**Building a case for a Sample Registration System**

**Illustrative example of Mozambique**

*The narrative below builds a case for the adoption, development and implementation of a sample registration system in Mozambique. This is developed for illustrative purposes for countries wanting to develop such a system. In 2017, Mozambique successfully launched a national sample registration system initially named Countrywide Mortality Surveillance for Action (COMSA) and later rebranded SIS-COVE. The example below focuses deliberately on maternal and child health needs but there could be other arguments (e.g. primary health care, all age mortality)*

**Background and Rationale**

Located in the Eastern sub-region of Sub-Saharan Africa, Mozambique is classified as a low-income country with an estimated population of 33.6 million in 2023, according to the United Nations’s projections. The population is growing rapidly, at a rate of 2.94%, adding over a million births annually and is expected to double in 24 years.[[1]](#footnote-1) This rapid population growth is the result of a slower decline in fertility compared to mortality. In 2023, Mozambique’s total fertility rate, the average number of children per woman, was estimated at 4.76, corresponding to a crude birth rate of 37.5 births per thousand population. The crude death rate was estimated at 7 deaths per 1000 population. Life expectancy in Mozambique was estimated at 63.6 years, with women living slightly longer than men (66.5 years versus 60.3 years).

Mozambique has made important strides in reducing mortality, especially among neonates and children under-five. The country was among the few countries in sub-Sahara Africa who reached the Millenium Development Goals of reducing under-five mortality by two-third between 1990 and 2015, going from 244 to 83 deaths per 1000 live births. Under-five mortality has continued to decline, reaching 66 deaths per 1000 live births in 2022, a 72% decline since 1990. Neonatal mortality has also declined substantially, although at a slower pace, reducing from 62 in 1990 to 26 deaths per 1000 live births in 2022. Under-five deaths are increasingly concentrated in the neonatal period. The proportion of deaths that are neonates increased from 25% to 39% in 2022. Mortality among children under five varies across the eleven provinces, ranging from 30 deaths per 1000 live births in Tete to 89 in Cabo-Delgado, according to a recent estimate produced by the demographic and health survey in 2022. These rates are based on the ten years preceding the survey and do not reflect the current situation of the country but confirm the inequity in mortality across provinces. Data from Demographic and Health Surveys conducted in Mozambique in 2003, 2011, and 2022-23 estimated maternal mortality at respectively 469, 408 and 242 deaths per 100,000 live births. These are, however, very uncertain and based on the seven years preceding the surveys.

In 2021, under-five children who survived the neonatal period died primarily of malaria (34%), pneumonia (13%), diarrhea (10%), and HIV/AIDS (8%). These have remained the top causes since 2000. During the neonatal period, newborns died largely from complications of prematurity (49%) and birth asphyxia or trauma (21%) and these have not changed in the past twenty years.

Mozambique has committed to the Sustainable Development Goals launched in 2015 of which goal 3 includes targets for under-five, neonatal, and maternal mortality. However, the current pace of decline in under-five and neonatal mortality since 2015 is too slow to achieve the under-five mortality rate target of 25 or lower deaths per 1000 live births, or neonatal mortality rate target of 12 or lower deaths per 1000.

Mozambique has reached a critical transition point where it needs timely, accurate and disaggregated data to monitor its population changes and make appropriate decisions to accelerate reductions in mortality. However, these data are currently lacking. Efforts to improve the Civil registration and vital statistics (CRVS) are on-going but registration data are not complete enough to use for population and health decision-making. The health information system also continues to struggle for completeness and only include data from facility users. Mozambique has relied on infrequent national surveys and decade population censuses to monitor the health of its population. Mortality data produced by these surveys are computed over several years preceding the survey (five years for the national estimates and ten years for the subnational estimates) and are not recent enough to reflect the current situation of the country. Three national demographic and health surveys were conducted in Mozambique over the past two decades and the last two population censuses occurred in 2007 and 2017.

The government of Mozambique urgently needs new approaches for population and mortality monitoring that will produce nationally and sub nationally representative estimates of mortality, causes of deaths and additional data to understand drivers of mortality. A continuous sample registration system that collects population and vital events data from a sample of geographic clusters of the population nationwide offers to address this data gap.

Situated in the Eastern sub-region of Sub-Saharan Africa with an estimated population of about 26.4 million in 2016[[2]](#footnote-2), Mozambique is an ideal country for implementing such an approach for several reasons. National household surveys and population census data are infrequent. Complete vital statistics data from a fully functioning Civil Registration and Vital Statistics (CRVS) is not available in the country. To improve measures of cause of death, Mozambique is one of the few countries that has piloted a new approach for cause of death determination using Minimally Invasive Tissue Sampling (MITS), carried out by the Manhiça Health Research Center (CISM). With support from BMGF, the center will implement MITS in children under five through the Child Health and Mortality Prevention Surveillance (CHAMPS) project. However, even this innovative effort, while helpful, is not sufficiently representative of the population for better targeting of programs across and between provinces in Mozambique. For these reasons therefore, the SRS is being proposed for Mozambique to fill the gaps. With regards to measurement of mortality across low- and middle-income countries, four main problems must be addressed to harness the opportunities set forth under the SDGs 3.2 and accelerate the momentum of progress in child mortality observed in some countries over the past two decades.

**Problem 1: Existing approaches for measuring mortality rates, and in particular mortality among children under-five years, at national and subnational level in countries where the disease burden is highest are inadequate**

A complete, good quality and well-functioning civil registration and vital statistics (CRVS) system is the ideal source for recording vital events such as births and deaths and allowing rapid generation and tracking of mortality rates, including mortality among children under-five, nationally, sub-nationally and for specific subgroups. However in most low-income countries – specifically in sub-Saharan Africa and Asia – such a system is nonexistent or defective.[[3]](#footnote-3) While many of these countries have subscribed to the current CRVS improvement movement and established plans for developing and strengthening their systems, it will take many years or decades to reach the level of completeness and quality sufficient to generate data that are usable for policy and decision making. Existing approaches for mortality measurement rely on national or subnational household surveys or once a decade population censuses. To measure child mortality in household surveys for example, women of reproductive age (typically 15-49 years) are interviewed on their full birth or pregnancy history. In addition to relying on the respondents’ memory on date of births for all children they have ever borne and age at death for those who have died, mortality rates produced by these approaches consist of average of wide reference periods preceding the surveys. Due to limited sample sizes, Demographic and Health Surveys (DHS) or Multiple Indicator Cluster Surveys (MICS) produce child mortality rates that refer to five years in the past for national level rates and ten years for subnational level rates. These rates are therefore not recent enough to reflect current program effects or the current situation. Although statistical models have been developed to produce annual national estimates of child mortality, as done by the United Nations Interagency Group on Mortality Estimates (IGME) or the Institute for Health Metric and Evaluation (IHME), these models rely on multiple assumptions that do not always meet the specific needs of countries and are not flexible in generating granular subnational or subgroup estimates despite increasing recent effort by the UN-IGME.1,[[4]](#footnote-4),[[5]](#footnote-5) Although increasingly popular, demographic surveillance sites provide data that cover only small areas that are not nationally representative or representative of some meaningful subnational areas. Furthermore, areas covered by these surveillances become gradually different from their surroundings or other parts of the countries. Routine administrative data in these countries are also not complete and of good quality enough to support regular mortality tracking. And finally, surveys rarely provide information about causes of death but are usually limited to reporting rates within limited age-groups or for discrete events when countries need information about all causes of mortality and for all age groups to plan the national health strategy.

**Problem 2: Existing approaches for measuring causes of death in children under-five years at national level and their distribution at subnational levels in high burden child mortality countries are limited and imprecise**

The defective CRVS system in most low-income countries means that quality data on causes of death are sparse or unavailable. Due to low use of health facilities, a substantial proportion of deaths occur outside these facilities and these deaths are rarely, if ever, investigated. Even for those that occur in facilities, there is no systematic certification of cause of death and most deaths and their causes are not registered in a national CRVS system. To produce comparable estimates of child cause of death across countries and time, statistical models are generated outside the country using limited data on causes of death and other selected covariates.5,7 These models allow generation of cause of death profiles and their trends, which countries have used to inform their programs and policy decision making. However, they are limited in yielding disaggregated estimates at subnational level.

**Problem 3: Lack of systematic integration of available data sources on mortality to generate distribution of mortality burden to support resource allocation and policy and program decision making**

To accelerate the decline in mortality across age-groups, high burden countries need accurate and targeted data to be able to prioritize limited resources appropriately. However, the wealth of mortality data collected from household surveys and censuses, verbal autopsies and demographic and health surveys, and routine health information systems are rarely integrated to generate a spatial distribution of burden and causes of death at national and subnational levels. While efforts are made at global level to harmonize and compare data across countries – such as the UN-IGME for under-five mortality - these efforts are often limited to national estimates and do not translate into an equity approach programming at country level. Innovative efforts are made at global level in geospatial mapping of disease burden, as done by the Malaria Atlas Project[[6]](#footnote-6), but these efforts are yet to be taken up and validated by country program planners and decision makers. Such efforts, including support to countries for integrated monitoring and evaluation systems as promoted by the Health Data Collaborative, must be encouraged.

**Problem 4: Existing data and measurement approaches do not often prioritize sustainability and country ownership to ensure continuous implementation of best practices through local resource mobilization**

A key principle in the Call to Action for Measurement and Accountability for Health Initiative and the Bill & Melinda Gates Foundation’s recent call for sustained and improved measurement is country leadership.[[7]](#footnote-7) Country leadership in measurement and monitoring initiatives is critical to ensure ownership required to generate continued success and sustainability. Too often national data collection initiatives such as household surveys for example, have not prioritized the necessary capacity building and technology transfer required to ensure continuing demand and prioritization of the initiatives. Countries are primarily accountable for progress being made in the health SDGs and successful long-term and sustainable initiatives must put them in the driver’s seat.

This proposal aims to address these four problems outlined above by developing and implementing a Countrywide Mortality Surveillance for Action (COMSA) in Mozambique as requested by the Bill & Melinda Gates Foundation. It proposes to develop and implement an approach of sample registration system (SRS) of births and deaths, with cause of death assessment using verbal autopsy and an innovative approach that relies on minimally invasive tissue sampling (MITS) for children under five years that will help achieve improved measurement needs and data availability in Mozambique. The proposal will be implemented under the leadership of the National Institute of Statistics with strong links with the Ministry of Health, Ministry of Justice and other credible and strong technical local institutions to ensure ownership, data use and high likelihood of sustainability.

1. United Nations, Department of Economic and Social Affairs, Population Division (2024). World Population Prospects 2024, Online Edition. [↑](#footnote-ref-1)
2. <http://www.ine.gov.mz>. (accessed May 15, 2016). [↑](#footnote-ref-2)
3. Mikkelsen L, Phillips DE, AbouZahr C, Setel PW, de Savigny D, Lozano R, Lopez AD. 2015. A global assessment of civil registration and vital statistics systems: monitoring data quality and progress. *Lancet* 2015; 386: 1395–406 [↑](#footnote-ref-3)
4. Wang H et al. 2014*.* Global, regional, and national levels of neonatal, infant, and under-5 mortality during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2014; 384: 957–79 [↑](#footnote-ref-4)
5. United Nations Inter-agency Group for Child Mortality Estimation, Subnational Under-five and Neonatal Mortality Estimates, 2000–2021 Estimates developed by the United Nations Inter-agency Group for Child Mortality Estimation, *United Nations Children’s Fund, New York, 2023*. [↑](#footnote-ref-5)
6. http://www.map.ox.ac.uk/ [↑](#footnote-ref-6)
7. Grove J, Claeson M, Bryce J, Amouzou A, Boerma T, Waiswa P, Victora C. 2015. Maternal, newborn, and child health and the Sustainable Development Goals—a call for sustained and improved Measurement. *Lancet*. Vol 386 October 17, 2015 [↑](#footnote-ref-7)