BIOSAFETY, BIOSECURITY, AND DISEASE SURVEILLANCE IN OGUN STATE

A Policy Brief by the Nigerian Academy of Science

THE NIGERIAN ACADEMY OF SCIENCE
ACADEMY HOUSE
8A Ransome Kuti Road
University of Lagos, Akoka, Lagos.
P.M.B. 1004 University of Lagos Post Office Akoka, Yaba, Lagos, Nigeria.
Tel: +234 808 962 2442
Email: admin@nas.org.ng Website: www.nas.org.ng

Introduction/Background

One of the key functions of any government; whether at the federal, state, or local government level, is the promotion of health for its citizenry. These monitoring and regulation activities are generally referred to as public health and also involve ensuring protection against epidemics; whether of natural or laboratory origins. It is therefore necessary that health workers who are charged with ensuring public health are adequately trained and equipped to carry out this all important task. This training should include aspects of biosafety, biosecurity, and disease surveillance which are requisite aspects of public health. In Nigeria, achieving effective disease surveillance in all its ramifications has posed a challenge. Although, in theory, frameworks for human and animal disease surveillance have been adopted, in reality, implementation has fallen far below the bench mark. Issues such as inadequate manpower and capacity building, poor infrastructure, poor feedback mechanisms, as well as inadequate financial and political support still plague the health system in Nigeria with a resultant impact on disease surveillance and management of epidemics.

Further complicating an already compromised situation is the apparent divide between the human and animal disease surveillance systems in Nigeria. Across the globe, the general consensus is that interdisciplinary cooperation is the way forward for achieving good health for all and an off shoot of this is the promotion of the 'One Health' initiative. One Health calls for cooperation between stakeholders from all branches of health, particularly human and animal health, to consolidate efforts to ensure health for all. One Health is of the utmost importance given the recent trends in emerging and re-emerging zoonotic diseases (diseases that can be passed from animals to humans). Nigeria has had its share of zoonotic diseases including yellow fever, lassa fever, and the recent outbreak of Ebola Virus Disease (EVD). In Nigeria, for the most part, an active One Health programme is non-existent. There is little or no interfacing between human disease surveillance (domiciled in the Ministry of Health) and animal disease surveillance (domiciled in the Ministry of Agriculture). This lack of collaboration does not augur well for public health in Nigeria.

The Nigerian Academy of Science (NAS) is the foremost independent scientific body in Nigeria. NAS is uniquely positioned to bring scientific knowledge to bear on the policies/strategic direction of the country and is also dedicated to the development and advancement of Science, Technology, and Innovation (STI) in Nigeria. One of the objectives of the Academy is the dissemination of scientific knowledge and facilitating its use in solving major problems of national interest. Over the years, NAS has been at the forefront of raising awareness on disease surveillance nationally and regionally through a number of stakeholder engagement activities. In August 2010, NAS organized a workshop for stakeholders in West Africa to explore the challenges hindering the implementation of the Integrated Disease Surveillance and Response (IDSR) tool, a disease surveillance framework, by the World Health

Organization (WHO), adopted by 43 African countries including Nigeria. Participants at the workshop agreed that there was a need for increased political support for disease surveillance activities across the sub-region[1]. In October 2012, NAS organized a follow-up workshop for Commissioners of Health and Directors of Public Health with representatives from 22 states in Nigeria to advocate for political support for IDSR implementation. Most recently in June of 2015, NAS in collaboration with the Ogun State Ministries of Health and Agriculture organized a training workshop for Disease Surveillance and Notification Officers (DSNOs) from both ministries on biosafety, biosecurity, disease surveillance, and One Health. This engagement sprang from key recommendations from the 2012 workshop to ensure the establishment and strengthening of functional epidemiology units at the state level, and the promotion of better collaboration between the medical and veterinary arms of disease surveillance especially as regards zoonotic infections[2].

The provision of scientific evidence for policy making is a key role of NAS and the Academy is in a unique position to do so due to its independent nature, and the expertise of its diverse Fellowship. It is only when stakeholders are supplied with relevant scientific information that impactful policies can be put in place.

Biosafety, biosecurity, and relevance to disease surveillance

Biosafety and biosecurity are interrelated concepts. Biosafety refers to practices intended to improve laboratory safety and protect health workers and the environment from exposure to dangerous materials. Simply put, it is ensuring that man (especially health workers) is not exposed to health risks in the course of handling hazardous materials. Biosafety extends to various aspects of life including agriculture, research, and medicine.

Biosecurity on the other hand refers to measures intended to protect biological diversity from the potential risk posed by living modified organisms or chemicals resulting from biotechnology. These measures keep hazardous materials and information from being used as weapons. Biosecurity is a relatively newer field than biosafety and came out of the realization that disseminating scientific findings may result in their use for bioterrorism which could endanger the human population[3]. Bioterrorism is a real and present concern in the world today and scientists have come to realize the dual use of science not just as a force for human development but also as a tool for destruction in the wrong hands. History is littered with incidences of bioterrorism; from the use of plague-infected cadavers during the siege of Caffa in 1346[4] to attempts to weaponize the Ebola Virus by the Amu Shinrikyo (a Japanese cult) in 1992[5]. Surveillance officers have a part to play in ensuring biosafety and biosecurity. This includes; compliance with established regulations, risk assessment, safety inspections and service, collaboration with internal and external partners, maintaining high ethical standards for professional service, awareness of the dual use of science for bioterrorism, as well as the promotion of dual use education[6].

Biosafety and biosecurity in Ogun State; polices and practice

In Ogun State, biosecurity and biosafety in human and animal health presents an interesting contrast. In terms of human

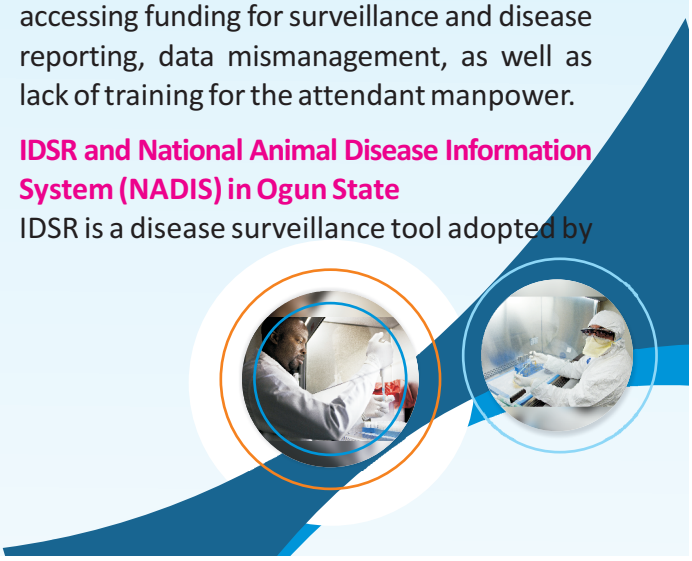
health and disease control, there is no specific State policy on biosafety and biosecurity. The protocols used by the State are as prescribed by the Centre for Disease Control and Prevention (CDC), WHO, and reference laboratories. These are used in conjunction with the already established basic universal safety precautions. Laboratory specific safety standards and protocols also exist. Factors affecting biosafety and biosecurity in the State include poor knowledge, poor compliance by most standard laboratories, as well as inadequate supply of materials for universal basic safety precautions.

Generally, in terms of veterinary health, biosafety addresses the safe handling and containment of infectious and hazardous materials, while biosecurity focuses on preventing the spread of disease to farms and live stock markets. Ogun State's veterinary biosafety policy follows common sense infection control practices with standard operating procedures; Veterinary Standard Precautions (VSP). These VSPs are based on the human standard safety precautions but in addition also include strategies to reduce zoonotic infections, bites, kicks, and other potential trauma. The Compendium of VSPs also covers areas of personal protective equipment (gloves, nose mask, lab coats, apron, gown, footwear, etc.), protective action during veterinary procedures, work environment control measures, engineering controls, as well as training[7]. The major gap in implementing this biosafety/infection control policy is that though it is known by practitioners, it is neither documented nor institutionalized. Furthermore, there is no comprehensive veterinary infection control policy for Nigeria as a whole; this is noticeably missing in the National Biosafety Bill.

The veterinary biosecurity frameworks used in Ogun State are the laws and guidelines that regulates the practice of animal health internationally as provided by the World Organisation for Animal Health (OIE)'s Terrestrial Animal Health Code, the World Trade Organization (WTO)'s General Agreement for Tariffs and Trade (GATT), the Food and Agricultural Organization (FAO)'s Transboundary Animal Disease information system (TADinfo), and the African Union Inter-African Bureau for Animal Resources (AU-IBAR)'s emergency preparedness plan. Nationally, there are also federal laws to ensure biosecurity such as the Veterinary Surgeons Act, biosafety acts, meat inspection and hygiene laws, reportable animal diseases list etc. As a result of international trade and zoonosis control, Nigeria sends reports of all activities relating to animal health and production including reportable diseases to the OIE. Also, the Federal Ministry of Agriculture published a guideline for disease reporting in Nigeria which was adopted by all states in the country including Ogun State. Also, past outbreaks of animal disease such as Rinderpest and Highly Pathogenic Avian Influenza (HPAI) in Nigeria have contributed to increased awareness and attention to biosecurity in animal health, with the various biosecurity guidelines being put into effect. Despite this, there are still a few challenges to be addressed including the absence of veterinary health biosecurity guidelines in the National Biosafety Act, disproportionate attention to veterinary services, difficulty in accessing funding for surveillance and disease reporting, data mismanagement, as well as lack of training for the attendant manpower.

IDSR and National Animal Disease Information System (NADIS) in Ogun State

IDSR is a disease surveillance tool adopted by



the WHO-African Regional Office (WHO-AFRO) in 1998. This strategy was adopted to address the prevailing issues in disease surveillance across the continent. Specifically, it seeks to coordinate and streamline all surveillance activities and ensure timely provision of surveillance data to all disease prevention and control programmes and health services at all levels. IDSR provides a framework through which stakeholders from the community level to the federal level work together to detect and respond to priority diseases and conditions with high morbidity, mortality, and disability rates. Within this framework, DSNOs report cases of epidemic-prone and priority diseases; monitor disease trends and detect impending epidemics within the Local Government Areas (LGAs); ensure that IDSR forms are available in all health facilities; ensure collection of data from all public and private health facilities within the LGAs; ensure existence of functional LGA Rapid Response Team (RRT); notify the State of any disease outbreak within 48 hours of detection; and conduct training and retraining of health personnel on IDSR. The intention on embracing IDSR was that "within ten years, all Member States would have established an effective and functional IDSR that will generate information for timely action thus contributing to the reduction of disability, morbidity, and mortality,"[8].

The progress of IDSR in Nigeria so far has seen the sensitization of health workers and stakeholders, establishment of surveillance structures, assessment of the surveillance system, development of IDSR policy and national plan of action, adaptation of generic IDSR guidelines, training manuals and tools, training and re-training on IDSR, as well as monitoring and evaluation of implementation. However, fourteen years after the official adoption in Nigeria, there are still gaps in IDSR implementation. Prevailing challenges exist in the areas of capacity building (suboptimal training, high turn-over of trained staff, dearth of health personnel, absence of linkages with health training institutions, adhoc RRTs at all levels especially State and LGAs); inadequate laboratory support (minimal infrastructure, reagents, supplies, and skilled personnel); and suboptimal implementation (surveillance data mismanagement, inadequate logistic support, weak monitoring and supervision at all levels, and poor resource allocation).

NADIS is a national veterinary surveillance network established by the Pan African Programme for the Control of Epizootics (PACE) and the National Special Programme on Food Security (NSPFS). NADIS, like IDSR, is a multi-level system based at the community, local government, and state levels with linkages to the federal level. Additionally, selected states are linked to zonal PACE offices, and abattoirs as well as the international and inter-state veterinary control posts serve as animal diseases surveillance points. The principal objectives of NADIS are the early detection of Trans-boundary Animal Diseases (TADS), timely response to these diseases, surveillance data collation, identification of resource needs in the field, and the monitoring and evaluation of the surveillance system. Veterinary surveillance officers are expected to investigate and collect information, locate index case/cases, collect samples for diagnosis, dispatch collected samples to designated national laboratories for diagnosis, enforce movement restrictions, and notify the State and PACE zonal offices.

The expected outcomes from the successful implementation of NADIS would be the collection of quality data from potential sources, periodic survey of animal population, close alliance between the field and laboratory, presence of a two – way reporting system, alliance with neighbouring countries and OIE, and regular trainings.

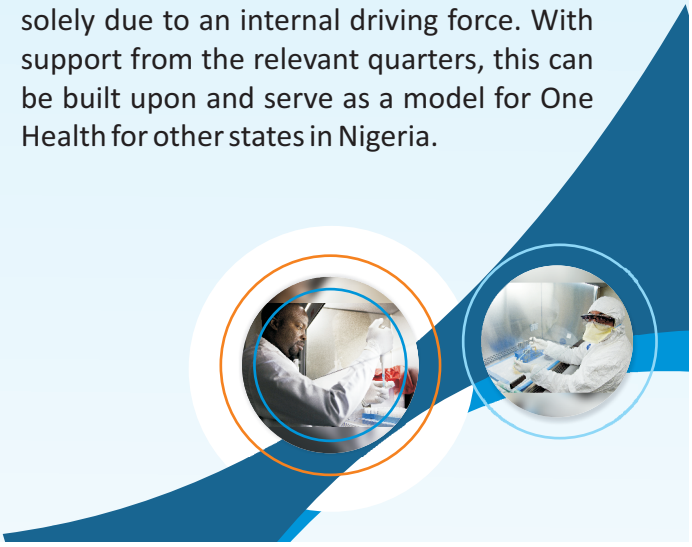
As with IDSR, lack of personnel, funding, training, and infrastructure are factors militating against effective NADIS implementation in Nigeria. In addition to this, other barriers are non-functional control posts and lack of serological surveillance.

The relevance of One Health

One Health is an evolving, interdisciplinary approach to handling complex health issues by recognizing the interconnectivity of human health, animal health, and the environment. It involves stakeholders from these disciplines looking beyond narrow professional perspectives but rather towards a more holistic view of health, working together to attain health for people, animals, and the environment. Although One Health is a new term, it is not a new concept. From the time of Hippocrates, the relationship between the veterinary, human, and environmental arms of health has been a recurring theme. The re-emergence of this old concept is due to the growing trend of emerging and remerging infections most of which are zoonotic in nature[9]. With the changing environment leading to increasing contact between humans and animals, and the use of animals to support humans socially and economically, there is a heightened risk of disease transmission from animals to humans. This increasing intimate relationship creates complex challenges calling for cross-disciplinary cooperation.

Nigeria has contended and is still contending with the prevention and control of zoonotic infections. Yellow fever which has been eradicated by most other countries is still an issue for Nigeria. Lassa fever has been endemic in Nigeria for forty-five years. Rabies is still an issue in Nigeria due to human activities, attitudes and error; major ecologic, environmental and anthropogenic changes leading to changes in agricultural practices; hunting with dogs; increasing demands for meat; migration of dogs and stray animals; increasing frequency of consumption of animal brain; vaccine failure; and low vaccination coverage with an increasing non-immune population. Most recent was the EVD outbreak which shook the country and West African sub-region to its core. This outbreak has resulted in 27,876 cases with 11,290 deaths in the affected countries as at July 2015[10].

Although there is no state or national funding or policy for One Health, stakeholders in Ogun State have taken a few important steps in building collaboration between the Ministries of Health and Agriculture. In the past, the Ministries have worked closely to control an outbreak of Avian Influenza in the State and prevent transmission to the human population. Furthermore, there is an open line of communication between the technocrats in both ministries charged with ensuring human and animal health in the State. This situation in Ogun State is encouraging as the 'informal collaboration' between both ministries so far came about solely due to an internal driving force. With support from the relevant quarters, this can be built upon and serve as a model for One Health for other states in Nigeria.



Recommendations

To ensure that Ogun State is adequately equipped to militate against disease epidemics and provide health for its citizenry, the following recommendations are put forward:

- Nigeria's health system should be strengthened with strong governance structures, legal frameworks, recognition of existing international standards, as well as adequate and equitable distribution of resources
- Biosafety and biosecurity involves team effort and therefore requires inter-sectoral collaboration
- The Nigerian biosafety law should be holistic in nature, incorporating other aspects of biosafety and biosecurity other than biotechnology
- There is a need to develop a biosafety and biosecurity policy for human disease surveillance in Ogun State. Without standardized and institutionalized frameworks, there will be no guidelines for practice. Relevant equipment and infrastructure for implementing biosafety and biosecurity protocol should also be made available at all levels in the State
- A compendium of Veterinary Standards Precautions for zoonoses prevention for veterinary personnel should be created to provide guidelines for biosafety
- Occupational risk/infection control guidance should be institutionalized in medical and veterinary practice. There is a need for continued capacity building on biosafety, biosecurity, and disease surveillance frameworks particularly for Surveillance Officers
- There is a need for stakeholders at the state level to take ownership of disease surveillance frameworks by providing political and financial support to ensure effective implementation.
- Surveillance data management in the State should be strengthened. Disease outbreaks should be investigated in a timely manner and reports shared using the standardized format. Efforts should be made to monitor the timeliness and completeness of reporting. Zero reporting should be considered as part of disease surveillance reporting
- Access to standard and reference laboratory for disease surveillance should be provided. Effective laboratory support and networking should be put in place through the establishment/strengthening of public health laboratories and upgrading of existing laboratories at the State and local government levels
- Epidemic Preparedness and Response (EPR) committees at the State and LGA levels should be established/strengthened
- Veterinary health control posts should be strengthened and regular serologic surveillance should be carried out
- The push for One Health should come from the top, a high level of commitment on the part of policy makers, strong political will, trust, as well as shared objectives and benefits are all essential
- All relevant partners should be identified and involved in the pursuit of One Health in Ogun State. These include stakeholders from veterinary medicine, human medicine, environmental health, ecology, health economics, etc.
- Routine communication and data sharing between stakeholders is necessary. Mechanisms for joint cross-sectoral simulation exercises and risk assessment should be put in place. Active

cooperation on disease control programmes, particularly zoonoses, is needed

Conclusion

DSNOs occupy a critical niche in the public health system of any state. They are basically the ears and eyes of the State, linking local communities with relevant officers at the state level. It is therefore important to arm them with the knowledge, training, equipment, and infrastructure to carry out their mandates/ duties. It lies with the government to build the capacity of its workforce; in this case surveillance officers. Nigeria has policies for health and disease surveillance; implementation is where the country has fallen short.

Efforts should be made to ensure that the positive outcomes of effective NADIS and IDSR implementation become actualities. This can only be achieved through state ownership of these frameworks especially in the form of political and financial support. In instances where there are lapses in policies; as is the case with the human branch of biosafety and biosecurity in Ogun State, urgent steps as listed in the recommendations are required to fill this gap so as to minimize the potential harm to health workers and the general public. It is important for Nigeria as a whole to embrace the new era of interdisciplinary cooperation in health. The era of building invisible walls between the various arms of health is over; the buy-in and support of policymakers will serve to propel Nigeria into a new age of inter-sectoral collaboration.

References

1 The Nigerian Academy of Science. 2010. Integrated Disease Surveillance and Response (IDSR) in West Africa-Bridging the gaps. Tomori O, Odubanjo MO, Lan SM (eds).

2 The Nigerian Academy of Science. 2013. Integrated Disease Surveillance and Response (IDSR) Stakeholders Awareness Creation Workshop (Workshop Summary). Tomori O, Odubanjo MO, Lan SM, Olanipekun AO (eds).

3 National Research Council (US) Committee on a New Government-University Partnership for Science and Security. Science and Security in a Post 9/11 World: A Report Based on Regional Discussions Between the Science and Security Communities. Washington (DC): National Academies Press (US); 2007. IV, Biosecurity and Dual-Use Research in the Life Sciences

4 Wheelis, M. (2002). Biological Warfare at the 1346 Siege of Caffa. Emerging Infectious Diseases, 8(9), 971-975. doi:10.3201/ eid0809.010536

5 Riedel, S. (2004). Biological warfare and bioterrorism: a historical review. Proceedings (Baylor University. Medical Center), 17(4), 400–40

6 Committee on Education on Dual Use Issues in the Life Sciences, Board on Life Sciences, Division on Earth and Life Studies, National Research Council. Challenges and Opportunities for Education About Dual Use Issues in the Life. Washington DC: National Academies Press. 2010.

7 NASPHV Compendium of Veterinary Standard Precautions JAVMA, Vol 237, No. 12, December 15, 2010 1405-1421

8 WHO-AFRO Regional Committee For Africa Fifty-eighth session, Yaounde, Republic of Cameroon, 1-5 September 2008: Strengthening public health laboratories in the WHO African region: a critical need for disease control

9 Karesh, WB et al. Ecology of zoonoses: natural and unnatural histories. The Lancet , Volume 380 , Issue 9857 , 1936 – 1945

10 http://www.cdc.gov/vh f/ebola/outbreaks/ 2014-west-africa/ case-counts