

Improving measurement of maternal and perinatal mortality in health facilities and in the population: country perspectives

*Countdown to 2030 for Women's, Children's and Adolescents' Health and
Ministry of Health, Tanzania*
Technical meeting, Dar es Salaam, September 17-18 September 2024

Background

Regular monitoring of maternal mortality and stillbirth rates in a population and health facilities is a priority for many countries and globally. Yet, reliable statistics on maternal mortality and, to a lesser extent, stillbirth rates are often lacking, especially in sub-Saharan Africa where mortality is highest.

Maternal mortality is a key indicator for measuring progress towards global and country development targets and one of the most powerful indicators of health systems functioning. It is one of the few health statistics that has consistently attracted major political interest at the highest levels of government, in the media and civil society. Yet, our ability to accurately monitor maternal mortality levels and trends has remained poor. This applies to both institutional mortality, an indicator of the quality of care, and to population mortality, which includes institutional and community deaths.

In the absence of well-functioning death registration systems, household surveys with sibling survival histories or, less commonly, censuses with questions on household deaths in the last year, have been used as the main data sources for population mortality in most countries. This has major limitations, including low frequency of measurement, long reference periods, small numbers and wide confidence intervals.^{1 2 3 4 5}

Modeled estimates of maternal mortality are primarily intended for global monitoring but, perhaps unfortunately, considerable attention is often paid to individual country estimates. The estimates are often based on a few divergent data points, the use of regional models and covariates (e.g., economic development, fertility and skilled birth attendance) to predict levels and trends. As a consequence, the estimates have wide uncertainty intervals, which renders the estimates of little use for short-term country monitoring. Furthermore, the estimates are prone to misinterpretation of changes in point estimates as true trends.^{6 7}

Stillbirth data are more readily available from household surveys but underreporting is a major problem.^{8 9 10} Also here, modeled estimates of stillbirth rates are available with the same limitations, albeit smaller uncertainty intervals.¹¹ Generally, there is more confidence in survey data on neonatal mortality in the first week of life, but facility data on neonatal mortality (before discharge from the maternal/newborn ward) have not been used much by countries or in global estimates.

Health facility reporting on maternal deaths and stillbirths (and neonatal deaths before discharge) are collected routinely and a potentially rich data source. Most countries have death reporting as part of the monthly reporting system (mostly DHIS2). Maternal and perinatal death surveillance and response (MPDSR) was proposed by WHO about a decade ago to improve identification and reporting of maternal deaths and involves almost continuous reporting of individual deaths.¹² MPDSR focuses on investigation of the factors contributing to the death but has rarely resulted in improved country mortality statistics.

Health facility reports on maternal and perinatal deaths are underutilized for the monitoring of institutional mortality, a good indicator of the quality of care in health facilities, because of major data quality issues. A critical step is a systematic assessment of these quality issues and the plausibility of institutional mortality rates in comparison to other sources.¹³

Major increases in the coverage of deliveries in health facilities in many countries provide an opportunity to improve population estimates of maternal mortality and stillbirth statistics (and early neonatal mortality). If institutional birth coverage is high (e.g., over 75%), and the mortality based on facility data is known, it is possible to make estimates of population mortality, depending on the completeness of maternal and perinatal death registration and the ratio community to institutional mortality. Such estimates could become an important input into country monitoring of maternal mortality and stillbirth rates, providing data on an annual basis at the subnational level.

The assessment of the completeness of maternal and perinatal death registration is critical. Deaths that occur ante-partum or postpartum are more likely to be missed. In particular, ante-partum deaths such as abortion and postpartum deaths are more likely to be missed, as they may occur at hospital wards other than the maternity wards. A global assessment provided crude estimated of the leading causes of maternal death for sub-Saharan Africa: abortion was associated with 9.6% (5.1-17.2%) of all deaths and sepsis with 10.3% (5.5-18.5%).^{14 15} An analysis of 84 DHS surveys from 34 sub-Saharan African countries between 1990 and 2014 showed that the proportions of pregnancy-related deaths reported as ante-partum, during delivery and postpartum, were highly variable between countries.¹⁶ The country medians were 36%, 31% and 31% for the ante, intra- and postpartum periods. While these figures cannot be considered good approximations of maternal deaths occurring outside the peri-partum period, which are less likely to be included in maternity registers and maternal death reporting systems, they indicated the need to carefully assess the levels of underreporting in maternal death reporting systems.

Objectives

1. Share and discuss the experiences of countries in monitoring institutional and population mortality statistics (maternal mortality ratios, stillbirth rates and neonatal mortality before discharge) through routine facility reporting (e.g., DHIS2) and MPDSR, and population-based sources
2. Discuss methods to assess data quality and develop estimates of institutional and population mortality rates based on health facility data
3. Discuss ways in which the completeness of reporting of maternal deaths, stillbirths and early neonatal deaths in health facility can be assessed to obtain better country statistics / estimates

Expected outcomes

- Synthetic report on the main approaches and findings from the participating countries and CAM 2024
- Synthesis of discussions on possible ways to assess completeness of facility reporting of maternal and perinatal deaths
- Synthesis of discussions on analytical methods to improve estimation of institutional and population maternal mortality and stillbirth rates at national and subnational methods

Agenda

Tue	Topic	Presenters
9:00	Welcome, introductions and opening remarks	Ahmad Makuwani, Ministry of Health, Tanzania; Cheikh Faye, APHRC / Countdown to 2030
9:30	General introduction: MMR and stillbirths monitoring: data sources, estimates, issues	Ties Boerma, U Manitoba / Countdown to 2030
10:00	Discussion	
10:30	Coffee / tea break	
	Country presentations: 15 minutes each, followed by 15 minutes discussion	
11:00	MMR and SBR in health facilities, by county, Kenya 2011-2022	Rose Muthee, Ministry of Health, Kenya
	<i>Data quality, adjustments and results for 47 counties from DHIS2 and MPDSR, with implications population measurement</i>	
11:30	MMR in Rwanda , facility and population-based sources (<i>Observed trends in MMR in health facility data with near universal coverage of deliveries and population estimates</i>)	Muhammed Semakula, Ministry of Health, Rwanda
12:00	MMR and SBR in Senegal in the survey, facility data and other sources (<i>Comparison of results from the 2023 DHS and facility data derived trends in MMR (and SBR)</i>)	Amadou Doucoure, Khaly Gueye, Ministry of Health, Senegal
12:30	MMR in Tanzania using multiple sources of data (<i>Synthesis and assessment of MMR levels and trends using survey, facility data (DHIS2 and MPDSR), and research data</i>)	Ahmad Makuwani, Ministry of Health, Tanzania
13:00	Lunch break	
14:00	MMR and SBR levels and trends in census, survey, sample vital statistics system, and facility data in Mozambique (<i>Synthesis of MMR and SBR results from multiple data facility-based and population sources</i>)	Nelia Nasson and Benilde Homo, Ministry of Health Mozambique, Celso Monjane, INSP
14:30	MMR and SBR in Burkina Faso in survey, facility data and research (<i>Comparison of results from the 2021 DHS, facility data and research studies</i>)	Karim Ouattara, ISSP and Sow Maimouna, Ministry of Health, Burkina Faso
15:00	MMR measurement in Ghana : long term trends in facility and population data from surveys and censuses (<i>Assessment of national and regional trends in institutional MMR since 1990s</i>)	Seth Afagbedzi, Univ Ghana, Anthony Oforu-Amah, Ghana Health Services
15:30	Coffee / tea break	
16:00	MMR and SBR in Uganda : survey and facility data (<i>Comparison of results from the 2022 DHS, facility data derived trends (DHIS2, MPDSR) and other sources</i>)	Peter Waiswa, Makerere Univ, Richard Mugahi, Ministry of Health
16:30	MMR in Zimbabwe : RAMOS experience and facility data (<i>synthesis of the RAMOS study 2018-2019 and comparison with other sources including health facility data</i>)	Reuben Musara, Zimbabwe and TBC, Ministry of Health, Zimbabwe
17:00	MMR in Cote d'Ivoire (<i>Comparison of results from the 2021 DHS, facility data and research studies</i>)	Kone Seidou, Ministry of Health and Sable Parfait, INSP
17:30	Closure	

Wed 18 Sep	Topic	Presenters
9:00	Synthesis of facility reporting on live births, MMR, stillbirth rates and neonatal mortality before discharge from the Countdown CAM 2024 (26 countries)	Sophia Kagoye, National Institute for Medical Research, Tanzania
9:20	Synthesis of the country inputs	Agbessi Amouzou, Johns Hopkins University
9:40	Considerations for the quantification of incomplete reporting bias in facility data	Claudia Hanson, Karolinska University, Sweden
10:00	General discussion, identifying main issues	All
10:30	Coffee / tea break	
11:00	Two working groups 1: Methods to assess the completeness of reporting of health facilities: maternal deaths, perinatal deaths 2: Analytical methods to obtain population MMR from facility MMR	All
13:00	Lunch break	
14:00	Report working group 1 & discussion	All
14:45	Report working group 2 & discussion	All
15:30	Coffee / tea break	
16:00	Final wrap up and way forward	
16:30	Closure	Ministry of Health, Tanzania and APHRC

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- ¹ Ahmed S, Li Q, Scraford C, Pullum TW. An assessment of DHS maternal mortality data and estimates. DHS Methodological Reports No. 13. Rockville: ICF International; 2014.
- ² Hill K, Arifeen SE, Koenig M, Al-Sabir A, Jamil K, Riggers H. How should we measure maternal mortality in the developing world? A comparison of household deaths and sibling history approaches. *Bull World Health Org.* 2006;84:173–80.
- ³ Mgwadere F, Kana T, van den Broek N. Measuring maternal mortality: a systematic review of methods used to obtain estimates of the maternal mortality ratio (MMR) in low- and middle-income countries [published correction appears in *Br Med Bull.* 2017 Jun 1;122(1):1]. *Br Med Bull.* 2017;121(1):121–134. <https://doi.org/10.1093/bmb/ldw056>.
- ⁴ Singh K, Li Q, Ahsan KZ, Curtis S, Weiss W. A comparison of approaches to measuring maternal mortality in Bangladesh, Mozambique, and Bolivia. *Popul Health Metr.* 2022 Jan 15;20(1):5.
- ⁵ The validity of the sibling survival histories for maternal mortality may also become more challenging in populations at lower levels of mortality, including a shift from direct towards indirect maternal mortality, deaths in older ages and potentially decreasing closeness between siblings needs to be considered.
- ⁶ 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; 2019.
- ⁷ GBD 2015 Maternal Mortality Collaborators. Global, regional, and national levels of maternal mortality, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet.* 2016 Oct 8;388(10053):1775-1812.
- ⁸ Blencowe H, Bottecchia M, Kwesiga D, et al.; Every Newborn-INDEPTH Study Collaborative Group. Stillbirth outcome capture and classification in population-based surveys: EN-INDEPTH study. *Popul Health Metr.* 2021 Feb 8;19(Suppl 1):13.
- ⁹ Akuze J, Cousens S, Lawn JE, et al. Four decades of measuring stillbirths and neonatal deaths in Demographic and Health Surveys: historical review. *Popul Health Metr.* 2021 Feb 8;19(Suppl 1):8
- ¹⁰ Ali M, Bellizzi S, Boerma T. Measuring stillbirth and perinatal mortality rates through household surveys: an integrated approach to data quality assessment and adjustment with 157 population-based surveys from 53 countries. *Lancet Global Health*, in press.
- ¹¹ United Nations. Never forgotten: the situation of stillbirth around the global. Report of the United Nations Inter-agency Group for Child Mortality Estimation. New York: UNICEF. 2022.
- ¹² WHO. Maternal death surveillance and response: technical guidance. Information for action to prevent maternal death. Geneva. 2013.
- ¹³ This work may link to the MPDSR technical working group at WHO which is also suggesting quality assessments of the MPDSR system.
- ¹⁴ Say L, Chou D, Gemmill A, Tunçalp Ö, Moller AB, Daniels J, Gülmezoglu AM, Temmerman M, Alkema L. Global causes of maternal death: a WHO systematic analysis. *Lancet Glob Health.* 2014 Jun;2(6):e323-33.
- ¹⁵ Other main causes: Indirect causes 28.6% (19/9-40.3%), haemorrhage 24.5% (16.9-34.1%), pregnancy induced hypertension (16.0 (11.7-21.0%), other direct causes 9.0% (5.1-15.7%), embolism 2.1%.
- ¹⁶ Merdad L, Ali MM. Timing of maternal death: Levels, trends, and ecological correlates using sibling data from 34 sub-Saharan African countries. *PLoS One.* 2018 Jan 17;13(1):e0189416.