



Hospital mortality data for impact monitoring and programmatic evidence-based decision in Tanzania

Key messages

- Mortality statistics are one of the main sources of health information.
- Knowing the burden and trends of the leading causes of death is critically important for monitoring the health of the population and identifying priorities.
- In Tanzania, there is dearth of information on causes and trend of mortality with very little utilization of the hospital data
- A strong health data governance framework is necessary for Government of Tanzania to enable hospital mortality data use to improve health care quality and performance
- It is envisaged that improvement in data governance mechanisms will support strengthening national health information systems and enable hospitals improve the public's health and patient care.
- This policy brief proposes actions to be taken to strengthen hospital mortality data management, use and archiving in Tanzania

Executive summary

Mortality statistics are one of the main sources of health information. Identifying the past and current causes of hospital mortality is critical for monitoring the health and identifying priorities. The current burden and trends of the leading causes of deaths is important to shed light on areas that need more attention and more resources. However, there is dearth of information on causes and trend of mortality in Tanzania, most probably due to poor data management and application in decision making. In a recent assessment of 39 hospitals in Tanzania, it was found that data on causes of death are poorly organized and incomplete. Data availability varied between individual hospitals and levels of hospitals. Data was relatively more available from zonal and specialized hospitals than from district hospitals. Various tools, i.e. registers and report forms are used for collection and compilation of mortality statistics and these are not standardized between hospitals. There was minimal use of standard disease classification nomenclature. Mortality data are rarely analysed, monitored and utilized within or outside these hospitals. These findings indicate the challenges in recording, utilization, storage and archiving of hospital mortality data

as well as the non-use of standard reporting procedures. To improve the reliability and usefulness of reported causes of death, the government of Tanzania (through the Ministry of Health, Community Development, Gender, Elderly and Children and the President's Office for Regional Administration and Local Government) should strengthen the capacities of hospital in data management and use as well as do periodic hospital record reviews to validate the quality of cause of death data.

The Problem

Mortality statistics are one of the most important sources of health information. In many countries mortality statistics are the most reliable type of health data. Identifying the causes of mortality in hospitals is important for monitoring the health of the nation, identifying priorities, and national burden of disease analysis which attempts to estimate the causes of loss of healthy life. The magnitude of mortality in the health care set up varies from region to region and is more affected by state of hospitalization, duration of admission, quality of services provided, number of co-morbid conditions, and type of illness among others. A number of factors have been associated with increased morbidity and mortality in low and middle-income countries. Lack of capacity and insufficient diagnostic resources and medicines have resulted to most of the deaths occurring in health facilities. Human resources capacity, skills and availability has been associated to high mortality when severe and complex cases are presented at health facilities, mainly in remote areas which are poorly accessible. The majority of the causes are known to be preventable or avoidable by formulating effective preventable strategies and being compliant with it.

In many countries, most often both community- and hospital-based data have been used as sources of mortality statistics. The vital statistics system, including births, deaths, and other reported vital events, is the principal standardized source of health-related data in high income countries. In these countries, mortality statistics derived from information reported on death certificates are among the most widely used sources of health data. Mortality data from the vital statistics system are considered to be unique as a means for measuring and comparing mortality at the national and sub-national levels.

These data are also useful to inform the system on death

patterns and critical causes to form a basis for developing preventive measures to reduce premature deaths. Yet, despite the critical importance of population statistics on causes of death, availability of such data in many low and middle-income countries is limited. In these countries only about 25% of deaths are recorded by vital registration (VR) systems (Lopez et al., 2001; Hill et al., 2006). Studies have shown that in low-income settings VR systems capture only a small fraction of deaths in the community (Mathers et al., 2005). Moreover, there are substantial differences in the causes of deaths when VR causes are compared with verbal autopsy (Arudo et al. 2003). A study in Tanzania, Whiting et al. (2006) found that causes of death in hospital were similar to those detected using VA for the population over 5 years of age. All in all, attempts to use VR and/or hospital death data have not attempted to address the problem that deaths in hospital are not a representative sample of all deaths (Murray et al, 2014).

Many low-income countries already collect data that in fact can be used to measure population cause-specific mortality fractions (CSMFs), namely in-hospital deaths where the underlying cause of death has been coded according to the International Classification of Diseases (ICD). In sub-Saharan Africa, at least 18 countries have reported mortality data in-hospital coded by ICD (Murray et al., 2014). Despite such initiatives, such data are rarely used for population cause-of-deaths monitoring since they are likely to be highly biased (Murrays et al., 2014). Hospital-based mortality data are described to be better than the population based data. Nonetheless, deaths in hospitals are not a random sample of deaths in the community- as mainly capture those who seek care from the facilities. A recent systematic review has indicated that the causes of death reported in hospitals are not accurate (Rampatige et al., 2014). All in all, attempts to use VR and/or hospital death data have not attempted to address the problem that deaths in hospital are not a representative sample of all deaths (Murray et al, 2014).

Cause-of-death statistics of poor quality have limited policy utility and may even seriously mislead policy debates (Adetoro, 1987). Reliable information on the leading causes of death in populations and how this death structure changes is a key element of the evidence base to guide health policies and programmes. Despite this fact, globally, national health systems depend on reliable information about causes of mortality to effectively respond to changing epidemiological profiles. Although most countries with statistical systems for cause of death now use the ICD classification for coding, not all countries have introduced the international standard certificate for reporting cause of death. Furthermore, physicians often do not receive adequate training in standard ICD death certification practices. It is, therefore, not surprising that comparative assessments commonly find the quality of medical certification of the cause of death is poor (Walker et al., 2004; Mathers et al., 2005).

Despite the efforts in strengthening the routine Health Management Information System (HMIS) in Tanzania, most often, the analysis of hospital mortality data to determine the overall as well as cause specific mortality trends over time has not been undertaken. Studies in Tanzania (Mboera et al., 2001, 2017; Mghamba et al., 2003; Rumisha et al., 2007) have indicated that most often data in registers/reports, archives or databases are not sufficiently used in programme development and improvement, patient's care, policy development, strategic planning, or advocacy (Smith et al., 2008; Nutley & Reynolds, 2013).

In a recent assessment of 39 hospitals in Tanzania, it was found that recorded data on causes of death are poorly organized and incomplete. Tools used for recording and reporting and level of data availability varied between hospitals and levels of hospitals. Data was relatively more available from zonal and specialized hospitals than from district hospitals. In some of the hospitals, registers, reporting forms and other records were not properly taken care of, misplaced, destroyed or thrown away. There was minimal use of standard disease classification nomenclature, poor adherence to standards in classification of diseases and mortality data are rarely analysed, monitored and utilized (Mboera et al., 2017). These findings indicate the challenges in recording, utilization, storage and archiving of hospital mortality data as well as the non-use of standard procedures.

Policy options

In Tanzania, routine HMIS is faced with challenges in recording, storage, utilisation and archiving of hospital mortality data as well as the non-use of standard disease classification. The Ministry of Health, Community Development, Gender, Elderly and Children and President's Office Regional Administration and Local Government carry out periodic hospital record reviews to validate the quality of the cause of death data. There is need for the Government to provide adequate standard hospital information registers to avoid improvising counter books by hospitals. The Ministry of Health should liaise with Registration, Insolvency and Trustees Agency (RITA) and agree on the need to retain copies of the death notifications (burial permits) in the respective hospitals. The two Institutions together with National Bureau of Statistics (NBS) should explore the possibilities of establishing an electronic platform tracking, monitoring and sharing vital registration data from source. Ministry of Health should strengthen the on-going training of certifiers and coders in cause attribution; as well as implement strategic strengthening of analytical capacity at hospital level and its Monitoring and Evaluation Section at the Central level. Policy guidelines need to be developed to guide on the data storage, archiving disposal and use. The training of doctors on disease classification and death certification needs to be included in the medical school curriculum. Disease classification should also be incorporated in nursing school curriculum since most of registers are being filled by nurses.

On the other hand, the hospital management should emphasize that hospital workers are trained about the public health importance of both morbidity and mortality data as well as how best to certify accurately the cause of death. The hospital management should organize in-house training to strengthen the capacity of the hospital workers in Management Information Systems including proper recording and filling of all register and reporting forms, day-to-day tracking of deaths at micro level (by village/street, disease, age category, linking with quality of service, human resource, etc.).

Hospital management should introduce internal data quality assurance and control procedures for recording and reporting of hospital data. Hospital Management needs to introduce and emphasize on different modes of data utilization to improve data quality and build interest among health care providers. There is an urgent need to strengthen hospital internal supportive supervision in hospital data management, considering areas such as recording, analysis and use, as well as data archiving procedures. Strengthening the hospital management team by involving personnel with expertise in data management who can perform periodic validation is essential to improve quality of hospital data.

Implementation considerations

There are a number of activities that need to be considered to strengthen the demand for and use of health data. These include (i) assessment and improvement of the data use; (ii) engagement of data users and data generators with a constant feedback mechanism; (iii) improvement of data quality as well as mechanisms for archiving and retrieving; (iv) identification of information needs; (v) strengthening the capacity in data use core competencies; (vi) Identification of data demands and strengthening use of available infrastructure for data collection and storage; and (vii) monitoring, evaluating and communicating data interpretation for use in interventions. For these to be successful, there is a need for legislative, regulatory, and planning frameworks; resources including personnel, financing, logistic support, information and communication technology; and defined indicators, comprehensive data sources, and established data management strategies at all levels. It is important that specific technical, behavioural and organizational activities need to be implemented to improve demand for, analysis, review and use of routine hospital data in decision making.

Data quality: For consistent data use to occur, data need to be of high quality so that data users are confident that the data they are consulting are accurate, complete, and timely. The Ministry of Health needs to develop, communicate and implement data quality protocols. It is equally important that the Ministry train and retrain health workers on data quality techniques and approaches.

Data use: In Tanzania, to-date, clear guidance on how to comprehensively improve data-informed decision

especially, at regional/district/health facility levels, is lacking. It has been described that the existence of quality data is insufficient to ensure use (AbouZahr & Boerma, 2005) because data use has not been adequately integrated into the decision making process and the information needs of decision makers are often not adequately represented in data collection efforts. Efficiency in data utilization process requires aggressiveness in both the demand and supply sides of data, i.e. those who generate and those who use. It is therefore important that specific policies and interventions aimed at improving the use of data produced by information systems are developed and implemented focusing at the two ends. Strategies for increasing the use of data in decision making should be promoted from the facility to national level.

Data availability: The Monitoring and Evaluation Section of the Ministry of Health should develop mechanisms to allow data availability to all users. Data availability envisages data synthesis, data communication, and access to data. To ensure that data are understood by potential users, data synthesis and communication need to be targeted and take into account user's role and information needs. Well-designed information systems should include the information technology infrastructure, policies and report templates to support targeted communication of synthesized data through dissemination and feedback techniques.

Strengthening inter-sectoral data sharing: Ministry of Health should liaise with RITA and agree on the need to retain copies of the death notifications (burial permits) in the respective hospitals. The two sectors should develop a data governance framework that enables data use that promote health care quality and health system performance, but that will also provide opportunities to strengthen inter-sectoral partnerships.

It is equally important that the government introduces electronic information systems and medical records in all hospitals. This will make data more available by increasing access and expanding the uses of hospital statistics. Such a system may allow the integration of vital statistics that are collected from hospitals, but also required by RITA. There must be data watchers at different points to increase validity and reliability of collected data before processing. Computerization of the health information system is likely to increase data quality, improve data storage and management, resulting in a better tool to support monitoring and supervision activities.

Competing interests

The authors declare that they have no competing interests.

Acknowledgments

The development of this policy brief was supported by Global Fund for AIDS, Tuberculosis and Malaria and the National Health Policy and Systems Research Hub.

References

- AbouZahr, C. & Boerma, T. (2005) Health information systems: the foundations of public health. *Bulletin of the World Health Organization* 83: 578-583.
- Adetoro, O.O. (1987) Maternal mortality—a twelve-year survey at the University of Ilorin Teaching Hospital (U.I.T.H.) Ilorin, Nigeria. *International Journal of Gynaecology & Obstetrics* 25: 93–98.
- Hill, K., Vapattanawong, P., Prasartkul, P., Porapakkham, Y., Lim, S., et al. (2006) Epidemiologic transition interrupted: a reassessment of mortality trends in Thailand 1980–2000. *International Journal of Epidemiology* 36: 374–384.
- Lopez, A.D., Ahmad, O., Guillot, M., Inoue, M. & Ferguson, B.D. (2001) *Life Tables for 191 Countries for 2000: Data, Methods, Results*. Geneva: World Health Organization.
- Mathers, C.D., Fat, D.M., Inoue, M., Rao, C. et al. (2005) Counting the dead and what they died from: an assessment of the global status of cause of death data. *Bulletin of the World Health Organization* 83: 171–177.
- Mboera, L.E.G., Rumisha, S.F., Magesa, S.M. & Kitua, A.Y. (2001) Utilisation of Health Management Information System in disease surveillance in Tanzania. *Tanzania Health Research Bulletin* 3 (2): 15-18.
- Mboera, L.E.G., Rumisha, S.F., Kumalija, C.J., Chiduo, M.G., Mangu, C.D., Matemba, L.E., Mkwashapi, D.M., Mremi, I.R., Lyimo, E.P., Massawe, I.S., Kishamawe, C., Bwana, V.M., Joachim, C., Nyondo, T., Msuya, M. & Mhehe, E. (2017) Hospital Mortality Patterns and Causes of Death in Tanzania, 2006-2015. National Institute for Medical Research, Dar es Salaam, Tanzania and Ministry of Health, Community Development, Gender, Elderly and Children, Dar es Salaam, Tanzania
- Mghamba, J.M., Mboera, L.E.G., Krekamoo, W., Senkoro, K.P. et al. (2004) Challenges of implementing Integrated Disease Surveillance and Response strategy using the current Health Management Information System in Tanzania. *Tanzania Health Research Bulletin* 6: 57-63.
- Murray, C.J.L., Lopez, A.D., Barofsky, J.T., Bryson-Cahn, C. et al. (2014) Estimating population cause-specific mortality fraction from in-hospital mortality: validation of a new method. *PLoS Medicine* 4(11): e326.
- Nutley, T. & Reynolds, H.W. (2013) Improving the use of health data for health system strengthening. *Global Health Action* 6: 20001.
- Rampatige, R., Mikkelsen, L., Hernandez, B., Riley, I. et al. (2014) Systematic review of statistics on causes of deaths in hospitals: strengthening the evidence for policy makers. *Bulletin of the World Health Organization* 92: 807-816.
- Rumisha, S.F., Mboera, L.E.G., Senkoro, K.P., Gueye, D. et al. (2007) Monitoring and evaluation of Integrated Disease Surveillance and Response in selected Districts in Tanzania. *Tanzania Health Research Bulletin* 9: 1-11.
- Smith, M., Madon, S., Anifalaje, A., Lazaro-Malecela, M. et al. (2008) Integrated health information systems in Tanzania: experience and challenges. *Electronic Journal on Information Systems in Developing Countries* 33: 1-21.
- Walker, N., Grassly, N.C., Garnett, G.P., Stanecki, K.A. et al. (2004) Estimating the global burden of HIV/AIDS: what do we really know about the HIV pandemic? *Lancet* 363: 2180–2185.

About the authors

Leonard E.G. Mboera, Susan F. Rumisha, Mercy G. Chiduo & Chacha D. Mangu
For further information contact: E-mail: lmboera@nimr.or.tz

About the National Institute for Medical Research

The National Institute for Medical Research is a public health research institution established by the Act of Parliament No. 23 of 1979 with the mandate to carry out, co-ordinate, monitor and control health research in the United Republic of Tanzania (<http://www.nimr.or.tz>)