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Monitoring Child Mortality through Community Health Worker Reporting of Births and Deaths: Case of Community Health Surveillance Assistants in Malawi

Benjamin Banda[1], Willie Kachaka[1], Agbessi Amouzou[2], Kenneth Hill[2], Jennifer Bryce[2]

[1] National Statistical Office, Zomba, Malawi; Benjamin Banda: bisabisa@yahoo.com; Willie Kachaka: wkachaka@yahoo.com

[2] Johns Hopkins Bloomberg School of Public Health, 615 N. Wolfe Street, Baltimore, MD 21205; Agbessi Amouzou: aamouzou@jhsph.edu; Kenneth Hill: khill@jhsph.edu; Jennifer Bryce: jbryce@jhsph.edu

Abstract

Decline in child mortality in most low-income countries is too slow to achieve the Millennium Development Goals 4 of reducing under-five mortality by two-third between 1990 and 2015. Effective strategies to monitor child mortality on short term intervals are urgently needed to allow countries to assess their progress. We present results from a test of mortality monitoring approach based on community health workers (CHW) recording of births and deaths within their communities. Mortality data collected by randomly selected CHWs of Malawi are compared to those of a "gold-standard" mortality survey. Results indicate that CHWs data under-estimated child mortality from 24% to 49% and the level of under-estimation increased over-time. The approach appeared however promising because events reported were found to be accurate and reliable. Further investigations are being conducted to learn the patterns of errors and profile of events that are likely to be missed by the CHWs.

Primary session: **413: methodological issues in health and mortality**

Secondary session: **411: Maternal, Infant, and Child Health and Mortality**

Extended Abstract

Introduction

Effective and timely tracking of progress toward the Millennium Development Goals (MDGs) at country level is essential to address the slow progress observed in most low- and middle-income countries. Analyses conducted to date by the Countdown to 2015 for Maternal and Child Survival classified Malawi as one of the few countries on track to achieve MDG4 of reducing its mortality among children under-five by two third between 1990 and 2015. However, to maintain this progress, the scale-up of child survival interventions in Malawi must be continued and sustained. The government of Malawi, with support from several international donors including the Canadian International development Agency (CIDA), is deploying increased efforts relating to child survival. In 2008, Malawi has expanded his cadre of community health workers, doubling the number from about 5500 to 11,000, to cover the entire country. These community health workers – referred to as Health Surveillance Assistants receive ten weeks basic health training and deployed to operate in communities with an average of 1000 population. In addition, the country adopted the management of uncomplicated cases of pneumonia, diarrheas and malaria by the HSAs. To qualify the HSA receive an addition one week training. The results of these efforts must be assessed regularly to provide timely feedback for improvement and to generate further support for the programs. The Real-time Results Tracking (RRT) project aims to accomplish this by implementing approaches for monitoring child mortality at intervals of no more than twelve months. The project is implemented in Malawi by the Institute for International Programs at Johns Hopkins University (IIP-JHU) in collaboration with the Malawi National Statistical Office (NSO), with support from Canadian International Development Agency. As part of this project a mortality monitoring approach based of community health workers reporting births and deaths within their communities is tested as an accurate and viable approach to rely on for assessing trends and levels in child mortality at national and subnational levels. This pilot is conduct in two districts in Malawi and data are collected every month from registers maintained by the HSAs. At the end of approximately months of implementation, a "gold-standard" mortality survey was carried and mortality estimate obtained from HSAs data are compared with mortality from the direct estimation. We present the results of this validation exercise in this paper.

Data and Methods

To test whether HSAs can report births and deaths with an acceptable accuracy and completeness that would allow effective monitoring of mortality in real-time (referred to as real-time mortality monitoring, RMM) two pilot districts were selected based on criteria of high under-five mortality, high fertility, easy access for the study team, and full coverage by HSAs. Additionally, at the time of selection, one district was receiving support for the scale of child survival intervention including the community case management of common childhood illnesses (Balaka) and the other was not. The RMM approach was implemented in these districts for approximately twenty months before a gold standard mortality survey was conducted to validate the results produced. A maximum difference of 20% between child

mortality rate generated by the RMM method and the household mortality survey was required to consider the method successful.

Community-level recording of vital events method relied on HSAs whose formal duties include maintaining government-issued Village Health Registers (VHRs) in which they were supposed to record health and demographic information about their catchment areas including the recording of pregnancies, births, and deaths. Each HSA covers a group of villages with an expected average population of about 1000 people. This existing platform constituted a unique in-country opportunity on which to build and test an RMM method. We conducted a formative research in the districts of Mangochi and Kasungu to learn more about this existing structure and to provide the information needed to develop clear and effective procedures for HSAs' recording of vital events, including initial training of HSAs, incentive and support structure and ongoing supervision. The formative research allowed us to learn more about the status of the HSAs, their duties in terms of identification and reporting of pregnancies, births and deaths, the reporting barriers and challenges, supervision issues, and the potential of other alternative means to identify vital community events. It showed that use of the VHR was the most appropriate community approach that was potentially sustainable and cost effective.

We estimated that a sample of 80 HSAs, in each of the two selected RMM districts, was required to reject the hypothesis of non-equivalence between the mortality rate produced by the RMM method and that generated from the gold-standard validation survey using 80% power. This translates into a sample of 24,000 households for the gold-standard survey. We mapped all HSA catchment areas in two selected districts for the project. The resulting 280 and 344 catchment areas, respectively in Balaka and Salima, constituted the sampling frame from which 80 HSAs were selected randomly in each district. A one-day sensitization of district stakeholders (District Health Officers, Traditional Authorities, District Assembly, and local NGOs) was conducted to explain the purpose of RMM and obtain their buy-in. Subsequently, selected HSAs were trained to record and extract data in the VHRs onto simple summary forms. The training required one day in each district and was led by the regular district HSA trainers. Following the instruction, each HSA was provided with at least one new VHR, a backpack, and a cell phone for the start of data collection. In each district, about 15 HSA supervisors were identified. These individuals were the regular government-mandated HSA supervisors who serve as Environmental Health Officers (EHO) or Assistant Environmental Health Officers under the overall supervision of the District Environmental Health Officer (DEHO) or his deputy. The HSA supervisors also participated in one-day training on supervision procedures, data recording and extraction from VHRs, and data flow processes. Following the training, each supervisor was required to conduct one-on-one training of each HSA under his/her supervision. A district coordinator was appointed to manage RMM activities. Data extraction from VHRs started in January 2010 and has continued to date. A gold-standard mortality survey was conducted in October 2011 through February 2012 and allowed validation of this approach.

Main results

Child mortality from HSAs data and comparison with results from "gold-standard" survey

We computed neonatal, infant, and under-five mortality rates for 12-month periods beginning every quarter from January 2010 to December 2011. The mortality rates were adjusted for HSAs that did not report data for specific months by imputing the number of births and death using the average number of events (births or deaths) reported by HSAs by month and across months during the period January 2010 to December 2011. Table 1 presents the results along with corresponding mortality rates from the gold-standard RRT survey and the ratio of the two rates. Figures 5 and 6 present graphical results for neonatal and under-five mortality rates respectively.

Two main results emerged from these analyses:

- First, the HSA data appear to underestimate all types of mortality rates relative to the gold-standard survey. Combined estimates for the two districts indicate underestimation ranging from 24% to 49% for under-five mortality, 44% to 50% for infant mortality, and 38% to 52% for neonatal mortality. Neonatal mortality appears most subject to under-estimation compared to other type of mortality. The degree of under-estimation appears more severe in Salima than in Balaka. During the period from April 2010 to March 2011, the under-five mortality rate calculated from HSAs' data in Balaka fell within 15% of the gold-standard mortality rate declining after March 2011.
- Second, considering the running 12-month mortality rates on periods beginning every quarter from January 2010 to December 2011, the degree of underestimation appears to increase over time and surpasses 50% in 2011 for some catchment areas. The rate of under-estimation for under-five mortality went from 24% in 2010 to 49% for the combined estimates of the two districts. On the same period, it went from 21% to 44% in Balaka and 28% to 57% in Salima. Thus, not only do HSAs data underestimate mortality, the level of under-estimation is not stable over time and therefore does not offer possibility for the development of a stable adjustment factor.

Table 1: Neonatal, infant and under-five mortality rate for annual periods from January 2010 to December 2011

Annual period	Neonatal mortality rate			Infant mortality rate			Under-five mortality		
	HSAs data	RRT Survey	Ratio HSAs data to RRT Survey	HSAs data	RRT Survey	Ratio HSAs data to RRT Survey	HSAs data	RRT Survey	Ratio HSAs data to RRT Survey
					BALAKA				
Jan 2010-Dec 2010	24.9	34.8	0.72	42.0	70.6	0.60	83.9	106.1	0.79
Apr 2010-Mar 2011	27.7	35.3	0.78	44.3	67.1	0.66	84.5	99.2	0.85
Jul 2010-June 2011	25.1	38.9	0.65	40.3	66.2	0.61	70.6	97.6	0.72
Oct 2010-Sep 2011	19.4	39.0	0.50	33.7	63.8	0.53	57.7	102.6	0.56
Jan 2011-Dec 2011	23.2			35.6			56.2		
					SALIMA				
Jan 2010-Dec 2010	25.6	47.8	0.54	54.7	77.2	0.71	89.2	123.4	0.72
Apr 2010-Mar 2011	25.8	44.7	0.58	50.9	75.9	0.67	83.4	121.4	0.69
Jul 2010-June 2011	23.0	37.6	0.61	41.9	68.9	0.61	71.3	109.4	0.65
Oct 2010-Sep 2011	15.0	31.2	0.48	29.6	61.6	0.48	44.3	102.6	0.43
Jan 2011-Dec 2011	13.9			27.0			41.9		
					TOTAL				
Jan 2010-Dec 2010	25.3	40.9	0.62	48.9	73.7	0.66	86.8	114.4	0.76
Apr 2010-Mar 2011	26.7	39.8	0.67	47.9	71.3	0.67	83.9	109.9	0.76
Jul 2010-June 2011	24.0	38.3	0.63	41.1	67.5	0.61	71.0	103.3	0.69
Oct 2010-Sep 2011	16.9	35.3	0.48	31.4	62.7	0.50	50.1	98.3	0.51
Jan 2011-Dec 2011	17.8			30.6			47.9		

Figure 5: Under-five mortality rates from HSAs data and from RRT survey for 12-month periods from January 2010 to September 2011 for Balaka, Salima and total

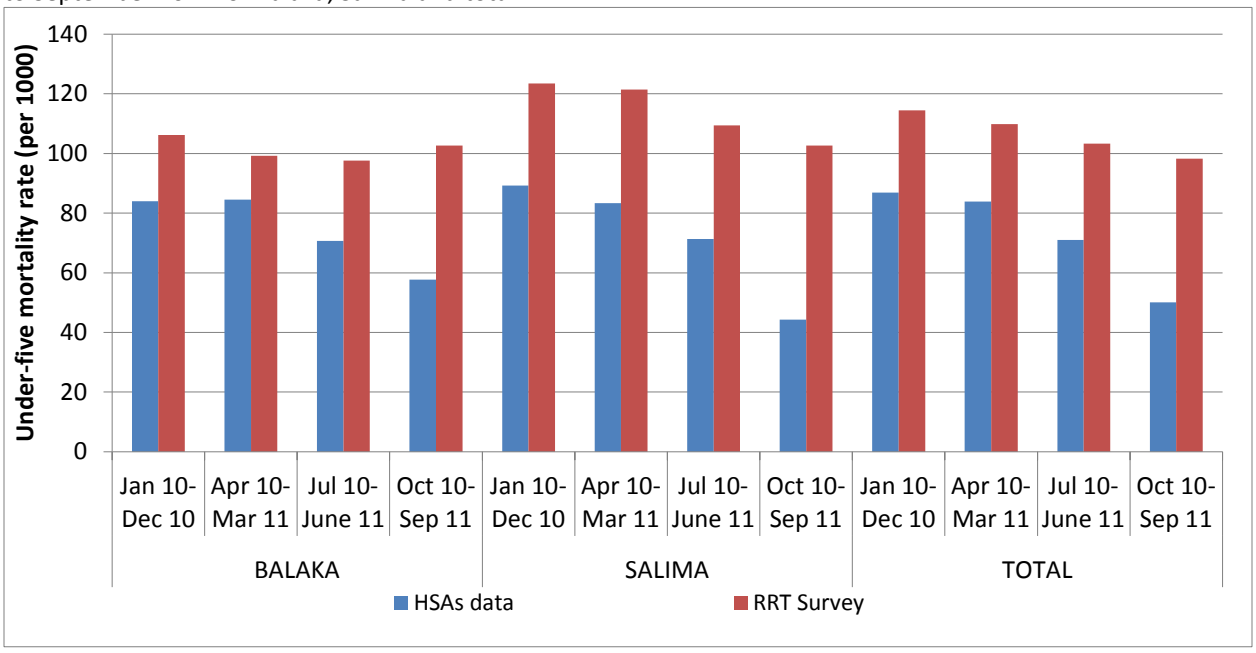
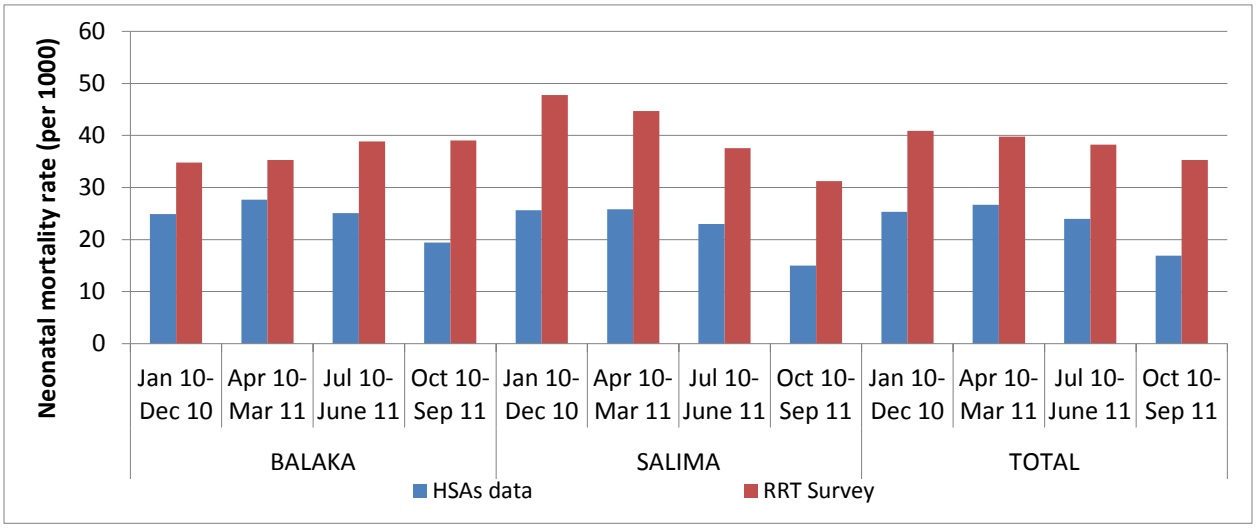


Figure 6: Neonatal mortality rates from HSAs data and from RRT survey for 12-month periods from January 2010 to September 2011 for Balaka, Salima and total



Discussion and conclusion

The experience in this first application of the RRT method based on HSA reporting of vital events generated valuable lessons. Some of the most important lessons are highlighted below.

The formative research conducted at the inception of the project and close monitoring throughout the evaluation period generated important and useful information about the functioning of the HSA recording system, the personnel involved, and the logistical support required for successful implementation of the project.

Although the approach of using HSAs for monitoring child mortality appears feasible and attractive, it requires high levels of inputs to ensure HSAs and their supervisors are well-trained, have support, and that incentives and supervision are provided continuously to maintain high levels of performance. The number of under-five deaths reported by HSAs went up in the months immediately following the training and provision of incentive packages, but dropped thereafter. It then peaked again following a review meeting that brought HSAs, supervisors, district management teams, and partners together to review the data and provide feedback. Ensuring stability of reporting required continued support and feedback to the HSAs. Recording of vital events in VHRs was already part of the job description of the HSAs prior to the implementation of RRT. Significant investments were needed to transform these formal terms of reference into reality. We believe that the learning from this first application can be used to improve and streamline the method in the future.

We found the events reported by the HSAs were highly reliable and accurate. A data quality audit conducted by the RMM team showed high levels of consistency in the data provided to NSO and those

recorded in the VHR. This suggests that HSAs were not simply making up the data. Although, in theory, HSAs were described as covering a population of 1000, in reality the number of people covered by each HSA varied widely. HSAs with high-population catchment areas showed more inconsistencies and inaccuracies in reporting than those with low-population catchment locations. The implications of this finding will be discussed with the MOH, and might include providing additional support to HSAs responsible for catchment areas with large populations.

Frequent supervision and contact with the HSAs were essential to maintain high levels of consistency and accuracy in reporting of vital events. The data quality audit showed that HSAs who reported receiving supervision in the past three months preceding the audit performed better in reporting pregnancies, births, and deaths than those who reported that they did not receive a supervision visit during this period.

Frequent data review meetings involving all RRT HSAs, the MOH, and the districts appeared to be essential for maintaining the engagement of district-level personnel and the HSAs. During these review meetings, the importance of the data collected was discussed, data quality issues were presented, and overall summary results were communicated. The district RRT coordinators and the HSAs reported that the review meetings provided a good incentive for them to continue the RRT activities.

The RRT method of having HSAs report on vital events in their catchment areas was found to be feasible for implementation in these two districts in Malawi, and was acceptable to all stakeholders. However, the method produced levels of under-five mortality that were on average 24 to 49% lower than those generated by the gold-standard household survey. The level of under-estimation increased drastically over time, suggesting that the approach is not stable and therefore cannot be relied upon to produce either accurate levels or accurate trends in childhood mortality. Given the high level of acceptability of the approach by the government, very good cooperation from the HSAs themselves and the potential to develop and strengthen vital registration, the approach merits further attention and effort. We therefore recommend that further investigations be conducted to understand better the weaknesses of the method, and that it be refined, improved, and tested again to assess accuracy.