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Applied Biological and
Biosecurity Research Laboratory



Global Health, Emerging Infectious Diseases, and Food Safety Implications of Bushmeat Consumption

Defining the role of wild animal meat as vehicles for transmitting important zoonotic pathogens to humans

Overview

Bushmeat is a widely harvested source of animal protein in many parts of Africa. It is typically harvested illegally in highly contaminated environments and transported to distant markets in unhygienic conditions. Given the documented prevalence of *anthrax*, *Brucella* and *Coxiella* amongst wild ungulates in Tanzania, bushmeat represents a plausible but yet undefined public health risk. To help traverse these critical knowledge gaps, we propose investigations to map the distribution of these major human and animal pathogens in bushmeat from different geographic and ecological regions of Tanzania using a comprehensive and statistically robust sampling approach. Additionally, microbiome surveys of bushmeat and lymphoid tissues from various animal species, geographic locations, and seasons will be used to define the total pathogen burden. With substantial partner country engagement, we anticipate that our proposed research program will help strengthen Tanzania's infectious disease research and disease surveillance capabilities, and thereby ensure sustainable impact.

Objectives / Goals

The overall objective of this study is to map the distribution and prevalence of zoonotic pathogens in bushmeat from different geographical and ecological regions of Tanzania and assess the biological risk and potential for impact on human health. A second objective is to characterize the spectrum of microbes present in market bushmeat and identify signatures of novel pathogens that may pose potential animal and human health risk. A final objective is to enhance one-health bio-surveillance capabilities in Tanzania.

Technical Approach

This project is divided into two phases. During the first phase of the program,

Mission Area:

Understanding Pathogen Dynamics and Creating Sustainable Interventions

Type: Hypothesis-Driven

Research, Capacity

Building

Region: Africa

Countries: Tanzania (Phase I)

Status: Ongoing



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we designed and built facilities, hired and trained staff and established local collaborations for sample acquisition. A two-week workshop was conducted in Tanzania by experts from Penn State and elsewhere that included lecture and field exercises covering various laboratory and mapping techniques and epidemiological analyses. Trainees were drawn from sectoral ministries responsible for livestock development, wildlife and natural resources, health, agriculture and science and technology. In addition, a metagenomics approach using next generation sequencing was developed for the characterization of new and emergent microbes in bushmeat. During the second phase, samples were collected from national parks and reserves. Molecular and metagenomic analysis is currently being performed on both fresh and processed samples primarily looking for DNA signatures of *Brucella*, *Bacillus anthracis*, and *Coxiella*. Experts in the fields of microbiology, genomics, epidemiology, geo spatial analysis, social sciences, ecology, veterinary science, bioinformatics, and statistics are coming together to rigorously analyze the data sets using molecular and genomic based approaches and decipher the implications of the findings on human and animal health in Tanzania and its effect on the global disease burden.

Partners

Funders:

- Defense Threat Reduction Agency (DTRA) - Cooperative Biological Engagement Program (CBEP)

Implementation / Scientific:

- Nelson Mandela African Institute of Science and Technology, Arusha, Tanzania
- Biosciences eastern and Central Africa hub (BeCA) at the International Livestock Research Institute in Nairobi, Kenya
- Sokoine University of Agriculture (SUA), Tanzania
- National Health Laboratory and Quality Assurance Training Center (NHLQATC), Tanzania
- Tanzanian Wildlife Research Institute (TAWIRI), Tanzania
- Tanzania National Parks Authority (TANAPA), Tanzania