaire. When countries adopted a long and short form for their censuses, questions on household deaths can only be found in the long-form. In addition, all questions about household deaths are placed either in the middle or at the end of the census questionnaires.

67. [Table 6](#) below further summarizes the way questions were asked about household deaths. Out of 76 countries that included questions on household deaths in their 2010 round of censuses, 59 have structured questions in a separate section while the rest (17 countries) mixed household death questions with dwelling/housing condition questions. All countries in Sub-Saharan Africa and Eastern and South-Eastern Asia covered the household death questions in a separate section. More than two thirds of the countries in Central and Southern Asia, Latin America and the Caribbean, and Northern Africa and Western Asia also included household deaths in a separate section compared to only 1 out of 9 Oceanian countries. The following subsections will further explain the review results regarding the different formats each question has been following.

Table 6. Household death question formulation, 2010 round (2005-2014), by SDG region

Region	Total # countries and areas with census Q	Total	Separate section on household deaths	Screening question	12-month reference period	Precise reference date	Additional questions
Central and Southern Asia	10	5	4	5	3	0	3
Eastern and South-Eastern Asia	19	7	7	7	6	5	1
Europe and Northern America	41	0	0	0	0	0	0

Latin America and the Caribbean	42	17	11	17	16	8	4
Northern Africa and Western Asia	18	6	4	6	5	2	4
Oceania	25	9	1	9	5	1	0
Sub-Saharan Africa	40	32	32	30	30	16	9
All countries/areas	195	76	59	74	65	32	21

Source: United Nations Statistics Division national census questionnaire collection

3.2.b.1.1 Screening questions

68. A screening question is usually asked at the beginning to see whether there is any death in the household. If there was death in the household in the specified time period, the respondent will be prompted to additional questions about the deceased person. A screening question is helpful in avoiding confusion about whether a non-response to the household death question set was due to mistake (accidentally left blank or skipped) or because there was no death in the household. Almost all countries (74 out of 76) included a screening question, with two countries in Sub-Saharan Africa did not.

69. There are two types of screening questions in countries: a YES/NO type or an enumeration type. Majority of the countries included the screening question in the form of Yes/No (*Figure 1* (a), (b) and (d)), and the rest ask the total number of deaths occurred in the household over the given reference period (enumeration type, *Figure 1* (c)). The enumeration type is generally not recommended as respondents must recall and count which would require a heavy load of mental processing. As for questions asked in the YES/NO type, only a few countries provided an additional option for “Don’t know/Not Sure (DK/NS)” (*Figure 1*(d)).

Figure 1. Examples of household deaths screening questions and reference period

M01 Has any member of this household died in the past 12 months?	<input type="radio"/> Yes <input type="radio"/> No	IF NO, GO TO C01
--	---	------------------

(a) Ghana (GHA) 2010 census³⁷

4.3 Has any member of this household died since January 1, 2010?	<input type="radio"/> Yes <input type="radio"/> No (End Interview)
--	---

(b) Jamaica (JAM) 2011 census³⁸

³⁷ <https://unstats.un.org/unsd/demographic/sources/census/quest/GHA2010enH.pdf>

³⁸ <https://unstats.un.org/unsd/demographic/sources/census/quest/JAM2011enHs.pdf>

(H-11)	Did any deaths occur in this household in the last 12 months? I mean from September 2013 upto December 2013. What about from 1st January 2014 to 27th August 2014?
How many deaths occurred in this household between 24/08/2008 and 24/08/09 (last 12 months)?	D1
If '00' Skip to H-17	1= Yes 2= No 8= Don't know
<input type="text"/> <input type="text"/>	<input type="text"/>

(c) Kenya (KEN) 2009 census³⁹ (d) Uganda (UGA) 2014 census⁴⁰

Source: United Nations Statistics Division national census questionnaires collection

3.2.b.1.2 Reference period

70. The *P&R Revision 3* recommends a reference period of 12 months for reporting household deaths with a specific reference date (to help recalling). For example, instead of asking “Is there death in the last 12 months” it is preferable to ask “Is there death since 1 January 2014 (assuming the census date is 31 December 2014)”. Out of 76 countries that asked the household death question, only 65 countries used the 12-month threshold, and 32 countries provided a specific reference period.

71. *Figure 1* (a) is the most common format where countries only asked “in the past 12 months” without specifying a specific starting date for reporting. Since countries usually take more than one day to complete the census data collection, asking questions without a fixed reference date could easily cause the miscounting and inconsistency of the results.

72. *Figure 1* (b) is a typical example for countries that included a specific reference starting date. Some other countries also used a festive date such as “Independence Day” as a reference date, which is also acceptable. Note that this formulation may not correspond to an exact 12-month reference period. For example Jamaica (*Figure 1* (b)), with its census period as 5 April 2011-31 Aug 2011, household deaths captured in its census were for a period of 15 to 20 months. Adjustment needs to be done when deriving number of deaths occurred within one year. However, if the date of death is also included in the census, the 12-month conversion can be done later during the data processing stage.

73. *Figure 1* (d), overall, represents an ideal example for both screening and referencing as it is structured as a YES/NO question for screening and provided both the length and exact dates of the reference period.

3.2.b.1.3 Name

74. Asking for names of the deceased person generally improves recall, therefore it is recommended variable to be included in the census questionnaire. Forty-one out of 76 countries followed the *P&R*

³⁹ <https://unstats.un.org/unsd/demographic/sources/census/quest/KEN2009en.pdf>

⁴⁰ <https://unstats.un.org/unsd/demographic/sources/census/quest/UGA2014enHh.pdf>

Revision 3 recommendations to record the name of the deceased. Examples of how names are asked in censuses are shown in [Figure 2](#).

Figure 2. Example of asking names of the deceased in household deaths question

(a) Uganda (UGA) 2014 census⁴¹

(b) Kenya (KEN) 2009 census⁴²

Source: United Nations Statistics Division national census questionnaire collection

3.2.b.1.4 Sex

75. All 76 countries asked questions about the sex of the deceased with relatively consistent format of providing Male/Female options. The only exception is that two countries provided an extra option for “Don’t know/Not Sure (DK/NS)” ([Figure 3](#)).

Figure 3. Examples of census questions about household deaths by sex in different formats

(a) Kenya (KEN) 2009 census⁴³

(b) Belize (BLZ) 2010 census⁴⁴

Source: United Nations Statistics Division national census questionnaire collection

3.2.b.1.5 Age

76. Age of the deceased is also asked by all 76 countries, although in different ways. Some countries asked the age of the deceased ([Figure 4](#) (a)), while others asked for the date of birth of the deceased ([Figure 4](#) (b)). A few countries asked both the age and the date of birth of the deceased ([Figure 4](#) (c)).

77. As for the format to follow in completing the question, most countries provided instruction to complete “0/00” if the age of death is under 1 year of age. For questions on the date of birth of the

⁴¹ <https://unstats.un.org/unsd/demographic/sources/census/quest/UGA2014enHh.pdf>

⁴² <https://unstats.un.org/unsd/demographic/sources/census/quest/KEN2009en.pdf>

⁴³ <https://unstats.un.org/unsd/demographic/sources/census/quest/KEN2009en.pdf>

⁴⁴ <https://unstats.un.org/unsd/demographic/sources/census/quest/BLZ2010en.pdf>

deceased, most countries only requested the month and year of the birth as in Figure 4 (b) and (c), as oppose to specific day, month and year as suggested by the *P&R Revision 3*. Some countries also provided an extra option for “Don’t know/Not sure”.

78. Iran asked about the age of the deceased as “Has the dead person been aged between 10 to 60?”, which is quite different from other countries. It is not clear why the census was particular interested in deaths occurred within this age group, but it is a challenge to use the data to analyze the age distribution of the decease people because of the age grouping.

Figure 4. Examples of asking age of the deceased in household deaths question

(a) Kenya (KEN) 2009 census form (H-14) details:

(H-14)
Age
How old was <NAME>'s at his/her death?
In completed years
Code "00" for less than 1 year
Code "99" for DK

(b) Algeria (DZA) 2008 census form (DC 4) details:

DC 4
تاريخ ميلاد المتوفى Date de naissance du décédé
سجل شهر و سنة ميلاد المتوفى Inscrire le mois et l'année de naissance du décédé
[] [] [] [] [] [] [] [] [] []

(a) Kenya (KEN) 2009 census⁴⁵

(b) Algeria (DZA) 2008 census⁴⁶

(c) Benin (BEN) 2013 census form details:

DATE DE NAISSANCE DU DEFUNT	AGE AU DECES
Inscrire le mois et l'année de naissance M=Mois; A=Année	Encercler le code de l'unité (1=J=Jour, 2=M=Mois, 3=A=Année), puis inscrire l'âge au décès
(34)	(36)
M [] [] [] [] A [] [] [] []	1 J [] [] 2 M [] [] 3 A [] []

(c) Benin (BEN) 2013 census⁴⁷

Source: United Nations Statistics Division national census questionnaire collection

⁴⁵ <https://unstats.un.org/unsd/demographic/sources/census/quest/KEN2009en.pdf>

⁴⁶ <https://unstats.un.org/unsd/demographic/sources/census/quest/DZA2008arfrHh.pdf>

⁴⁷ <https://unstats.un.org/unsd/demographic/sources/census/quest/BEN2013frHh.pdf>

3.2.b.1.6 Date of death

79. Only one third of the 76 countries included household death questions in the 2010 round of censuses asked for the date of death. It is unfortunate that this particular question is not being covered well by countries. It is an important question to understand how deaths are distributed within a year. Data on the date (or at least month and year) of death is particularly useful under situations like COVID-19.

80. A number of countries did not indicate the format for recording day, month and year (e.g., MM/YYYY, [Figure 5\(b\)](#)). The *P&R Revision 3* recommends recording exact date (day, month and year) of death as [Figure 5 \(b\)](#) shown. However, it could be difficult to recall the exact date or to retrieve the death registration document for verification purposes, some countries only collect month and year ([Figure 5 \(a\)](#)).

Figure 5. Examples of asking date of death in household deaths question

(a) Brazil (BRA) 2010 census⁴⁸ (b) Turkey (TUR) 2011 census⁴⁹

Source: United Nations Statistics Division national census questionnaire collection

3.2.b.1.7 Cause of death other than maternal death

81. Less than 20 countries asked for the cause of death within the question set on household deaths. Given the challenges in defining causes of death, which is usually done by a health professional, the *P&R Revision 3* recommends asking only whether death was due to external causes such as accident, violence, homicide or suicide. However, very few countries followed this suggestion. Instead, some included an extended list of causes of deaths on the census questionnaire.

82. As shown in two examples provided in [Figure 6](#), Cambodia provided a long list of causes of death while Vietnam asked to specify cause of death other than diseases and accidents. Ghana (see in [Figure 6 \(c\)](#)), on the other hand, followed the P&R recommendations and used general approach in asking the cause of death.

83. Additionally, it is worth mentioning that for countries giving options to answer the cause of death questions, the list of options should be located next to the question or at least at the same page. Also, for options given in abbreviation, it is better not to use it other than the common ones like DK/NS.

Figure 6. Examples of asking causes of deaths in household deaths question

⁴⁸ <https://unstats.un.org/unsd/demographic/sources/census/quest/BRA2010enl.pdf>

⁴⁹ <https://unstats.un.org/unsd/demographic/sources/census/quest/tur2011en.pdf>

Codes for col. 6 Cause of Death		
ILLNESS	ACCIDENT	NOT KNOWN
01: Fever	12: Land mine	16: Don't know
02: Diarrhoea	13: Road Accident	
03: Tuberculosis	14: Drowning	
04: Heart disease	15: Other accident	
05: Dengue fever		
06: Malaria		
07: Tetanus		
08: HIV/AIDS		
09: Pregnancy complication		
10: Delivery complication		
11: Other illness		

(a) Cambodia (KHM) 2008 census⁵⁰

(b) Vietnam (VNM) 2009 census⁵¹

(c) Ghana (GHA) 2010 census⁵²

40. What is the cause of [NAME]'s death?

L

DISEASES	1	<input type="checkbox"/>
WORKING ACCIDENT	2	<input type="checkbox"/>
TRAFFIC ACCIDENT	3	<input type="checkbox"/>
OTHER ACCIDENT	4	<input type="checkbox"/>
OTHER	5	<input type="checkbox"/>

(SPECIFY)

D

Was the death due to accident, violence, homicide or suicide?

Yes
 No

Source: United Nations Statistics Division national census questionnaire collection

3.2.b.1.8 Pregnancy-related death

84. A total 58 out of 76 countries included the optional questions on pregnancy-related deaths and all countries asked whether deaths occurred during: pregnancy, childbirth, or six weeks after the end of pregnancy. The example in [Figure 7\(a\)](#) represents a common formulation of the question on pregnancy-related death, following the *P&R revision 3* recommendations with appropriate age limits.

85. Some countries ask the question differently compared to the recommendations, in relation to the women's age, marital status and the length of weeks after the end of pregnancy. For example, the question in [Figure 7\(b\)](#) does not have a lower age limit and includes married women only. Example in [Figure 7\(c\)](#) records death within two months after delivery, instead of 6 weeks as recommended. Example in [Figure 7\(d\)](#) covers the three stages (during pregnancy, during childbirth and after pregnancy) in one long sentence, which might be challenging to process for respondents.

⁵⁰ <https://unstats.un.org/unsd/demographic/sources/census/quest/KHM2008en.pdf>

⁵¹ <https://unstats.un.org/unsd/demographic/sources/census/quest/VNM2009enL.pdf>

⁵² <https://unstats.un.org/unsd/demographic/sources/census/quest/GHA2010enH.pdf>

Figure 7. Examples of asking whether pregnancy-related in household death question

If death of Woman aged 12-49, ...		
Did the death occur while pregnant? 1. Yes 2. No	Did the death occur during childbirth? 1. Yes 2. No	Did the death occur during the 6 weeks period following the termination of pregnancy, irrespective of the way the pregnancy was terminated? 1. Yes 2. No

If deceased was an ever-married woman below 50 years old
Did _____ die during pregnancy, giving birth, or within 6 weeks of delivery?
Enter code in the box 1 - During pregnancy 2 - Giving birth 3 - Within six weeks of delivery 4 - No, did not die during pregnancy, giving birth or within six weeks of delivery 5 - Do not know

(a) Rwanda (RWA) 2010 census⁵³

(b) Afghanistan (AFG) 2011 census⁵⁴

H: Information About Deaths In the Household
(H-16)
For females who died at age 12 - 49 years
Did the death occur... 1=During pregnancy? 2=During delivery? 3=Within two months after delivery? 4=Other 9=DK

(c) Kenya (KEN) 2009 census⁵⁵

E
FOR ONLY FEMALES 12 - 54 YEARS OLD
Did the death occur whilst pregnant, during delivery, or within 6 weeks after the end of a pregnancy or child birth?
<input type="radio"/> Yes <input type="radio"/> No

(d) Ghana (GHA) 2010 census⁵⁶

Source: United Nations Statistics Division national census questionnaire collection

3.2.b.1.9 Additional questions under household deaths

86. Out of the 76 countries that have included household deaths question, 21 also included additional sub-questions. Two most commonly asked questions were: (a) death registration (9 countries, one example shown in [Figure 8\(a\)](#)); and (b) relationship to the head of household (5 countries, example shown in [Figure 8\(b\)](#)).

Figure 8. Examples of additional questions about household deaths

⁵³ <https://unstats.un.org/unsd/demographic/sources/census/quest/RWA2012enHh.pdf>

⁵⁴ <https://unstats.un.org/unsd/demographic/sources/census/quest/AFG2011enL.pdf>

⁵⁵ <https://unstats.un.org/unsd/demographic/sources/census/quest/KEN2009en.pdf>

⁵⁶ <https://unstats.un.org/unsd/demographic/sources/census/quest/GHA2010enH.pdf>

(H-13)
Was this death notified?
1=Yes 2=No 9=DK

Relationship to Head of Household (Use Code given for col.3 of Par 2)
--

(a) Kenya (KEN) 2009 census⁵⁷

(b) Cambodia (KHM) 2008 census⁵⁸

Source: United Nations Statistics Division national census questionnaire collection

87. Different additional questions asked by countries are as follows:

- Death registration: Was this death notified? / Death certificate? / Death declaration? / Was the death registered? (Armenia, Colombia, Congo, Honduras, Kenya, Namibia, Nicaragua, Senegal, Turkey)
- Relationship to the head of household? (Bhutan, Botswana, Cambodia, State of Palestine, Turkey)
- Are there more than 10 deaths in this household/ Institution during the past 2 years? (Afghanistan)
- Where did the deceased person die? (Bangladesh)
- Place of burial? (Benin)
- Marital situation at death? (Benin)
- Occupation at time of death? (Bhutan)
- What was the deceased person's usual place of residence at time of death? (Botswana)
- Did anyone in this household who was too ill to perform their duties for 3 months die in the past 12 months? (Cameroon)
- Did the deceased die in the Cayman Islands or abroad? (Cayman Islands)
- Si M4=00 (moins de 1 an): age exact du bebe decede? (If the deceased person is less than 1 year old, what exact age of the baby when he/she died?) (Djibouti)
- How many members of the household have passed away in the last 12 months? (South Africa)
- Nationality (Saudi or Non-Saudi)? (Saudi Arabia)

3.2.b.2 Maternal and paternal orphanhood

88. Questions about maternal or paternal orphanhood are included in the census individual form as information should be collected from each person in the household regardless of age based on *P&R Revision 3*, with two questions asking whether each person's biological mother or father was still alive at the time of interview, respectively.

89. The proportion of respondents whose mother is surviving, or whose father is surviving, at the time of a census reflects the level of adult mortality. Higher mortality levels will result in lower proportions surviving, and lower mortality levels will result in higher proportions surviving. Procedures have been developed for estimating the level and trend of adult mortality during the years prior to a census.

⁵⁷ <https://unstats.un.org/unsd/demographic/sources/census/quest/KEN2009en.pdf>

⁵⁸ <https://unstats.un.org/unsd/demographic/sources/census/quest/KHM2008en.pdf>

90. As shown in *Figure 9* (a), two questions are asked to all household members about the survival of their parents. Note that in this particular example, the question does not specify that the parents should be “biological” or not. The category “Don’t Know/Not Sure (DK/NS)” is provided, which is sensible considering that census questionnaire is usually completed by one reference person and this person may not know the survival status of parents for all household members. The example in *Figure 9* (b) only asks the question to individuals of age 10-24. It is unclear why this age range was selected but this would certainly impact on the estimation of older age mortality. Limiting this question to individuals with certain age is also shown in seven countries (under 18, 0 – 30 or 10 – 24).

91. Several countries asked additional questions on whether the parents, if alive, are living in the household (Figure 9 (c)).

Figure 9. Examples of questions about maternal and paternal orphanhood

Orphanhood	
(P-22)	(P-23)
Is <NAME>'s father alive?	Is <NAME>'s mother alive?
1=Yes 2=No 9=DK	1=Yes 2=No 9=DK

PARENTAL SURVIVORSHIP	
10 - 24 YEARS	
Is.... mother alive?	Is.... father alive?
Yes=1 No=2 DK=3	Yes=1 No=2 DK=3
P13	P14

(a) Kenya (KEN) 2009 census⁵⁹

(b) Liberia (LBR) 2008 census⁶⁰

⁵⁹ <https://unstats.un.org/unsd/demographic/sources/census/quest/KEN2009en.pdf>

⁶⁰ https://unitednations.sharepoint.com/sites/DESA-POP/DataArchive/Forms/AllItems.aspx?e=2:Ok4IjA&at=9&CT=1634828138012&OR=OWA-NT&CID=ea15b0c2-b866-419a-258f-307ef419a035&id=%2Fsites%2FDESA-POP%2FDataArchive%2FLiberia%2F2008%20Census%2FLBR_2008_Census_Questionnaire.pdf&parent=%2Fsite%2FDESA-POP%2FDataArchive%2FLiberia%2F2008%20Census

ALL PERSONS

Is name's biological mother still alive?	Is she living in this household?	Is name's biological father still alive?	Is he living in this household?	What is
Y=YES N=NO (IF NO GO TO P12)	Y=YES, N=NO (IF YES, ENTER PERSON NUMBER)	Y=YES N=NO (IF NO GO TO P14)	Y=YES, N=NO (IF YES, ENTER PERSON NUMBER)	1: 2=Other is
P10	P11	P12	P13	

(c) Tuvalu (TUV) 2012 census⁶¹

Source: United Nations Statistics Division national census questionnaire collection

3.2.c Insights of country practices in the 2020 round of censuses

92. Based on a review of currently available census questionnaires for the 2020 census round, there has been no significant change on the type of questions asked on household deaths and parental orphanhood from the 2010 round. Noticeably, four countries - Equatorial Guinea, Jordan, Philippines and Sierra Leone – included questions on household deaths in the 2020 round but did not in the 2010 round.

93. None of the censuses conducted between 2020 and 2021 has adjusted questions related to household deaths or parental orphanhood to take into consideration the pandemic yet. Whether the remaining countries that have yet to conduct the census will tailor their census questions related to the pandemic is unclear.

3.3 Data quality issues

94. Questions on recent household deaths have several important advantages. In the absence of complete and accurate death registration data, they are the only possible source of information on the age pattern of adult mortality. However, it is generally believed that reporting of household deaths may not be complete and therefore, it might be necessary to estimate and adjust for unreported deaths.

95. Household deaths may be underreported for a variety of reasons, for example, enumerator`s training may not properly explain the questions on household deaths and respondents may be reluctant to report deaths or may be uncertain whether or not a death should be reported because they are uncertain when exactly it occurred. Another important reason for underreporting is related to dissolution of some households before the census is conducted. Deaths that occurred in those households will not be reported. Similarly, all deaths occurring in one-person households will not be reported. Young people who migrate from their homes of origin might be registered as belonging to more than one address, which can lead to an over-estimation of deaths among young people.

96. On the other hand, there is a possibility of reporting deaths that occurred before the reference period. Sometimes respondents may be unclear when the reference period began and ended. Therefore, it is crucial to ask a question for date of death for every deceased person to be able to select deaths that

⁶¹ <https://unstats.un.org/unsd/demographic/sources/census/quest/TUV2012enHhIn.pdf>

occurred in the reference period. Although the question on household deaths is about death events among household members, the respondent may include deaths of family members not usually living in the household, such as members of extended family members. This type of error will create over-counting of household deaths.

97. It may safely be assumed that the sex of deceased persons is accurately reported, but their ages at death may be less accurately reported than the ages of persons living in the household. Accurate reporting on age of deceased person and date of death is very important for reliable estimates of mortality indicators.

98. Another important common mistake is related to skipping questions about household deaths if this topic is sensitive or if the household deaths questions do not appear in a prominent position of the questionnaire. High quality trainings are necessary on building rapport with households, asking mortality-related questions properly, understanding the major skip patterns and recording the answers properly with the appropriate level of details. Training should be included on how to list all eligible household members and when to apply prompts or probes. The importance of and concepts related to household deaths and parental orphanhood should be properly conveyed to the enumerators. In addition to the quality of training, the role of supervisors in checking whether the death questions are fully completed is extremely important for improving the quality of data.

99. For newer topics for which there is limited experience, more testing would be required to ultimately determine whether their inclusion in the basic census questionnaire might be worthwhile.

100. For better identification and understanding of the limitations of the data, it should be evaluated against other available sources of data on mortality such as household surveys, sample registration, civil registration if any, and cemetery records etc. Although estimates of adult mortality using census data should be interpreted with care due to the large variability of data quality and little knowledge of the quality of such data. For example, since there is no complete civil registration system, it is not possible to validate the estimates or compared to other sources.

101. An assessment of the quality of age and sex data should be undertaken for the purpose of identifying and analyzing those age groups that are more susceptible to the effects of coverage errors and age misreporting. If age misreporting distorts the population distribution by age group and/or if there is a coverage error for specific age group(s), the census results should be adjusted for the known errors.

102. Early experience with questions on household deaths frequently resulted in high levels of omission, but recent developments in censuses, especially the use of electronic data collection technologies can play a significant role to improve the quality of data in the 2020 round of censuses and future censuses, compared to the past experiences in which data was collected mainly with paper questionnaires.

103. While it is probably unrealistic to expect complete reporting, increasing use of electronic data collection technologies, especially using tablets for data collection purposes, will have significant impact on data quality. Real-time quality checks during field enumeration will eliminate skipping errors and reduce missing data in the information collected through household deaths questions and maternal and parental orphanhood questions. Furthermore, application of built-in editing rules can significantly reduce errors in capturing information, such as date of death and age of deceased persons.

4 COLLECTING ADULT MORTALITY DATA IN HOUSEHOLD SURVEYS

104. Household survey is an important data source for adult mortality data especially for countries without a good civil registration and vital statistics system. Because of its ability to collect a large number of variables about dwelling units, households and members of the households, household surveys also have the potential to understand the association between demographic and social characteristics and the vital event, in this case, adult mortality.

105. Household surveys also have limitations in measuring adult mortality as mortality is usually a rare event and sample size would generally be a limiting factor to obtain estimates with reasonable accuracy.

106. Major household surveys that collect adult mortality data are Demographic and Health Surveys (DHS) supported by USAID and Multiple Indicator Cluster Surveys (MICS) supported by UNICEF.

107. The [DHS Program](#) has been implemented in overlapping five-year phases from 1984. Seven phases have been completed with Phase 8 started in 2018. With standard model questionnaires adopted by each country, the DHS Program is able to collect data that are comparable across countries. Since its inception, DHS has supported more than 400 surveys in over 90 countries. There are four core questionnaires in the DHS phase 8: Household Questionnaire, Woman's Questionnaire, Man's Questionnaire and Biomarker Questionnaire. Adult mortality questions are covered in household and Women's questionnaires.

108. The [MICS](#) programme started in the mid-1990s. Currently six phases have been conducted with MICS7 starting in 2022. MICS is a major data source on children and women. Since its inception the programme has covered around 350 surveys in 118 countries. There are 4 sections in MICS6 survey questionnaires – Household Questionnaire, Woman's Questionnaire, Man's Questionnaire and Questionnaire for Children under 5. Adult mortality questions are covered in household and Women's questionnaires.

109. Both DHS and MICS national surveys follow a set of model questionnaire but have flexibility to adapt to national circumstances and policy needs. This has a certain impact on adult mortality data collection, which will be detailed later. Both surveys also limit the age of respondents to the women's questionnaire to 15-49.

110. A number of other survey programmes also administer surveys that collect data on adult mortality. The Pan Arab Health Survey (PAPFAM) supports 16 Arab countries to collect data on family and reproductive health. Most PAPFAM surveys were carried out for earlier years (before 2007) but a number of recent surveys were also recorded (Morocco in 2017-2018; and Djibouti in 2012) A new survey programme named "Population-based HIV Impact Assessment (PHIA)", supported by the US started its implementation since 2014 and so far has covered 15 countries, mostly in sub-Saharan Africa. There are also national household surveys outside of these survey programmes –through either ad-hoc demographic surveys or integrated household surveys that are conducted regularly. This chapter only focuses on surveys that have been implemented since 2005 – earlier programmes such as the World Health Surveys are not included.

111. The chapter is structured around 3 sets of survey questions that could be used to produce estimates on adult mortality: (a) orphanhood (survival of biological parents); (b) household deaths; and (c) sibling survival. For each set of questions, description is provided on: the standard question

formulation recommended by the latest round of DHS and/or MICS and national deviations from the standard formulations; question coverage in countries since 2005 by these two survey programmes and surveys other than DHS and MICS; and the strength and limitations of each set of questions in measuring adult mortality.

112. With the understanding that question formulations are usually driven by national policy needs and vary across countries, standard questions by DHS and MICS are used here for illustration purposes because (a) the two survey programmes are covering a large proportion of countries on adult mortality data collection; (b) national data collection also tends to follow similar question formulation as suggested by DHS and MICS; (c) it is useful to have a reference point (i.e., DHS/MICS) and discuss how much deviations national practices might have from the reference.

113. Since household deaths question is not common in DHS/MICS surveys, only national example will be provided.

4.1 Orphanhood (survival of biological parents)

4.1.a Question formulation

114. The orphanhood (survival of biological parents) question typically targets children aged between 0 and 17 and asks whether the biological mother and father of the respondents are still alive at the time of the survey and if yes, whether they reside in the same household. Sometimes an additional question is asked on the usual residence of the biological parent (mother or father) if he or she does not live in the same household as the respondent. [Figure 10](#) shows the model questions suggested by the DHS phase 8. MICS6 standard questions on orphanhood also ask for the name of the primary caretaker if both biological parents died ([Figure 11](#)).

Figure 10. Model questionnaire for parental survivorship, DHS phase 8 household questionnaire

IF AGE 0-17 YEARS			
SURVIVORSHIP AND RESIDENCE OF BIOLOGICAL PARENTS			
12	13	14	15
Is (NAME)'s natural mother alive?	Does (NAME)'s natural mother usually live in this household or was she a guest last night? IF YES: What is her name? RECORD MOTHER'S LINE NUMBER. IF NO, RECORD '00'.	Is (NAME)'s natural father alive?	Does (NAME)'s natural father usually live in this household or was he a guest last night? IF YES: What is his name? RECORD FATHER'S LINE NUMBER. IF NO, RECORD '00'.
Y N DK 1 2 8 ↓ GO TO 14	<input type="text"/>	Y N DK 1 2 8 ↓ GO TO 16	<input type="text"/>

Source: https://www.dhsprogram.com/pubs/pdf/DHSQ8/DHS8_Household_QRE_EN_8Apr2020_DHSQ8.pdf

Figure 11. Model questionnaire for parental survivorship, MICS6 household questionnaire

HL11. Age 0-17?	HL12. Is (name)'s natural mother alive?	HL13. Does (name)'s natural mother live in this household?	HL14. Record the line number of mother and go to HL16.	HL15. Where does (name)'s natural mother live?	HL16. Is (name)'s natural father alive?	HL17. Does (name)'s natural father live in this household?	HL18. Record the line number of father and go to HL20.	HL19. Where does (name)'s natural father live?	HL20. Copy the line number of mother from HL14. If blank, ask: Who is the primary caretaker of (name)? If 'No one' for a child age 15-17, record '90'.
1 YES 2 <u>NO</u> ↻ Next Line	1 YES 2 <u>NO</u> ↻ 8 DK ↻ HL16 HL16	1 YES 2 <u>NO</u> ↻ HL15		1 ABROAD 2 IN ANOTHER HOUSEHOLD IN THE SAME REGION 3 IN ANOTHER HOUSEHOLD IN ANOTHER REGION 4 INSTITUTION IN THIS COUNTRY 8 DK	1 YES 2 <u>NO</u> ↻ 8 DK ↻ HL20 HL20	1 YES 2 <u>NO</u> ↻ HL19		1 ABROAD 2 IN ANOTHER HOUSEHOLD IN THE SAME REGION 3 IN ANOTHER HOUSEHOLD IN ANOTHER REGION 4 INSTITUTION IN THIS COUNTRY 8 DK	
Y N	<u>Y</u> N DK	Y N	MOTHER		<u>Y</u> N DK	Y N	FATHER		

Source: MICS6 Household Questionnaire. <https://mics.unicef.org/tools>

115. Note that both DHS and MICS recommend this set of questions to be asked to children age 0-17 only. Countries sometimes made adaptations, as discussed earlier, per their national needs. For example,

as shown below, out of 147 DHS surveys carried out since 2005, 121 adopted the standard age group for respondents, 24 modified the upper limit of the age range slightly (15, 16 or 18) instead of 17, and 7 surveys asked the question to respondents of all ages ([Table 7](#)). Two surveys did not ask the question.

Table 7. Different age specifications for questions regarding to parental survivorship with individual country cases listed

Orphanhood age	Count	Country lists
0-14	1	Indonesia 2007 DHS
0-17 (recommended)	121	
Under 15	9	Peru 2012/2011/2010/2009/2007-08 DHS, Mali 2006 DHS, Niger 2006 DHS, Guinea 2005 DHS, Senegal 2005 DHS
Under 16	2	Dominican Republic 2013/2007 DHS
Under 18	5	Honduras 2011-12/2005-06 DHS, Benin 2006 DHS, Congo 2005 DHS, Rwanda 2005 DHS
Age not specified	7	Papua New Guinea 2016-18 DHS, Colombia 2015/2010/2005 DHS, Turkey 2013/2008 DHS, Albania 2008-09 DHS
Total surveys	145	

116. Another deviation from the standard DHS/MICS formulations is on the follow up questions on their residence if the biological parents are still alive. Out of the 145 DHS surveys that included a question on orphanhood, 142 followed the standard DHS formulation. Three surveys - Bolivia 2008 DHS, Dominican Republic 2007 DHS, and Pakistan 2006-07 DHS - have only asked about whether their natural mother/father is alive, without asking whether the survival parents live in the same household.

117. Some surveys asked more questions in relation to orphanhood (24 DHS surveys), as listed below. The fourth question on the list appeared most frequently (shown in 15 surveys).

- Where does biological mother/father live if she/he not living in this household?
- Does the mother of (NAME) live in the country or abroad?
- Which country does the mother live if living outside the country?
- Has (NAME)'s mother/father been very sick for at least three months during the past 12 months if she/he not living in this household?
- Year of (NAME)'s mother/father's death if she/he is not alive?
- Has he received at least one external assistance during the last 12 months?
- Who is the main caretaker/ guardian?
- Birth registration?

4.1.b *Country coverage*

118. As shown in [Table 8](#) below, the orphanhood question is covered by a large number of countries in their DHS or MICS surveys: 73 in the period 2005-2014 and 78 since 2015. In both Central and Southern Asia and sub-Saharan Africa, around 70 per cent of the countries asked the question.

119. Orphanhood question is very common to be covered by DHS: out of 147 DHS surveys since 2005, 145 surveys have included questions about orphanhood except the Indonesia 2012 DHS and the Kenya 2008-09 DHS. For MICS, almost all surveys asked this question since 2005.

120. The orphanhood question is not common among surveys outside of DHS and MICS, with the only exception of the surveys organized under PHIA given its focus on the HIV impact.

Table 8. Orphanhood questions coverage in DHS and MICS since 2005 and 2015, by SDG regions

Region	Total # countries	% countries with incomplete death registration data (<75%)	Orphanhood			
			2005-2014		2015+	
			#	%	#	%
Sub-Saharan Africa	53	83.0	38	71.7	34	64.2
Oceania excl. Australia and New Zealand	23	52.2	0	0.0	5	21.7
Eastern Asia and South-eastern Asia	18	50.0	6	33.3	6	33.3
Australia and New Zealand	6	50.0	0	0.0	0	0.0
Western Asia and Northern Africa	25	40.0	8	32.0	7	28.0
Central and Southern Asia	14	35.7	10	71.4	11	78.6
Latin America and the Caribbean	51	19.6	8	15.7	10	19.6
Northern America and Europe	57	1.8	3	5.3	5	8.8
All regions	247	38.4	73	29.6	78	31.6

Note: MICS6 national questionnaires are reviewed only when published reports are available. There are additional 7 MICS6 surveys are either at data collection or analysis stage, for which final reports are not available yet. Information extracted in January 2022.

Source: United Nations SDG Database; Demographic and Health Surveys (DHS); Multiple Cluster Indicators Survey (MICS)

4.1.c *Quality considerations*

121. The orphanhood question has the potential to estimate adult mortality by calculating the probability of dying through demographic techniques.⁶² However, as seen above, most of the countries only ask this question to children up to age 17, which limits its usefulness for adult mortality estimation.⁶³

122. Using orphanhood data for adult mortality uses the indirect method that produces measures back in time than direct measures and infers a broad trend of mortality over approximately 10-50 years preceding the survey. It cannot capture “short-term” (less than 10 years) or recent mortality trends.⁶⁴

123. Data quality challenges associated with this question include: (a) misreporting of survival of parents and (b) selection bias. The orphanhood question is included in the household questionnaire, for which information is most likely provided by one person in the household. This person could be the most knowledgeable person, the head or reference person of the household or someone who happens to be home to respond to surveys. Therefore, the survival status of parents for all children up to age 17 could be misreported. Misreporting also arises when foster parents or stepparents were reported instead of biological parents. A selection bias might be introduced by the exclusion of individuals with no children.

⁶² United Nations, 2004. Handbook on the Collection of Fertility and Mortality data. ST/ESA/STAT/SER.F/92

⁶³ Suggestions to improve the collection of data on adult mortality in DHS surveys, available at [Suggestions for DHS adult mortality module IMT-PG.pdf \(ihns.org\)](https://www.ihns.org/Suggestions_for_DHS_adult_mortality_module_IMT-PG.pdf)

⁶⁴ United Nations, 2002. Methods for Estimating Adult Mortality, ESA/P/WP.175.

There is no child to report their deaths. If their mortality level varies from those with children, then the overall estimate of the adult mortality level is biased.

4.2 Sibling survival

4.2.a Question formulation

124. Another common question that can be used to estimate adult mortality is survival of siblings. In the latest model questionnaire of DHS, a total of 24 questions were dedicated to the collection of adult and maternal mortality data, situated within the Woman's questionnaire, which targeted women aged between 15 and 49 in the household. The first 11 questions (MM01-MM11, not shown) are included to ensure that information about siblings is accurate. This method records all children born to the interviewed woman's natural mother. Note this includes all brothers and sisters of the respondent who may live elsewhere and those who have died. It also includes those half brothers and sisters, who share the same biological mother, but different biological father.

125. Questions MM12-MM24 (*Figure 12*) ask about the name and sex of the siblings, survival status, if alive the age; if not, age at death (or age if still alive) and number of years since death. Whether deaths were pregnancy-related is asked to women 12 and older. Deaths due to violence or accident were also asked. *Figure 12* below shows questions MM12-MM24 from DHS phase 8. The complete adult and maternal mortality module is available online.⁶⁵ The model questionnaire for MICS6 on this topic is similar to the model DHS questions, especially the part covered in *Figure 12*. There are some differences in the screening questions that ensure all siblings are being reported.

Figure 12. Model questions on sibling survival, woman's questionnaire, DHS phase 8

⁶⁵ [DHS7-Module-Adult-Maternal-Mort-Qnaire-EN-17Jun2016-DHSQM.xlsx \(dhsprogram.com\)](#)

MM12	LIST THE BROTHERS AND SISTERS ACCORDING TO THE ORDER NUMBER IN MM01. ASK MM13 TO MM24 FOR ONE BROTHER OR SISTER BEFORE ASKING ABOUT THE NEXT BROTHER OR SISTER. IF THERE ARE MORE THAN 12 BROTHERS AND SISTERS, USE AN ADDITIONAL QUESTIONNAIRE.						
MM13	NAME OF BROTHER OR SISTER.	(01)	(02)	(03)	(04)	(05)	(06)
MM14	Is (NAME) male or female?	MALE 1 FEMALE . . 2	MALE 1 FEMALE . . 2	MALE 1 FEMALE . . 2	MALE 1 FEMALE . . 2	MALE 1 FEMALE . . 2	MALE 1 FEMALE . . 2
MM15	Is (NAME) still alive?	YES 1 NO 2 GO TO MM17 ← DK 8 GO TO (02) ←	YES 1 NO 2 GO TO MM17 ← DK 8 GO TO (03) ←	YES 1 NO 2 GO TO MM17 ← DK 8 GO TO (04) ←	YES 1 NO 2 GO TO MM17 ← DK 8 GO TO (05) ←	YES 1 NO 2 GO TO MM17 ← DK 8 GO TO (06) ←	YES 1 NO 2 GO TO MM17 ← DK 8 GO TO (07) ←
MM16	How old is (NAME)?	<input type="text"/> GO TO (02)	<input type="text"/> GO TO (03)	<input type="text"/> GO TO (04)	<input type="text"/> GO TO (05)	<input type="text"/> GO TO (06)	<input type="text"/> GO TO (07)
MM17	How many years ago did (NAME) die?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
MM18	How old was (NAME) when (he/she) died? IF DON'T KNOW, PROBE AND ASK ADDITIONAL QUESTIONS TO GET AN ESTIMATE.	<input type="text"/> IF MALE OR DIED BEFORE 12 YEARS OF AGE, GO TO MM23	<input type="text"/> IF MALE OR DIED BEFORE 12 YEARS OF AGE, GO TO MM23	<input type="text"/> IF MALE OR DIED BEFORE 12 YEARS OF AGE, GO TO MM23	<input type="text"/> IF MALE OR DIED BEFORE 12 YEARS OF AGE, GO TO MM23	<input type="text"/> IF MALE OR DIED BEFORE 12 YEARS OF AGE, GO TO MM23	<input type="text"/> IF MALE OR DIED BEFORE 12 YEARS OF AGE, GO TO MM23
MM19	Was (NAME) pregnant when she died?	YES 1 GO TO MM23 ← NO 2	YES 1 GO TO MM23 ← NO 2	YES 1 GO TO MM23 ← NO 2	YES 1 GO TO MM23 ← NO 2	YES 1 GO TO MM23 ← NO 2	YES 1 GO TO MM23 ← NO 2
MM20	Did (NAME) die during childbirth?	YES 1 GO TO (02) ← NO 2	YES 1 GO TO (03) ← NO 2	YES 1 GO TO (04) ← NO 2	YES 1 GO TO (05) ← NO 2	YES 1 GO TO (06) ← NO 2	YES 1 GO TO (07) ← NO 2
MM21	Did (NAME) die within two months after the end of a pregnancy or childbirth?	YES 1 NO 2 GO TO MM23 ←	YES 1 NO 2 GO TO MM23 ←	YES 1 NO 2 GO TO MM23 ←	YES 1 NO 2 GO TO MM23 ←	YES 1 NO 2 GO TO MM23 ←	YES 1 NO 2 GO TO MM23 ←
MM22	How many days after the end of the pregnancy or childbirth did (NAME) die?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
MM23	Was (NAME)'s death due to an act of violence?	YES 1 GO TO (02) ← NO 2	YES 1 GO TO (03) ← NO 2	YES 1 GO TO (04) ← NO 2	YES 1 GO TO (05) ← NO 2	YES 1 GO TO (06) ← NO 2	YES 1 GO TO (07) ← NO 2
MM24	Was (NAME)'s death due to an accident?	YES 1 NO 2 GO TO (02)	YES 1 NO 2 GO TO (03)	YES 1 NO 2 GO TO (04)	YES 1 NO 2 GO TO (05)	YES 1 NO 2 GO TO (06)	YES 1 NO 2 GO TO (07)

Source: DHS program, 2016. Adult and maternal mortality module, model woman's questionnaire.

4.2.b Country coverage

126. The set of questions on survival of siblings are covered by DHS/MICS, by around 70 per cent of the countries in sub-Saharan Africa, in the period 2005-2014; and only around 40 per cent for the same region since 2015. Around 43 per cent of countries in Central and Southern Asia also asked the questions in the period 2005-2014 but the country coverage is a lot lower since 2015. ([Table 9](#))

127. Sibling survival is commonly included in DHS but only on ad-hoc basis in MICS surveys. This set of questions is only optional in MICS6.

128. Note that sibling survival question in DHS and MICS is only asked to women of age 15-49, which has its limitation in estimating adult mortality. The question is not very commonly asked in non-DHS/MICS national surveys, which might be due to the large number of questions and its burden on respondents.

Table 9. Sibling survival questions coverage, 2005-2014 and 2015, by SDG region

Region	Total # countries	% countries with incomplete death registration data (<75%)	Sibling survival			
			2005-2014		2015+	
			#	%	#	%
Sub-Saharan Africa	53	83.0	37	69.8	21	39.6
Oceania excl. Australia and New Zealand	23	52.2	0	0.0	1	4.3
Eastern Asia and South-eastern Asia	18	50.0	5	27.8	2	11.1
Australia and New Zealand	6	50.0	0	0.0	0	0.0
Western Asia and Northern Africa	25	40.0	2	8.0	1	4.0
Central Asia and Southern Asia	14	35.7	6	42.9	2	14.3
Latin America and the Caribbean	51	19.6	5	9.8	2	3.9
Northern America and Europe	57	1.8	0	0.0	0	0.0
All regions	247	38.4	55	22.3	29	11.7

Source: United Nations SDG Database; Demographic and Health Surveys (DHS); Multiple Cluster Indicators Survey (MICS)

4.2.c *Quality considerations*

129. Sibling survival questions are primarily covered by DHS to collect data on adult and maternal mortality. Collecting such data requires careful training and supervision. The advantage of the set of questions is that it can capture more deaths than household deaths questions. Respondents reporting on several siblings compensates somewhat the sample size limitation of household surveys. Some of the DHS surveys administer the questions to both women and men questionnaires, which would increase the overall precision for adult mortality estimation. It is unclear whether the quality of the sibling survival data collected from men is comparable to those collected from women, although a study found both women and men provide equally reliable responses.⁶⁶ Nonetheless because adult mortality is a rare event, estimates produced from household surveys usually cannot be used for sub-national level monitoring.

130. Mortality information of siblings are collected from surviving respondents in the DHS or MICS surveys. Estimates produced cannot be further disaggregated by region or by socio-demographic characteristics because the information is collected from the respondents rather than from the deceased siblings. It cannot be assumed that the siblings would be residing in the same geographical location, or having the same education level.⁶⁷

⁶⁶ Merdad L, Hill K, and Graham W. 2013. Improving the Measurement of Maternal Mortality: The Sisterhood Method Revisited. DOI: 10.1371/journal.pone.0059834

⁶⁷ USAID, DHS Survey Design: Maternal Mortality.

131. Another intrinsic challenge using sibling survival question in DHS is the age limit of the respondents (15-49). This is not ideal for estimating adult mortality, which has an internationally agreed definition for age 15 to 59.

132. Other quality considerations in collecting sibling survival data include: (a) the accuracy in reporting sibling death, age of the siblings, and time of deaths; and (b) potential bias from violating the assumption that mortality among siblings is independent.

133. An analysis of sibling survival data from DHS surveys for 10 countries showed that the percentage of missing value for survival status and sex of siblings was relatively low (between 0.05% to 1.55%). Missing age of living siblings, age at death and year of death of the dead siblings is higher, ranged from 0.08 to close to 5%.⁶⁸

134. The estimation method further assumes that the risk of mortality among siblings is independent. That is, the risk of a sibling dying is not related to the risk of another sibling in that family dying. If mortality risk is related, then siblings with a higher risk of dying are less likely to be available to respond and thus the estimate will be biased downward.⁶⁹

4.3 Household deaths

4.3.a Question formulation

135. Household death question is not commonly used by DHS or MICS surveys but is rather population with other national surveys. Formulation of the household death question in surveys is very similar to what is used in censuses. [Figure 13](#) below is an example of household death question in the 2017 Botswana Demographic Survey. In this particular example, the question started with a heading “Deaths occurred during last 12 months”, then asked to provide the name, date of death (month/year), sex, age at death and place of usual residence. Additional questions were asked on causes of death, for how long the person was sick and whether the death was registered. The last question in the module asked for the number of burials in the household in the past 12 months and the question could be used to check against the number of deaths reported.

Figure 13. Household death data collection, Botswana 2017 Demographic Survey

⁶⁸ Merdad L, Hill K, and Graham W. 2013. Improving the Measurement of Maternal Mortality: The Sisterhood Method Revisited. DOI: 10.1371/journal.pone.0059834

⁶⁹ USAID, 2014. An Assessment of DHS Maternal Mortality Data and Estimates (2014)

BOTSWANA DEMOGRAPHIC SURVEY 2017											
D M O R T A L I T Y											
DEATHS OCCURRED DURING LAST 12 MONTHS											
Serial No	Has any usual member of this household died in the last 12 months? (Stayed atleast 14 days) 1. Yes 2. No IF 2 → D11	Write name of the deceased (START WITH THE MOST RECENT)	Date of death		Was..... male or female 1. Male 2. Female	How old was... in completed years at the time of death? (Age as at last birthday. If under 1 enter 00 and if 98 or above enter 98)	What was ... place of usual residence (STATE DISTRICT VILLAGE AND LOCALITY) IF RESIDENT IN BOTSWANA) Otherwise state country	What was the cause of death? 1. Illness 2. Transport related accident 3. Other accidents 4. Murder 5. Suicide 6. Maternal (Pregnancy/ childbirth) 7. Natural Disaster Other (Specify) IF 2 TO 7 & OTHER → D10	For how long had s/ he been sick? STATE PERIOD IN MONTHS	Was the death registered with Civil Registration? 1. Yes 2. No 9. Don't Know	Was there any burial in this household in the past 12 months (Enter number of persons buried during the period. If none Enter 00) (IF NO → H01) If total burials is not equal to number of deaths Check D3 and correct accordingly Number of buried persons
D1	D2	D3	D4(6)		D5	D6(2)	D7(7)	D8	D9(2)	D10	D11(2)
			MONTH	YEAR							
01											
02											

Source: Statistics Botswana, Botswana Demographic Survey Report 2017. Available [here](#).

136. There are variations across countries in formulating this question. For example, the Population-based HIV Impact Assessment surveys tend to have fewer questions on household deaths (*Figure 14*). In this particular example, the name, time of deaths, sex and age at death were asked. The time reference for including deaths was around 2 years (since 1 January 2015). Note that this module is optional (not always the case for PHIA surveys) and when asking the date of death, there is a note “Please give your best guess”, probably due to difficulties in recalling the exact date of death.

Figure 14. Household death question, Ethiopia Population-Based HIV Impact Assessment, 2017-2018

NO.	QUESTIONS AND INSTRUCTIONS	CODING CATEGORIES	SKIP
-----	----------------------------	-------------------	------

HOUSEHOLD DEATHS (OPTIONAL)

114	Now I would like to ask you more questions about your household. Has any usual resident of your household died since January 1, 2015?	YES _____1 NO _____2 DON'T KNOW _____8	NO, DK →201
-----	---	--	-------------

115	How many usual household residents died since January 1, 2015?	NUMBER OF DEATHS <input type="text"/> <input type="text"/>	
		DON'T KNOW _____8	

ASK 116-119 AS APPROPRIATE FOR EACH PERSON WHO DIED. IF THERE WERE MORE THAN 3 DEATHS USE ADDITIONAL QUESTIONNAIRES.

116	What was the name of the person who died (most recently/before him/her)?	NAME 1 ST DEATH _____	NAME 2 ND DEATH _____	NAME 3 RD DEATH _____
-----	--	-------------------------------------	-------------------------------------	-------------------------------------

117	When did (NAME) die? Please give your best guess.	DAY <input type="text"/> <input type="text"/>	DAY <input type="text"/> <input type="text"/>	DAY <input type="text"/> <input type="text"/>
		MONTH <input type="text"/> <input type="text"/>	MONTH <input type="text"/> <input type="text"/>	MONTH <input type="text"/> <input type="text"/>
		YEAR <input type="text"/> <input type="text"/>	YEAR <input type="text"/> <input type="text"/>	YEAR <input type="text"/> <input type="text"/>
		DON'T KNOW DAY = -8 REFUSED DAY = -9 DON'T KNOW MONTH = -8 REFUSED MONTH = -9 DON'T KNOW YEAR = -8 REFUSED YEAR = -9	DON'T KNOW DAY = -8 REFUSED DAY = -9 DON'T KNOW MONTH = -8 REFUSED MONTH = -9 DON'T KNOW YEAR = -8 REFUSED YEAR = -9	DON'T KNOW DAY = -8 REFUSED DAY = -9 DON'T KNOW MONTH = -8 REFUSED MONTH = -9 DON'T KNOW YEAR = -8 REFUSED YEAR = -9

NO.	QUESTIONS AND INSTRUCTIONS	CODING CATEGORIES		SKIP	
HOUSEHOLD DEATHS (OPTIONAL) (CONTINUED)					
118	Was (NAME) male or female?	YES _____1	YES _____1	YES _____1	
		NO _____2	NO _____2	NO _____2	
		DON'T KNOW _____8	DON'T KNOW _____8	DON'T KNOW _____8	
		CURRENT DATE> DATE OF DEATH 1 > JANUARY 1, [INSERT YEAR]	CURRENT DATE> DATE OF DEATH 1 > JANUARY 1, [INSERT YEAR]	CURRENT DATE> DATE OF DEATH 1 > JANUARY 1, [INSERT YEAR]	
119	How old was (NAME) when (he/she) died?	DAYS <input type="text"/> <input type="text"/>	DAYS <input type="text"/> <input type="text"/>	DAYS <input type="text"/> <input type="text"/>	
	RECORD DAYS IF LESS THAN 1 MONTH, MONTHS IF LESS THAN 1 YEAR, AND COMPLETED YEARS IF 1 YEAR OR MORE.	MONTHS <input type="text"/> <input type="text"/>	MONTHS <input type="text"/> <input type="text"/>	MONTHS <input type="text"/> <input type="text"/>	
		YEARS <input type="text"/> <input type="text"/>	YEARS <input type="text"/> <input type="text"/>	YEARS <input type="text"/> <input type="text"/>	
		DON'T KNOW _____8	DON'T KNOW _____8	DON'T KNOW _____8	

Source: Ethiopia Population-Based HIV Impact Assessment, EPHIA 2017-2018. Final Report. Available at https://phia.icap.columbia.edu/wp-content/uploads/2020/11/EPHIA_Report_280820_Web.pdf

4.3.b Country coverage

137. Household death question is commonly included in non-DHS/MICS national household surveys. Out of a compilation of 55⁷⁰ distinct non-DHS/MICS national surveys (for 36 countries) that included adult mortality relevant questions since 2005, 50 included the household death question, compared to 19 that included the orphanhood questions and 4 included the sibling survival question. Out of the 36 countries that have at least 1 survey outside of DHS and MICS collecting adult mortality question(s), 21 are from sub-Saharan Africa. A list of these 55 distinct non DHS/MICS national surveys since 2005 is included in Annex 1.

4.3.c Quality consideration

138. In addition to the quality issues covered in Section 3.3 for household death data collected from population censuses, household surveys have an intrinsic flaw due to sample size limitation. Adult mortality is a rare event and producing estimates with sufficient precision requires a large sample size. This is probably why in many of the national surveys, the reference period is longer than 12 months, ranging from 2 to 5 years before the survey data collection. Note that the longer reference period, the more difficult it is for respondent to recall.

5 EMERGING CHALLENGES AND DATA NEEDS IN THE CONTEXT OF THE COVID-19 PANDEMIC

139. The COVID-19 pandemic affects multiple dimensions of the implementation of surveys and censuses. It also creates new data needs, for example to better understand the magnitude of excess mortality generated by the pandemic in low-income and lower-middle-income countries, and/or

⁷⁰ For surveys that have been conducted regularly (annual or every several years), only the latest survey was included in the analysis. For example, China has been carrying out Annual Population Change Survey since 2005 but only the latest survey in 2019 is included in the calculation.

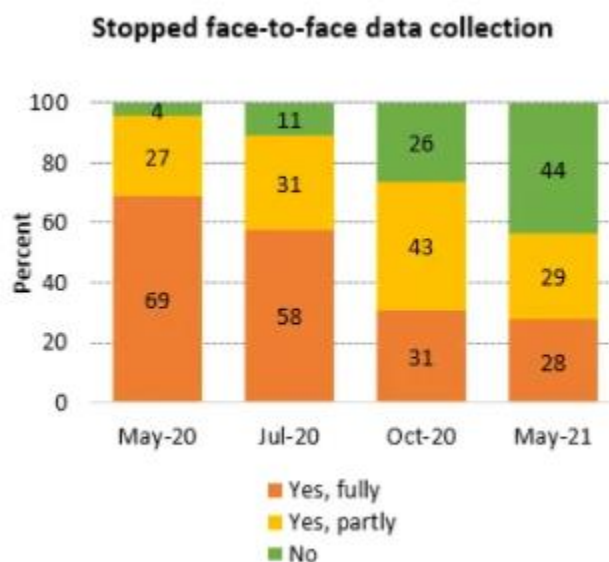
evaluating the effectiveness of control measures in such settings. In this chapter, we review challenges linked to data collection and estimation. We discuss how the COVID-19 pandemic has affected all stages of the data collection process, and might invalidate several hypotheses that underlie survey and census methods for the measurement of mortality. Then, we present several areas where data needs have emerged during the course of the COVID-19 pandemic.

5.1 Impact of COVID-19 on survey data collection

5.1.a Data collection

140. Survey data collection has been heavily impacted by COVID-19. According to surveys of NSOs carried out by the UN Statistics Division and the World Bank, 96 per cent of the countries stopped face-to-face survey data collection, either fully or partially, in May 2020. In-person data collection gradually resumed after the initial lockdown: in May 2021 proportion of countries stopped fully or partially face-to-face interviewing reduced to 57 per cent.⁷¹ (*Figure 15*)

Figure 15. NSOs that stopped face-to-face data collection in 2020 and 2021 as a consequence of COVID-19



141. The 2020 round of population censuses, covering the period of 2015 to 2024, has been severely impacted by COVID-19. Two rounds of surveys were conducted by the UN Statistics Division to monitor the impact of COVID-19 on census-taking in 2020 and 2021⁷². According to the latest survey in 2021, 83 out of the 111 responding countries with censuses planned for 2020 and 2021 reported impacts of the COVID-19 pandemic on their censuses. Countries using register-based censuses are less likely to be impacted by the pandemic. For those that reported being impacted by COVID-19, postponing census

⁷¹ United Nations Statistics Division and World Bank, 2021. Monitoring the State of Statistical Operations under the COVID-19 Pandemic, highlights from the fourth round of a global COVID-19 survey of National Statistical Offices (NSOs). Available at: <https://covid-19-response.unstatshub.org/posts/nso-still-face-disruptions-and-challenges/>

⁷² Impact of COVID-19 on 2020 round population and housing censuses, <https://unstats.un.org/unsd/demographic-social/census/COVID-19/>

activities, extending the enumeration period, shortening the census questionnaires or reducing direct contact with respondents have all been reported.

5.1.b *Field organization*

142. Field organization such as recruiting and organizing field staff and training field staff has been impacted by COVID-19. First of all, given the challenges in handling sickness, containment and care time required for family members who may become sick due to COVID-19, NSOs had to plan for more reserve staff and make provisional plans.⁷³ In some extreme cases, fieldwork had to stop because of shortage of staff. This usually implies longer enumeration period than originally planned and higher cost.

143. For countries that introduced remote data collection such as telephone interviewing for the first time, recruiting field staff who could administer telephone interviewing instead of face-to-face could be a challenge. It is usually a lot more challenging to build rapport with respondent through telephone than face-to-face.

144. With all the changes introduced to household surveys during COVID-19, training of field staff is important than ever. As mentioned earlier, interviewers not familiar with telephone interviewing techniques need to be trained to connect with respondents and to handle the time pressure as respondents are more likely to break-off during a telephone interviewing. Even for countries administering face-to-face interviewing, additional training is required on COVID-19 related field protocols intended to reduce the risk of transmission of the virus.⁷⁴

145. To reduce the risk of COVID-19 transmission, many countries have offered remote trainings. The effectiveness of remote learning, however, is seriously hampered by the lack of ICT facilities: globally 23 per cent of the countries indicated that they did not have adequate equipment for remote training. The proportion is higher (54 per cent) in sub-Saharan Africa.⁷⁵

5.1.c *Data quality*⁷⁶

146. Despite the challenges many countries adopted innovative approaches to meet the data demand. When asked about changes introduced in their survey operations to mitigate the challenge, more than 50 per cent reported change of data collection mode or use other data sources; around 40 per cent adding COVID-19 related questions to their surveys.⁷⁷

⁷³ Inter-Secretariat Working Group on Household Surveys, 2021. Technical Guidance Note on Planning and Implementing Household Surveys under COVID-19. Available at https://unstats.un.org/iswghs/news/docs/COVID-19_TechnicalGNote_final.pdf

⁷⁴ Inter-Secretariat Working Group on Household Surveys, 2021. Technical Guidance Note on Planning and Implementing Household Surveys under COVID-19. Available at https://unstats.un.org/iswghs/news/docs/COVID-19_TechnicalGNote_final.pdf

⁷⁵ United Nations Statistics Division and World Bank, 2020. Monitoring the State of Statistical Operations under the COVID-19 Pandemic, highlights from the second round of a global COVID-19 survey of National Statistical Offices (NSOs). <https://covid-19-response.unstatshub.org/survey/covid-19-nso-survey-report-2.pdf>

⁷⁶ Materials extracted from Inter-Secretariat Working Group on Household Surveys, forthcoming. Guidance Note on Assessing and Minimizing the COVID Impact on Survey Quality.

⁷⁷ United Nations Statistics Division and World Bank, 2020. Monitoring the State of Statistical Operations under the COVID-19 Pandemic, highlights from the first round of a global COVID-19 survey of National Statistical Offices (NSOs). Available at <https://covid-19-response.unstatshub.org/survey/covid-19-nso-survey-report-1.pdf>

147. Compared to surveys carried out before COVID, changes and adaptations introduced to household surveys during the pandemic could potentially impact on data and its quality. Changing modes of data collection from face-to-face to telephone could introduce biases in the results when the phone penetration rate is relatively low in the country. In addition, countries without proper survey infrastructure especially a telephone frame to reach survey respondents risk producing estimates that are biased. In a compilation of national COVID-19 impact surveys maintained by the Inter-Secretariat Working Group on Household Surveys, only 43 percent of approximately 180 countries used a recent household survey as a sampling frame for telephone interviews; the remaining countries lacked an updated sample frame with telephone numbers.⁸⁹

148. Incorporating new questions or removing existing questions without thorough testing is likely to affect the original flow of questions and hence the overall survey data quality. Yet changes introduced in data collection mode and questionnaires are an over-simplistic summary of what has happened to national household surveys during the pandemic, for instance changes in training, survey monitoring, and quality control procedures could be introduced. Each of these cascading actions could impact the quality of data provided by NSOs.

5.1.d *Government funding*

149. Collecting data through household surveys is costly, especially during the COVID-19 pandemic as a consequence of changing methodology and additional COVID-19 mitigation measures to ensure safety of interviewers and respondents and continuity of data collection. At the time when investment in data is crucial than ever, 50 per cent of the countries surveyed indicated a decrease in government funding on data. The decrease in funding happened in around 70 per cent of countries in sub-Saharan Africa.⁷⁸

5.1.e *Collecting data from institutions – forthcoming*

- i. Long-term care facilities
- ii. Prisons and other group-living settings

5.1.f *Collecting data on death: stigmatize – forthcoming*

- i. Asking questions about deaths during a pandemic
- ii. Stigmatized and non-stigmatized causes of deaths

5.2 *Estimation challenges – forthcoming*

5.2.a *Correlation of survival within families*

5.2.b *Single households, and the residence of older adults*

5.3 *New data needs to estimate COVID-related excess mortality – forthcoming*

5.3.a *Longer reference periods*

5.3.b *Detailed reporting of date of death*

5.3.c *Older age groups*

5.3.d *Circumstances and causes of deaths*

⁷⁸ United Nations Statistics Division and World Bank, 2021. Monitoring the State of Statistical Operations under the COVID-19 Pandemic, highlights from the fourth round of a global COVID-19 survey of National Statistical Offices (NSOs). <https://covid-19-response.unstatshub.org/posts/nso-still-face-disruptions-and-challenges/>

6 USING ADULT MORTALITY DATA COLLECTED FROM CENSUSES AND SURVEYS AT THE NATIONAL AND INTERNATIONAL LEVEL

6.1 Selected national examples:

6.1.a *Country case studies on use/analysis of adult mortality data (Structured outline for input request to countries is in Annex 2) - Forthcoming*

6.1.b *Sample registration systems*

151. Sample vital registration systems (SVRS) use a national sample of communities to continuously track population and demographic events. SVRS offer the possibility of continuous monitoring of numbers of deaths, as well as causes of death if verbal autopsy methods are included.⁷⁹ Currently only a handful of countries have established SVRS. SVRS in India and Bangladesh are the oldest, established in the 1970s and 1980s, respectively and covering 7 million and 700,000 people respectively. China's SVRS, formed in 2013 by integrating 2 separate parallel systems, covers 324 million people. In Africa, Mozambique established a SVRS, COMSA, in 2017, covering 900,000 people. More recently, Sierra Leone launched the Sierra Leone Sample Registration System (SL-SRS), with 678 geographically dispersed enumeration areas covering an estimated population of about 340 000.⁸⁰

6.2 International examples

6.2.a *Population Division – use of census and survey estimates in overall analysis of adult mortality for population estimates.*

6.2.a.1 Data holdings of the Population Division

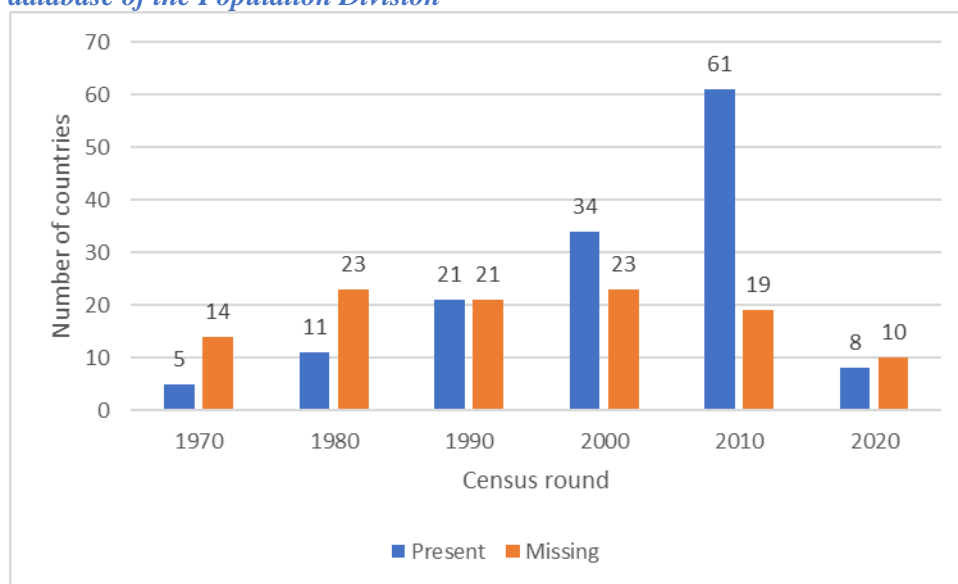
152. The United Nations Department of Economic and Social Affairs/Population Division maintains an inventory of censuses and surveys known to have asked questions for the estimation of mortality, and a database of all available empirical statistics that are relevant for the preparation of national population estimates and projections (e.g. population by age and sex from censuses; fertility and mortality data from civil registration and vital statistics, as well as from censuses and surveys based on direct and indirect estimation methods upon data availability). Information on types of data collected by censuses and surveys is obtained through review of questionnaires, reports or other means. The latest Excel version of the inventory was published in 2019.⁸¹ It is not always known whether the data collected by a particular survey or census were processed, tabulated or published in their entirety. For example, the figure below shows, for household deaths data from censuses, the number of countries for which data known to have been collected are available in the empirical database of the Population Division.

⁷⁹ Setel, P.W. et al. Sample registration of vital events with verbal autopsy: a renewed commitment to measuring and monitoring vital statistics. *Bull World Health Organ.* 2005;83:611-7; Amouzou, A. et al. (2020) National Sample Vital Registration System: A sustainable platform for COVID-19 and other infectious diseases surveillance in low and middle-income countries. *Journal of global health*, 10(2), 1-3. <https://doi.org/10.7189/jogh.10.020368>

⁸⁰ Carshon-Marsh, R. et al. (2021) Child, maternal, and adult mortality in Sierra Leone: nationally representative mortality survey 2018–20. *Lancet Glob Health* 2021. [https://doi.org/10.1016/S2214-109X\(21\)00459-9](https://doi.org/10.1016/S2214-109X(21)00459-9)

⁸¹ United Nations (2019) World Mortality Report 2019, CD-ROM Edition. <https://www.un.org/en/development/desa/population/publications/mortality/world-mortality-cdrom-2019.asp>

Figure 16. Number of countries with data on household deaths from census available in the empirical database of the Population Division



Source: United Nations Population Division/DESA. World Mortality Report 2019 Data Inventory and DemoData database

6.2.a.2 Preparation of global mortality estimates

153. The Population Division prepares estimates of mortality by age and sex as part of the World Population Prospects series. In the most recent revision, completed in 2019, estimates of adult mortality were derived from complete data on registered deaths by age and sex whenever possible. In other cases, analysts evaluated data from incomplete registration, from questions on household deaths by age and sex and from questions on parental survival in censuses or surveys, or from questions on the survival of the siblings of respondents in demographic surveys.⁸² Among the 201 countries or areas with 90,000 inhabitants or more in 2019, 137 countries had available adult mortality data collected in 2015 or later; the most recent data were collected between 2010 and 2014 in 51 countries, between 1998 and 2009 for another ten countries, and three countries had no data on adult mortality. In cases where available data on adult mortality were too sparse or inconsistent, life expectancy at birth was derived by using recent information about infant and child mortality together with model life tables. Furthermore, in countries with high levels of HIV prevalence among persons aged 15 to 49 (i.e., at least 4 per cent at some point between 1980 and 2018), age-specific mortality patterns up to the period 2015-2020 were estimated as a function of adult HIV prevalence, child mortality, adult mortality, and coverage of antiretroviral treatment (ART) of both children and adults, based on model life tables accounting for the effect of HIV on mortality⁸³ recalibrated using the latest epidemiological data.⁸⁴ For many countries, empirical adult mortality estimates from censuses or surveys were considered “post-facto” to validate modelled estimates but were not used as direct inputs.

154. For the forthcoming revision of *World Population Prospects*, scheduled for release in mid-2022, methods are being developed to directly use more data from censuses and surveys while accounting for

⁸² United Nations, Department of Economic and Social Affairs, Population Division (2019). *World Population Prospects 2019: Methodology of the United Nations population estimates and projections (ST/ESA/SER.A/425)*

⁸³ Sharrow, D.J., and others (2014). Modeling age-specific mortality for countries with generalized HIV epidemics. *PLoS One*, vol. 9, No. 5, pp. e96447. doi: 10.1371/journal.pone.0096447

⁸⁴ UNAIDS (2019). *AIDS Info Database*. Joint United Nations Programme on HIV/AIDS (UNAIDS). Available from <http://aidsinfo.unaids.org/>

error or bias in these data. For countries lacking or with deficient vital registration, a Bayesian hierarchical model will be used to model mortality at ages 15-59 for each country as a function of several factors including HIV prevalence, antiretroviral therapy, regional under-5 mortality rate, a country-level temporal effect, and an offset factor. The method will estimate and take into account both sampling error based on the survey sampling design, and non-sampling errors, which are usually unknown but arise from factors such as non-response, recall bias, data input error, etc. Details of the model will be published in a Population Division working paper in 2022.

6.2.b *CELADE*

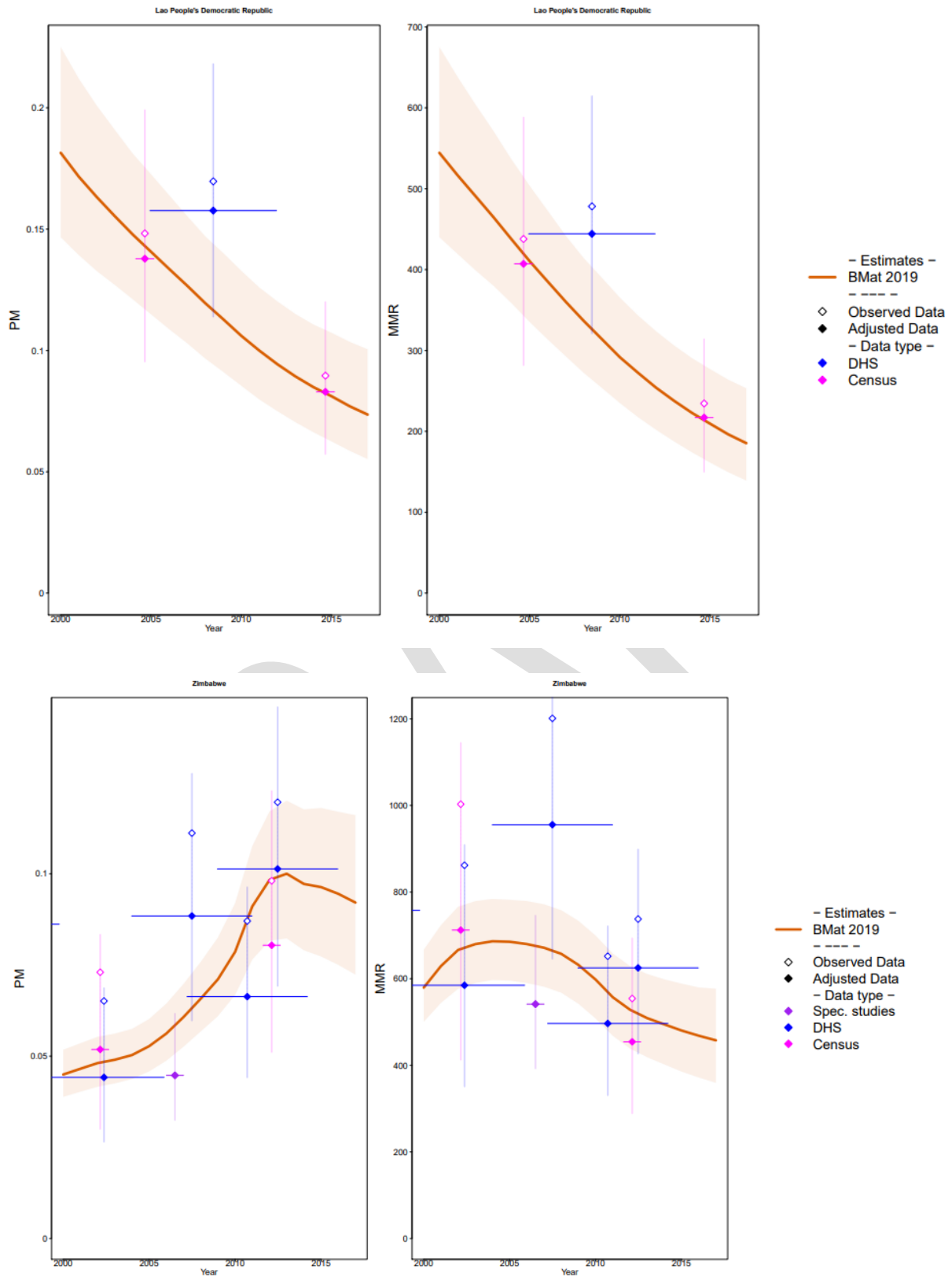
155. The Latin American and Caribbean Demographic Centre (CELADE) of the UN Economic Commission for Latin America and the Caribbean provides technical assistance to Latin American and Caribbean countries to advise on the collection, evaluation and adjustment of mortality data. It has performed comprehensive analyses of available data from censuses, surveys and vital registration and applied demographic methods to estimate data completeness. CELADE also provides courses on mortality estimation to staff in National Statistical Offices and other governmental institutions.

6.2.c *Maternal mortality estimation in MMEIG*

156. In preparing global estimates of maternal mortality for the monitoring of SDG target 3.1: reduce global MMR to less than 70 per 100 000 live births by 2030, the Maternal Mortality Estimation Inter-Agency Group (MMEIG) includes estimates drawn from civil registration and vital statistics systems (CRVS), household deaths modules of censuses and from sibling history data in surveys.⁸⁵ The observed proportion of maternal deaths (PM) among all deaths to women aged 15–49 years is taken as the preferred indicator. An adjustment is made in the case of data sources that report pregnancy-related mortality rather than maternal mortality. In addition, an adjustment is applied to all observations from censuses or surveys to account for deaths early in pregnancy that might not have been captured. Error variances are calculated for each estimate as well. The adjusted data from these sources are included as inputs to the Bayesian maternal mortality (BMat) estimation model. The model is fitted to all data available in the country, taking into account adjustments and uncertainty associated with the data points. The country profiles in [Figure 17](#) show the adjustments and error variances for two sample countries, Lao People’s Democratic Republic and Zimbabwe.

Figure 17. Data sources and estimates of maternal mortality, Lao People’s Democratic Republic and Zimbabwe

⁸⁵ WHO, UNICEF, UNFPA, World Bank Group and United Nations Population Division (2019). Trends in maternal mortality 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization. Licence: CC BY-NC-SA 3.0 IGO.



Source: <https://www.who.int/data/gho/data/themes/maternal-and-reproductive-health/maternal-mortality-country-profiles>)

Annex 1. A compilation of non-DHS/MICS national surveys⁸⁶ with questions on adult mortality, 2005 and later

SDG region	Country	Survey name	Year	Deaths in the household	Survival of parents (orphanhood)	Siblings survival
Central and Southern Asia	Afghanistan	2010 Mortality Survey	2010	1		
Central and Southern Asia	Bangladesh	Bangladesh Maternal Mortality and Health Service Survey 2010	2010	1		1
Central and Southern Asia	India	India District Level Household Survey 2012-2014	2012-2014	1		
Central and Southern Asia	Pakistan	Pakistan 2007 Demographic Survey	2007	1		
Eastern and South-Eastern Asia	China	China 2015 One-percent Sample Survey	2015	1		
Eastern and South-Eastern Asia	China	China WHO Study on Global Ageing and Adult Health 2007-2010	2007-2010	1		
Eastern and South-Eastern Asia	China	China 2019 Annual Population Change Survey*	2019	1		
Eastern and South-Eastern Asia	Indonesia	Indonesia 2020 National Socio-economic Survey*	2020	1		
Eastern and South-Eastern Asia	Indonesia	2014-2015 Family Life Survey (fifth wave)	2014-2015	1		
Eastern and South-Eastern Asia	Thailand	Thailand 2015-2016 Survey of Population Change*	2015-2016	1		
Eastern and South-Eastern Asia	Viet Nam	Viet Nam 2013 Annual Population Change Survey*	2013	1		

⁸⁶ Compiled based on information from United Nations Population Division, Institute for Health Metrics and Evaluation and national websites. The list here consists of surveys for which information (either survey questionnaire or report) is available in the public domain for review. For national surveys that are carried out regularly either on an annual basis or every X number of years (marked with an *), only the latest round is included.

Eastern and South-Eastern Asia	Viet Nam	Viet Nam 2014 Intercensal Population and Housing Survey	2014	1		
Eastern and South-Eastern Asia	Viet Nam	Viet Nam 2015 Time-point population change and family planning survey	2014-2015	1		
Latin America and the Caribbean	Dominican Republic	2006 Encuesta Nacional de Hogares de Propósitos Múltiples	2006	1		
Latin America and the Caribbean	Ecuador	Ecuador 2012 Encuesta Nacional de Salud y Nutrición*	2012	1		
Latin America and the Caribbean	Ecuador	Ecuador 2005-2006 Living Conditions Survey	2005-2006	1		
Latin America and the Caribbean	Mexico	Mexico 2015 Intercensal Survey	2015		1 (all ages) ⁸⁷	
Latin America and the Caribbean	Mexico	Mexico WHO Study on Global Ageing and Adult Health 2009-2010	2009-2010	1		
Northern Africa and Western Asia	Iraq	Mortality in Iraq Associated with the 2003-2011 Invasion and Occupation	2011	1 (10 years before the data collection) ⁸⁸		1
Northern Africa and Western Asia	Iraq	Harmonized Household Health Survey, HHHS	2012	1		
Northern Africa and Western Asia	Iraq	Iraq 2006-2007 Family Health Survey	2006-2007		1 (all ages)	
Northern Africa and Western Asia	Morocco	Morocco 2018 Enquête sur la Population et la Sante Familiale (ENPSF)	2018	1 (in 2015-16)		
Northern Africa and Western Asia	Morocco	Morocco 2009-2010 Enquête Nationale Démographique	2009-2010	1		
Northern Africa and Western Asia	Saudi Arabia	Saudi Arabia 2016 Demographic Survey	2016	1		
Northern Africa and Western Asia	United Arab Emirates	UAE Health Survey	2017-2018	1		
Sub-Saharan Africa	Botswana	Botswana 2017 Demographic Survey*	2017	1		

⁸⁷ Noted in parenthesis if the orphanhood question is asked to respondents of all ages.

⁸⁸ Reference period is presented in parenthesis when it differs from 1 year.

Sub-Saharan Africa	Burkina Faso	Burkina Faso 2008 Global Fund Facility Survey	2008	1		
Sub-Saharan Africa	Cameroon	Population-based HIV Impact Assessment	2017-2018	1 (3 years before)	1 (0-20)	
Sub-Saharan Africa	Cote d'Ivoire	Population-based HIV Impact Assessment	2017-2018	1 (2 year, optional ⁸⁹)	1	
Sub-Saharan Africa	Djibouti	PAPFAM (Family Health Survey)	2012	1 (5 years)		
Sub-Saharan Africa	Eswatini	2006 Demographic Survey	2006	1		
Sub-Saharan Africa	Eswatini	Population-based HIV Impact Assessment	2016-2017	1 (2 year, optional)	1	
Sub-Saharan Africa	Ethiopia	Population-based HIV Impact Assessment	2017-2018	1 (2 years, optional)	1	
Sub-Saharan Africa	Kenya	Kenya 2007 AIDS Indicator Survey	2007	1	1	
Sub-Saharan Africa	Lesotho	Population-based HIV Impact Assessment	2016-2017		1	
Sub-Saharan Africa	Malawi	Population-based HIV Impact Assessment	2015-2016	1 (2 years)	1	
Sub-Saharan Africa	Malawi	Malawi 2017-2018 Fourth Integrated Household Surveys*	2017-2018	1 (2 years)	1 (all ages)	
Sub-Saharan Africa	Namibia	Population-based HIV Impact Assessment	2017	1 (2 years)	1	
Sub-Saharan Africa	Niger	Niger 2006 Enquête de Base sur le Programme Service de Base Intégrés dans les Zones d'Intervention de l'Unicef au Niger	2006		1	1
Sub-Saharan Africa	Nigeria	Nigeria 2018-2019 GHS Panel survey	2018-2019	1		
Sub-Saharan Africa	Rwanda	Population-based HIV Impact Assessment	2018-2019	1 (2 years, optional)	1	
Sub-Saharan Africa	Somalia	Health and Demographic Survey (SHDS)	2018-2019	1 (2 years)		
Sub-Saharan Africa	South Africa	South Africa 2006 General Household Survey	2006		1 (all ages)	
Sub-Saharan Africa	South Africa	South Africa 2008 National Income Dynamics Study (Wave 1)	2008	1		
Sub-Saharan Africa	South Africa	South Africa 2016 Community Survey	2016	1	1	

⁸⁹ The question was optional in the survey.

Sub-Saharan Africa	Sudan	Harmonized household health survey, HHHS	2010-2010	1	1	
Sub-Saharan Africa	Uganda	Uganda 2016-17 HIV-AIDS	2016-2017	1 (2 years)		
Sub-Saharan Africa	United Republic of Tanzania	United Republic of Tanzania 2019-2020 National Panel Survey	2019-2020	1		
Sub-Saharan Africa	United Republic of Tanzania	Population-based HIV Impact Assessment	2016-2017	1 (2 years)		
Sub-Saharan Africa	Zambia	Zambia 2008 Household Health Coverage Survey	2008	1		
Sub-Saharan Africa	Zambia	2008 Global Fund Facility Survey	2008	1		
Sub-Saharan Africa	Zambia	Zambia 2009 Sexual Behaviour Survey	2009	1		
Sub-Saharan Africa	Zambia	Zambia 2010 Living Conditions Monitoring Survey	2010	1		
Sub-Saharan Africa	Zambia	Population-based HIV Impact Assessment	2016	1 (3 years)		
Sub-Saharan Africa	Zimbabwe	Population-based HIV Impact Assessment	2020	1 (3 years)	1	

Annex 2: Draft questionnaire to countries for Chapter 6, part A

158. List of known adult mortality data collected in the country since 2005 from UN DataCatalog can be attached to each request

- Are there any additional sources not listed above? Please kindly provide information about the source(s):
 - Date of data collection
 - Type of data collection
 - Website or report to the data collection
- For all available data collection of adult mortality through censuses and surveys since 2005, please respond to the following questions. Kindly share reports or papers that covered any of the items below:
 - Have the collected data been tabulated and published?
 - How was data quality assessed? What adjustments were carried out?
 - What mortality indicators were calculated/published, for what age groups?
 - For census data, were subnational tabulations/estimates made?
 - How are data used to inform policy or planning?