

RESEARCH: EDUCATION, SCIENCE AND SERVICE

(a) Research Completed

1. Studies on work system design, privatization of veterinary services and actualization of “One-Health” collaboration in West Africa
2. Epizootiology of priority trans-boundary animal diseases, especially viruses of high economic importance in West Africa (including African swine fever, Foot-and-Mouth Disease and *Peste des Petits Ruminants*)
3. Epizootiology of priority zoonotic diseases of viral aetiology in West Africa (including Highly Pathogenic Avian Influenza H5N1, human and swine influenza H3N2, and Rabies)
4. Development of geo-spatial information infrastructure and data profile of Lassa fever in Liberia: a nowcasting and forecasting model for West Africa

(b) Research In Progress

1. URBANE: One Health approaches to support agroecological transformation of peri-urban farming in south-western Nigeria

This project was started in June 2022 to explore the links between farming practices (crop and animal production) and health as it applies One Health approaches, including agroecology, novel diagnostics, probiotics and information technology to resolve intensification of peri-urban agriculture and the health of animals, humans and the ecosystem as a whole. URBANE supports a logical framework that aims to achieve more effective agroecology and better health of humans, animals and the ecosystem in general by promoting improvements in their physical and psycho-emotional states. Use of the URBANE novel tools, including SWINOSTICS portable diagnostics device for African swine fever, Avian influenza, Foot-and-Mouth Disease and Newcastle Disease, and the engagement of local knowledge is used as drivers to support decision making and achieve a high impact. URBANE is designed to build on local knowledge, supported by new technologies and best practices applied in European regions where agroecology is already applied in intensified, market-oriented production fields. The URBANE DSS will be delivered in two versions: a) for farmers in the form of a friendly application and b) for authorities providing information on the potential dangers and the environmental, animal and crop yield impact of the application of agroecological farming practices. The project will be completed in 2026.

2. Research and education in spatio-temporal mapping of Lassa fever spread and control at the human-animal-environment interface in West Africa

This project was started in October 2020 as a major attempt at sustaining education, science and service on Lassa fever among farming communities in

West Africa in Nigeria and selected West African countries. The project is now 60% completed and is due for completion in October 2024. Viral Haemorrhagic Fevers, including Ebola virus disease have led to epidemic of international concern in West Africa in the past one decade. Lassa fever has received increased attention of the Nigeria Center for Disease Control, yet it is far from being effectively controlled. Epidemiological efforts in all the countries affected are still needed. This study deploys sero-surveillance in south-western Nigeria, since there is need to actively sustain surveillance at strategic locations across the sub-region. Geographic maps and time-series analysis of risk factors of Lassa fever are being compiled and evaluated in this study at the human-animal-environment interface. To date, 2 postgraduate students (1 PhD, 1 Master of Philosophy) have benefited from the project. I offer community health extension services on Lassa fever risk and control through the Centre for Control and Prevention of Zoonoses (CCPZ), University of Ibadan.

3. Research and education in the spatio-temporal mapping of Pandemic Influenza-A virus spread and control at the human-animal interface in West Africa

This project is a major attempt at sustaining research activities in the occurrence, distribution, control and prevention of Pandemic Influenza-A virus (PIAV) in Ghana, Liberia, Nigeria and Sierra Leone. The studies entail isolation and molecular characterization of Influenza-A viruses and their phylogenetic analysis in comparison to influenza strains accessioned in the NCBI GenBank. The project aims to achieve One Health audit, spatial mapping and time-series model of PIAV at the human-animal-environment interfaces in West Africa. Two postgraduate students (1 PhD, 1 Masters) have benefitted from this project. From the on-going studies, some eight (8) influenza-A viruses have been isolated, with their nucleotide and protein sequences accessioned in NCBI GenBank. The GenBank accession numbers are: (i) KX429673; (ii) KX429674, (iii) KX429675; (iv) KX429676; (v) KX429677; (vi) KX429678; (vii) KX429679; and (viii) KX429680. I have provided leadership to promote community health education in West Africa, providing extension information on influenza occurrence, spatial distribution pattern, with forecasts and control in selected communities at risk in Ghana, Liberia, Nigeria and Sierra Leone.

(c) Project, Dissertation and Thesis

Olugasa, B. O. Determination of the health status and problems of a small flock of West African Dwarf Goats in a backyard environment in Ibadan, Nigeria. D.V.M. Project, 1995. University of Ibadan, Ibadan, Nigeria. 102 pp.

Olugasa, B. O. Evaluation of the health status and problems of resident White Fulani cattle herds in Eruwa town and environs, Oyo State, Nigeria. M.Sc. Epizootiology Project, 1999. University of Ibadan, Ibadan, Nigeria. 88 pp.

Olugasa, B. O. Epizootiology of African swine fever outbreaks in South-Western Nigeria, 1997-2005. Ph.D. Thesis, 2006. University of Ibadan, Ibadan, Nigeria. 204 pp.

Research Focus

My research is focused on veterinary epidemiology and public health informatics. I have identified bio-medical, spatio-temporal and socio-environmental drivers of selected animal and zoonotic diseases. I aimed at achieving more effective surveillance of diseases at the human-animal-environment interface, using the tools and techniques of epidemiology. This enables early warning, tactical control of diseases using limited resources in Africa. My studies aimed at detecting endemic, emerging and neglected animal or human-animal diseases; mapping their spatial distribution pattern, prevalence, and computing their time-trend models to improve services delivery, aiding forecasts for efficient control framework.

I integrated geographic information systems (GIS) and global positioning systems (GPS) tools into clinical case review of specific pathogens, with laboratory data on exposures to achieve and deploy a robust toolkit for one health data audit of specific-illnesses. This was used to harness public health project planning approach to epidemiological survey methods. This, included use of ELISA technique, virus gene isolation, molecular characterization, and phylogenetic analysis. The study designs were targeted at informing tactical veterinary extension delivery for sustainable public health promotion in West Africa. I have studied place-based clinical (individual) and public health (population) outcomes of animal diseases, including African swine fever, Foot-and-Mouth Disease, *Pest des Petits Ruminants*; and zoonotic diseases, including Ebola virus disease, Human and Swine Influenza, Lassa fever, and Rabies. I have quantified their prevalence, identified the socio-environmental drivers, and public health impacts. These provided information that linked animal and human health to their environment, in a way that could assist policy makers to set public health goals at city/town and district, levels.

These efforts yielded network of improved human-animal disease surveillance programme in West Africa, a co-reviewed postgraduate curriculum in epizootiology at the University of Ibadan that deployed GIS-GPS tools to convert clinical data from animal hospital, human hospital and diagnostic laboratories to map points, included data from field investigations and care-seeking preferences of victims. The concept won a major grant from the John D. and Catherine T. MacArthur Foundation Higher Education Initiative in Africa to establish the Centre for Control and Prevention of Zoonoses (CCPZ) at the Faculty of Veterinary Medicine, University of Ibadan, Nigeria. The emergence of CCPZ has intensified my use of One-Health data audit to model the spatio-temporal patterns and estimate annual human deaths from rabies, Lassa fever and influenza in selected cities of Liberia, Ghana and Nigeria. I provided epidemiological lead that isolated emerging influenza-A and rabies viruses with their nucleotide's sequences accessioned in GenBank. The maps developed on these outbreaks were used for public health practice and to fill critical gaps in literature due to under-reporting of cases of these major neglected diseases. A Society for Epizootiology in West Africa and a Society for Rabies in West Africa (RIWA) were incorporated as One Health fora dedicated to Stepwise Actions toward Rabies Elimination in the sub-region.

Thus, my contributions towards One Health knowledge and public health practice have been modest; fostering data audit, early detection of disease exposures, identifying their drivers, showing their pattern of spread, and predicting the outcome scenarios with logical framework. The One Health models are adaptable to other locations in West Africa and are useful for identifying potential sites of epidemics before a pathogen causes havoc. I delivered early warning about African swine fever, Swine influenza and Lassa fever epidemics. I facilitated public health actions for mitigating outbreaks in selected localities.