



Community-based one health participatory disease surveillance using digital and mobile technologies in Tanzania

Key messages

- Infectious diseases have a significant impact on vulnerable populations of humans and animals across the world.
- Response to infectious disease epidemics largely depends on appropriate and effective surveillance programmes that inform decision-making and practice.
- The current official disease surveillance strategies in Tanzania have sub-optimal performance in capturing major disease events of human or animals occurring at community level.
- The fact that disease outbreaks typically erupt in communities suggests that communities are a key drivers influencing the transmission dynamic of epidemics.
- That the most vulnerable communities are located in areas that are hard to reach and that do not have reliable communication, calls for utilization of innovative approaches for early detection and reporting of disease events in near-to-real time for prompt response.
- Complementing the official national disease surveillance strategies with participatory engagement of communities is expected to enhance early detection, timely reporting and prompt response.
- This policy brief recommends for the formalization of community-based participatory surveillance using digital technologies to complement the current disease surveillance strategies.

are based on International Health Regulations (IHR 2005) and the World Organization for Animal Health (OIE), which mandate the flow of information from the community to the global level. However, existing public health surveillance systems have been performing sub-optimally, relying solely on epidemiological surveillance information collected and reported from health care facilities. The fact that disease outbreaks typically erupt in communities, suggests that communities are a key driver influencing the persistence and transmission dynamic of infectious diseases. The fact that the most vulnerable communities are typically located in areas that are hard to reach and/or do not have reliable communication, calls for active involvement of community and use of innovative approaches to enhance early detection and reporting of disease events in near-to-real time.

Approximately 70% of emerging infectious diseases of humans have an animal origin, suggesting that a disease surveillance approach that is based on One Health principles and is participatory, is likely to enhance early detection and response to outbreaks. Moreover, participatory surveillance is envisaged to empower communities to take ownership and control over local decisions and to have a stake in maintaining the surveillance structures and practices. The widening use of mobile phones in Tanzania offers the opportunity to develop innovative participatory disease surveillance strategies that rely on the design and deployment of digital and mobile technology solutions. In this policy brief, it is proposed to implement a participatory community-based disease surveillance system that employs digital and mobile technology using One Health approach to enhance early disease detection, timely reporting and prompt response.

Executive summary

Surveillance of infectious disease is recognized as the foundation of human and animal health decision-making and practice. The current disease surveillance systems and strategies in Tanzania

The Problem

Surveillance of infectious disease is recognized as the foundation of human and animal health decision-making and practice. However, there are a number of challenges facing human and animal health disease surveillance and response systems in Tanzania. Whereas the current global disease surveillance systems and strategies are based on International Health Regulations (IHR 2005) and The World Organization for Animal Health (OIE) codes which require flow of information from the grassroots/community to the global level, there has been relatively sub-optimal performance of such systems in Tanzania. The current disease surveillance systems in Tanzania are mainly health facility-based clinical cases, and have no formal strong linkage to community level thereby posing the challenges on early detection and capture of major disease events from the general population, timely reporting and prompt response at all levels. Complementing the national disease surveillance strategies with participatory engagement of local communities is expected to improve performance of disease surveillance systems in the country.

The now wide use of mobile telephones offers the potential that disease surveillance reporting, including event reporting, could be timely and faster by using digital and mobile technology solutions (Adepetun, 2015). Utilization of mobile phones and other information communication technologies (ICT) to improve disease surveillance in public and animal health sectors has been reported in other countries, including China (Yang et al., 2009), Sri Lanka (Robertson et al., 2010), Zambia, Madagascar, Uganda and Kenya (Zurovac et al., 2012). The use of community health workers in public and animal health sectors has been piloted in Kenya (Mugunieri et al., 2004), Tanzania (Allport et al., 2005; Greenspan et al., 2013) and other countries in East and Southern Africa (Kumar et al., 2014). The research conducted in Tanzania by the Southern African Centre for Infectious Disease Surveillance (SACIDS), indicated that the combination of participatory community-based approaches with mobile technology has the potential to support not only early detection of disease events happening at the community level, but also near- to real-time responses (Karimuribo et al., 2017).

Policy options

There is opportunity to strengthen and improve

the functionality of the current disease surveillance systems in Tanzania to enhance prompt response to disease events especially those of epidemic potential. The performance of disease surveillance systems can be enhanced by establishing community-based participatory One Health disease surveillance system using ICT tools. These community health reporting tools will assist community to collect information on human and animal disease events within their community. Data, once collected, will be submitted to a central database, whereby it will be analysed and provide instructions on the responses required including feedback to the reporter. The feedback will include possible diagnosis, recommended self-care actions, among other recommendations. The proposed options fit well with the national one health strategy that is being implemented by the Tanzanian National One Health Coordination Unit. OHCU has been established to serve as the National One Health Platform, facilitator, convener and guarantor of multi-sectoral coordination for the implementation of the designated activities.

Implementation considerations

The ministry responsible for human health in Tanzania adopted engagement of Community Health Workers (CHWs) in the provision of primary health care services in humans since 1978 following the declaration of Alma-Ata (WHO, 1978), which identified CHWs as one of the foundation stones of comprehensive Primary Health Care (PHC) to improve community health services (Standing & Chowdhury, 2008). The roles and activities of CHWs extremely varied within and across various programmes. In some initiatives CHWs perform a wide range of different kinds of tasks including maternal and child health, and HIV/AIDS programmes. Previously, the CHW were working on voluntary basis. However, this could not be sustained, and the government ceased to deploy CHW thereafter. In 2005, the government re-introduced to address gaps in healthcare. The CHW is a member of a community who has received training to provide basic health care services to humans at the community level.

Similarly, during the past two decades, the ministry responsible for animal health in Tanzania introduced Community Animal Health Workers (CAHWs) delivery system to avail veterinary clinical services to pastoral communities (Allport et al., 2005; Swai

et al., 2014). Like the CHW, CAHW is a member of community, who has received training on basic animal health skills to provide health care services to animals at the community level. In both human and animal health sectors, the CHWs and CAHWs (hereinafter both being referred to as Community Health Reporters (CHRs)) create connections between community and healthcare systems. Besides the strong push to officially recognize CHRs, there has been no strong linkage of this cadre to the official disease surveillance systems in Tanzania. Their mode of operations has been mainly on specific disease programmes with inadequate consideration to epidemic prone priority diseases of humans and animals in the country. Besides the fact that 70% of human infectious diseases are of animal origin, engagement of CHRs by the government ministries responsible for human and animal health has been made in silos. In addition, important constraints that should be addressed include the need to access remote and often large areas characterized by poor infrastructure and communications and the need to conduct adequate surveillance with limited financial resources.

In order to capture disease events occurring in human and animal populations at the community level there is a need to strengthen the on-going and scale-up community-based One Health participatory disease surveillance programmes in the country. To enhance early detection, timely reporting and prompt response, the disease surveillance system needs to use efficient ICT tools, mobile phones in particular. For this system to function optimally there is a need to develop a standardized national training curriculum and material packages for CHRs that take One Health approach into consideration.

Having recognized the importance of prompt detection, reporting and feedback, the Southern African Centre for Infectious Disease Surveillance (SACIDS) has developed a One Health Knowledge Repository (OHKR) for key endemic and epidemic prone diseases (based on priority by the human and animal health sectors) to improve public health management. OHKR is a decision making expert system that helps local communities, ministries responsible for human and animal health as well as district/regional animal and human health departments to make prompt and appropriate decision required to prevent and control diseases based on disease events data submitted by CHRs.

The participatory community-based disease surveillance systems can be enhanced by OHKR, which helps to support the prediction of likely disease conditions based on signs and symptoms reported, thereby guiding disease management at community level even in the absence of laboratory confirmation. The generated disease data from community level complements the national Integrated Disease Surveillance and Response (human sector) and animal surveillance systems.

The proposed strategy is in line with the Tanzania's One Health Strategic Plan 2015-2020 that focuses on training, advocacy and communication; preparedness and response; research; disease surveillance, prevention and control; and coordination. It is also in line with the National Health Sector Strategic Plan (HSSP) IV (2015-2020) that focuses on practical measures to protect population health and wellbeing through several measures, including strengthening surveillance systems.

While implementing the proposed strategy, there are potential challenges that need to be addressed. Although engagement of CHRs in disease surveillance is not a new strategy, consideration of One Health approach is likely to be a challenge because of different priorities and organizational structure of key sectors. To address this challenge training and sensitization of key sectors should be conducted on One Health approach in disease surveillance. Unreliable communication networks link might be another limiting factor in the adoption of the strategy. To address this challenge, the digital data collection tools should be designed to collect data off-line in locations with poor internet access and submit data to higher levels when the CHR reaches the locations with reliable internet access.

Competing interests

The authors declare that they have no competing interests.

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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.

Sokoine University of Agriculture is a public university that was established by Parliamentary Act No. 6 of 1984 of the United Republic of Tanzania which was subsequently repealed in 2005 by the Universities Act No. 7 of 2005. Following the enactment of the Universities Act, SUA was granted the SUA Charter of 2007.

Southern African Centre for Infectious Disease Surveillance is a One Health consortium of southern African medical and veterinary, academic and research institutions involved with infectious diseases of humans and animals in the Democratic Republic of Congo, Mozambique, South Africa, Zambia and Tanzania, in an innovative partnership with world-renowned centres of research in industrialised countries.