

One health data audit: a spatio-temporal approach to cultivating sustainable multi-disciplinary collaboration and communication in zoonoses surveillance, control and stepwise elimination



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Abstract

Auditing public health data has become an important component of zoonosis surveillance for one health inclusion and communication. The concept of one health data audit may be defined as the inspection of data to assess their origins and traits, verifying their utility based on completeness, accuracy and timeliness in human-animal disease surveillance, food safety, security and other areas of public health importance. One health data audit involves looking at key metrics to make decisions about the properties of data sets in terms of the composite part of the tripartite of one health that they belong: animal, environment or human's health attribution. In relation to the environmental component, one health data audit includes and promotes protocols for spatial and spatio-temporal data visualization, which plays a role in disease mapping and identification of associated risk factors, using Geographic Information Systems (GIS). We present ten critical points of how one health data audit was carried out, exemplified with dog bite victims' records in rabies surveillance in West Africa. We concluded that as Global Positioning System (GPS) technology advances, so is its practical application in the tracking and mapping of zoonosis in space and time to achieve more accurate and complete one health data sources representation.

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Editorial

The idea of auditing public health data has become an important component of zoonoses surveillance for one health inclusion and communication [1-3]. “One health data audit” may be described as the inspection of zoonoses data to assess their origins and traits, and verify their utility based on completeness, accuracy and timeliness in human-animal disease surveillance, food safety, security and other areas of public health importance. One health data audit involves looking at key metrics to make decisions about the properties of data sets in terms of each part of the tripartite of one health that they belong, that is animal, environment or human health [4]. One health data audit is certain to include and promote cartographic protocols for spatial and temporal data visualization, due to the environmental component which plays a role in disease and associated risk factor mapping using Geographic Information Systems (GIS) [5,6]. As Global Positioning System (GPS) technology advances, so is its practical application in the tracking and mapping of zoonoses in space and time to achieve more accurate and complete one health data sources representation [7]. The information generated about the timing, trend and spatial diffusion pattern of human-animal disease are vital in planning for control of future outbreaks [7,8]. Recognition of “*one health datapenia*” in the developing regions of the world and addressing it with the arts, science and technology of spatio-temporal data visualization is particularly timely, where incomplete or poor-quality data or both are mostly notable [4,9]. In West Africa, a forum for multi-disciplinary collaboration and communication in rabies education, capacity building for one health surveillance and sustainable resolution of *one health datapenia* was initiated in December, 2012 at the University of Ibadan, Nigeria by the Society for Rabies in West Africa (RIWA).

RIWA, a forum that coordinates regular meeting among stakeholders in public and private sectors for concerted one health action against human and animal rabies in the sub-region, was inaugurated to link Anglophone and Francophone West African countries in the surveillance and control of rabies [3]. It aims to disseminate progress reports on rabies surveillance and control activities within West Africa. Ten critical points of how one health data audit was carried out, exemplified by records of dog bite victims, included: compilation of what is already known about victims by case definitions and site names obtained in a defined retrospective period from clinic records of persons and offending dogs, inventoried as computer-stored data in spreadsheets; conversion of the site names to map points using standard global positioning system procedure; processing of map points using symbology of cartographic design available in geographic information application software to achieve user-friendly mapping along data source domains; identification of locations with possible undetected human and dog rabies cases and documentation of skewness in geospatial-observation linked data (GOLD) profile evident in the environment on one health inclusiveness and location-linked risk patterns; creation of time series plot of dog bite victims from case-based hospital surveys and household questionnaire surveys for a very clear time-trend of exposure events displayed on one health dashboard; utilization of additional helplines such as trained lay persons to facilitate surveillance and access to prophylactic care against rabies among at-risk individuals at the community level; formulation of a logical framework for more effective detection, control and stepwise elimination of the disease at the human-animal-environment interface and to guide caregiving; optimization of cost of preventive intervention through mass sensitization and spatial coverage of vaccination and availability of humanitarian services from local, national, regional or global partners; facilitation of sustainable collaboration and communication among

epidemiologists, geographers, laboratorians, physicians, sociologists, statisticians, veterinarians and lay persons; storage of one health user-friendly information on a secure server, providing open online access to service providers and the general public for control strategies towards stepwise elimination.

One health audit has emerged to promote multi-disciplinary and multi-sectoral collaboration and communication in a rapidly changing world of human, animal and environmental health. Our ability to protect, promote, improve, and advance health has evolved based on strategic one health collaboration [9,10]. The use of GIS for mapping is capable of further strengthening health systems and capacity in the West African sub-region. RIWA efforts has delivered One Health data audit at workshops in different countries in the sub-region, while recognizing the increasing role and relevance of spatio-temporal statistics. For instance, in Nigeria, the Centre for Control and Prevention of Zoonoses (CCPZ), University of Ibadan sponsored a rabies surveillance and diagnostic workshop (nicknamed "RAB-48"), facilitated by RIWA Nigeria at Babcock University, Ogun State, November 26-27, 2019. Participants were drawn from Ogun (Nigeria's gateway) State's Ministry of Health, Ogun State Ministry of Agriculture and Natural Resources, University of Ibadan and the Benjamin Carson School of Medicine, Babcock University. At the end of the workshop, participants endorsed one health surveillance agenda on rabies. The surveillance project commenced in January 2020 to uncover dog bite victims and affected animals in urban and rural areas of Ogun State, Nigeria. One health data audit at the School of Public Health in Babcock University offered the critical public-private higher educational partnership for coordinating and building students-practitioners relationship and interests for improvement of education, research and services in one health collaboration, where limited communication had been reported [4]. In the first

two months of 2020, six rabies exposed dog bite victims, two of which died were laboratory confirmed outside the usual urban environment of Ogun State. The outcome attracted humanitarian support from concerned citizens and Rotary International, offering free prophylactic care of exposed victims and gainful employment of the parents of victims that died. In this way, one health data audit enabled setting simple, measurable, achievable and realistic goals for improving multi-sectoral collaboration [9,10]. By acting locally within communities and with support from global health partners [10], one health auditors are already providing unified messaging on nowcasting and forecasting of dog bite and human rabies victims through RIWA. This represents a model of collaboration and communication among higher educational institutions, and the public and private sectors in West Africa. The model is adaptable to other zoonoses including Brucellosis, Buruli ulcer, Covid-19, Ebola virus disease, Swine influenza, Lassa fever and Tuberculosis in West Africa.

Competing interests

The authors declare no competing interests.

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