Malaria mortality estimates: need for agreeable approach

1. Yazoume Ye¹,*
2. Catherine Kyobutungi²
3. Bernhards Ogutu³
4. Leopoldo Villegas¹
5. Diadier Diallo⁴
6. Halidou Tinto⁵
7. Abraham Oduro⁶
8. Osman Sankoh⁷,⁸

Tropical Medicine & International Health

Volume 18, Issue 2, pages 219–221, February 2013

Article first published online: 29 NOV 2012

DOI: 10.1111/tmi.12020

Keywords:

- malaria mortality;
- cause of death;
- verbal autopsy;
- health and demographic surveillance systems

When the Institute of Health Metrics and Evaluation (IHME) published the global estimate for malaria mortality in the Lancet (Murray et al. 2012), it generated extensive and diverse reactions of malaria scientists (Chambers 2012; Horton 2012; WHO 2012a) because IHME's estimated number of deaths due to malaria differed greatly from the estimates provided by WHO (2011). While the two estimates were different, IHME and WHO agreed that the collaborative efforts on malaria control are having an impact on the reduction in malaria-related mortality (Chambers 2012a,b; WHO 2012a). The dust has settled since then, and the interest in this debate about the issues related to malaria mortality estimates seems to have evaporated. This should not be the case; malaria scientists should keep the debate going. In view of Millennium Development Goals 4 and 6, it is crucial to enable optimal estimation of malaria-related mortality. This will also help to evaluate the impact of control measures. The purpose of this commentary is to shed light on ways to ensure that we do not continue to have this dichotomy in malaria mortality estimates in the future.
There is agreement among malaria scientists on the lack of sufficient information on malaria-related deaths, especially in endemic countries where most of the deaths take place at home and many of the dead are buried without being seen by a qualified healthcare provider. This situation makes it hard to account for every death and even more difficult to determine the cause of death. Irrespective of this unfortunate situation, efforts geared towards improving data availability seem to have been very limited relative to the extent of the problem.

A substantial amount of money is spent on malaria control (Chambers 2012); therefore, it is unacceptable that we cannot accurately account for most of the malaria-related deaths. It is even more worrisome because malaria is one of the most-studied parasitic diseases. Most of the debates among malaria scientists have been limited to criticising methodological approaches without agreeing on what can provide agreeable estimates. Relevant as they are, such debates run the risk of not providing to programme implementers the critical tools to support their control efforts; worse still, this confusion could lead to a reverse effect and jeopardise the achievements gained so far.

While we are calling for continued strides from partners to support malaria control (Chambers 2012) and elimination efforts, it is critical for malaria scientists to agree on the most appropriate and reliable method for accounting for individual malaria deaths wherever they happen. Chambers laments that ‘It is simply not acceptable for anyone to die from malaria – not in 2012, and most certainly not by the end of 15’. We will add along these lines that it is not acceptable that someone dies of malaria and the cause remains unclear.

While a good health information system might provide good data for estimating malaria-related mortality, there is an agreement that only very few of these deaths will occur in well-functioning healthcare systems in most of the malaria endemic countries, especially those in sub-Saharan Africa where most cases occur. Alternative population-based approaches such as INDEPTH’s health and demographic surveillance systems (HDSSs) should therefore be strongly supported to capture deaths occurring outside the healthcare system. Verbal autopsy (VA) is a method used to elicit the most probable cause of death at HDSSs (Sankoh & Byass 2012). Despite the limitations of the VA methods especially in detecting malaria deaths, they remain so far the only tools available to provide more reliable estimates of malaria-attributable deaths at the population level. Moreover, as it may be said that VA is not accurate, malaria as cause of death is a diagnosis of exclusion even with post-mortem capability as the presence of parasites in blood may not necessarily mean it is the cause of death unless there is no other possible cause discernible with the available tools.

The need for information on malaria mortality was emphasised several years ago by de Savigny & Binka (2004). ‘Ambitious new goals for control of malaria have been set, and
significant additional resources for malaria control are being mobilised. Yet for many of the countries most severely burdened by malaria, both baseline data and reliable monitoring of key impact indicators are lacking. For such countries, it will be difficult to know when targets are met or whether to make mid-course corrections if progress is inadequate. The new investments in malaria control have triggered resurgence in demand for health information, both for performance-based resource allocation and for health impact. The ongoing multi-agent impact evaluation of malaria control programmes which is being led by the US President’s Malaria Initiative (PMI) is restricted to using all-cause under-five mortality as the impact indicator because of lack of cause-specific mortality data (WHO 2012b). While this approach will provide valuable information on performance of malaria control efforts, it is difficult to quantify the exact contribution of these efforts on the change in under-five mortality.

Verbal autopsy appears to work well for classifying deaths due to certain diseases such as measles, whooping cough and cholera owing to the very distinct symptoms/signs of these conditions and also for deaths from injuries and violence. But it is not as sensitive for conditions with less specific symptoms/signs such as HIV/AIDS in children and malaria in adults. However, VA has an important role in providing information on malaria-specific mortality. A number of studies with varying sensitivity (24–75%) and specificity (77–100%) have been able to quantify burden and trends in malaria mortality using VA data (Korenromp et al. 2003; Deressa et al. 2007; Ndugwa et al. 2008). A study in Burkina Faso demonstrated that all-cause mortality rates declined while malaria-specific mortality remained constant between 1999 and 2004 in rural north-western town in the country (O’Meara et al. 2008). Another study in Ethiopia demonstrated the seasonality of malaria mortality and treatment patterns/care-seeking behaviour of malaria victims before death (Korenromp et al. 2003).

Most of INDEPTH’s 44 member HDSSs in 20 countries in Africa, Asia and Oceania apply VA to elicit causes of death. It is logical that the Network should be supported to generate this empirical information at a timely manner in the absence of reliable national vital registration systems (VRSs) (Ye et al. 2012).

Beyond the small areas covered by the HDSSs, WHO and the Health Metrics Network (HMN) have collaborated with the INDEPTH Network and the University of Queensland and recently published a shortened form of the VA questionnaire that can be fielded quickly by non-research national health teams. The recent attempt to nest VAs within demographic and health surveys (DHSs) to have causes of death at the national level should be encouraged and sustained.
The data from VA can be enriched with a good diagnostic framework for malaria. This calls for a radical shift from presumptive to diagnostic enabled treatment by ensuring that diagnosis capacity is available at every point of healthcare delivery including public and private facilities.

The lack of an agreement on estimates of malaria burden presents a public health challenge. Malaria scientists have the ethical obligation to provide an answer. Malaria-specific mortality derived from VA may have validity issues especially in relation to their low sensitivity. However, considering the lack of effective VRSs in most of the countries that have the highest burden of malaria, VAs provide a reasonable short- to medium-term source of malaria-specific mortality data. It is difficult to point to any one source of VA data, say HDSS or DHS, as the ideal to generate malaria-specific mortality given their various limitations. Rather, it would be expedient to combine different data sources to have better estimates. The various sources of VA data can complement each other. For instance, using Symptom Pattern (SP) methods (King & Lu 2008; King et al. 2010), hospital-based data on malaria mortality may be combined with VA data from the HDSS to generate population-level malaria-specific mortality fractions. The precise approach to be used, or the combinations thereof, will depend on the available context-specific resources. As much as possible, standardised VA processes should be used to ensure high-quality data. The current VA tool could also be revised in the light of the existing evidence to increase its sensitivity in detecting malaria-related deaths.

1. **Acknowledgements**
2. **References**

Osman Sankoh is funded by core support grants from the Gates Foundation, Sida, Hewlett Foundation and Wellcome Trust. He is the Executive Director of the INDEPTH Network.