Timely child mortality estimates are a critical tool

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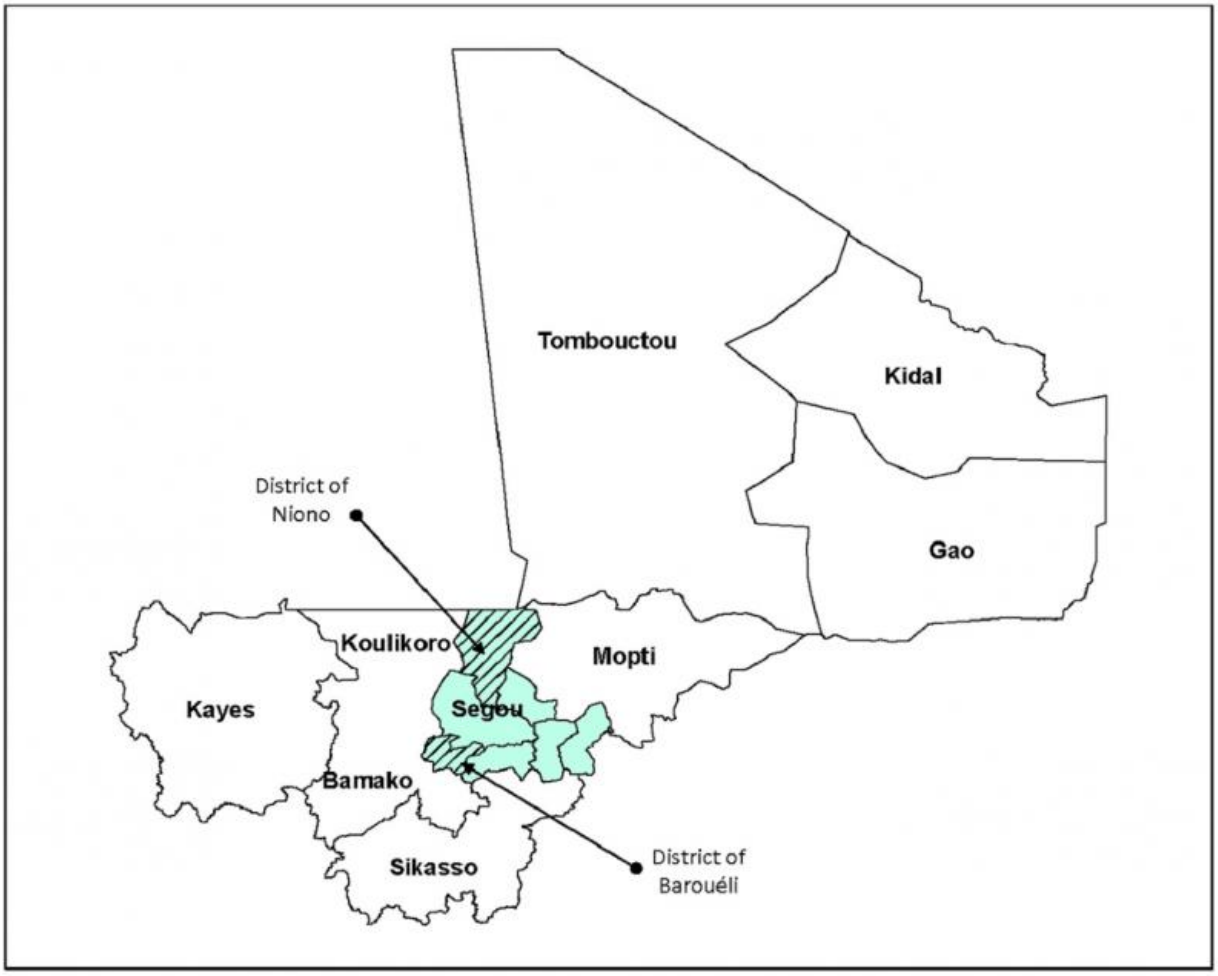

Map of Mali showing the two health districts selected for the RMM study in Ségou Region. doi:10.1371/journal.pone.0132164.g001

Evaluating progress towards the Millennium Development Goals has been at the top of the global public health agenda, and work to develop plans for monitoring the goals beyond 2015 and strengthening accountability for women's and children's health are already under way. As a part of these efforts, there are increasing demands for measurement of short-term changes in mortality among children less than five years of age in low- and middle-income countries.

Timely and accurate measurement of mortality has been critical in some of the most important population health improvements in modern times. William Farr, as part of his pioneering work at the General Registrar's Office in England in the 19th century, substantially developed the field of vital statistics as a means of assessing health and welfare of populations. Farr, as part of his work to understand the health risks associated with urbanization during the industrial revolution, used data on registered deaths to construct life tables and assess geographic and age group disparities in health across London. His work was particularly innovative in summarizing routine death registration data and providing timely reporting to public health authorities at the time and the general public.

Measurement of short-term change in child mortality is challenging

In many low-income countries health information systems are weak, particularly in rural areas. Hence, accurate and timely measurement of short-term changes in basic health indicators, such as child mortality indicators, are challenging. Vital statistics systems are weak in these settings, facility-based data only document a portion of the broader population, and survey measurement is hampered by the need for large sample sizes to measure short-term change. Hence, there is an increasing need for new innovations to improve the timeliness and accuracy of

maternal, newborn and child health in low-income countries.

Data collection as part of the RMM Project

The PLOS RMM Collection

The Real-Time Monitoring of Under-Five Mortality (RMM) project developed and tested methods for producing estimates of child mortality for recent periods of one year or less. Three broad approaches were assessed: community-based reporting of vital events; calibration of facility data to represent deaths in the population; and rapid survey methods. The Collection presents assessments of the feasibility and accuracy of community-based and survey-based approaches to measuring under-five mortality in recent periods of 12 months or fewer.

Some of the RMM findings were positive, such as the completeness and

data quality assessments of community-based vital events reporting in Mali discussed in Munos and colleagues, and offer encouragement to those calling for a massive scaling up of efforts to strengthen CRVS in low-income countries.

Other aspects of the RMM experience with community-based approaches should serve as cautionary guidance about the considerable field challenges and methodological issues associated with improving timely and accurate vital events reporting in low-resource settings. In Ethiopia, Agbessi Amouzou and colleagues found that notably low population density in rural catchment areas and high workload of community health workers resulted in substantial under-reporting of vital events.

The RMM project also tested two new survey-based methods to measure short-term changes in child mortality: the cohort change method follows cohorts of women defined by their age over time, between two successive summary birth history surveys; and the birth history imputation method in which a full birth history data collected from a woman in one survey is assigned to a women with similar characteristics in another recent survey of the same reference population. Ken Hill and colleagues report that the RMM survey validation results were mixed. The cohort change validation results were promising and warrants further testing, but the method appears highly sensitive to survey data quality issues. Whereas, the birth history imputation method validation results suggest that this method is not sufficiently sensitive to measure short-term change in under-five mortality rates.

The road ahead: Learning lessons to advance child mortality measurement

Much work remains to better address the challenges of measuring short-

term changes in newborn and child mortality rates in low-resource settings. The RMM project has developed an important evidence base about the challenging contextual factors that affect the completeness and quality of vital events reporting by community health workers. It has also tested two new survey-based methods that are based on birth history data that are routinely collected in national health surveys, the demographic and health surveys, as well as UNICEF Multiple Indictor Cluster surveys.

Our findings provide a number of humbling results and cautionary lessons for policy makers, public health practitioners, donors and researchers. In particular, it is clear that improving 'real-time' vital events reporting in rural areas of low-income countries is a long-term endeavor that requires sustained commitment and iterative learning. But with improved measurement methods, that build on existing health systems and link to the civil registration system, we can substantially improve the evidence-base for timely monitoring of child mortality. Such measurement and evaluation is a core component of ensuring sustainable and equitable health improvements for all children, everywhere.

More information: Agbessi Amouzou et al. Monitoring child survival in 'real time' using routine health facility records: results from Malawi, *Tropical Medicine & International Health* (2013). DOI: 10.1111/tmi.12167

Kenneth Hill et al. Monitoring Change in Child Mortality through Household Surveys, *PLOS ONE* (2015). DOI: 10.1371/journal.pone.0137713