SURVEILLANCE ASSESSMENT:

SIERRA LEONE

A Report from STOP Spillover

September 23, 2022

CONTENTS

STOP SPILLOVER

Strategies to Prevent Spillover (or "STOP Spillover") enhances global understanding of the complex causes of the spread of a selected group of zoonotic viruses from animals to humans. The project builds government and stakeholder capacity in priority Asian and African countries to identify, assess, and monitor risks associated with these viruses and develop and introduce proven and novel risk reduction measures. "Spillover" refers to an event in which an emerging zoonotic virus is transferred from a non-human animal host species (livestock or wildlife) to another, or to humans.

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INTRODUCTION

The Surveillance Assessment (SA) is a tool used to identify existing sources of and gaps in surveillance information regarding STOP Spillover priority pathogens. Completed by STOP Spillover country team members with support from the global STOP Spillover team, these assessments ensure that STOP Spillover activities complement current surveillance activities and build upon current country capacity, as well as identifying synergies and areas of mutual interest across stakeholders and institutions within the country.

A common information gathering framework was used to summarize relevant resources and capacity with respect to surveillance systems, research networks, and laboratory diagnostics. This framework helped the STOP Spillover team to identify common gaps across target countries, and allows the STOP Spillover team to compare progress and lessons learned across countries. The SA serves as a resource for the global consortium and country teams, and aids them in strengthening existing local systems. The data and insights from the SA were used to support Outcome Mapping and work plan development and to identify potential project collaborators.

METHODS

BOX 1: STOP Spillover Priority Pathogens

Sierra Leone SA scope outline in red

- Nipah Virus
- Avian Influenza Viruses
- Zoonotic Coronaviruses
- Filoviruses
- Lassa Virus

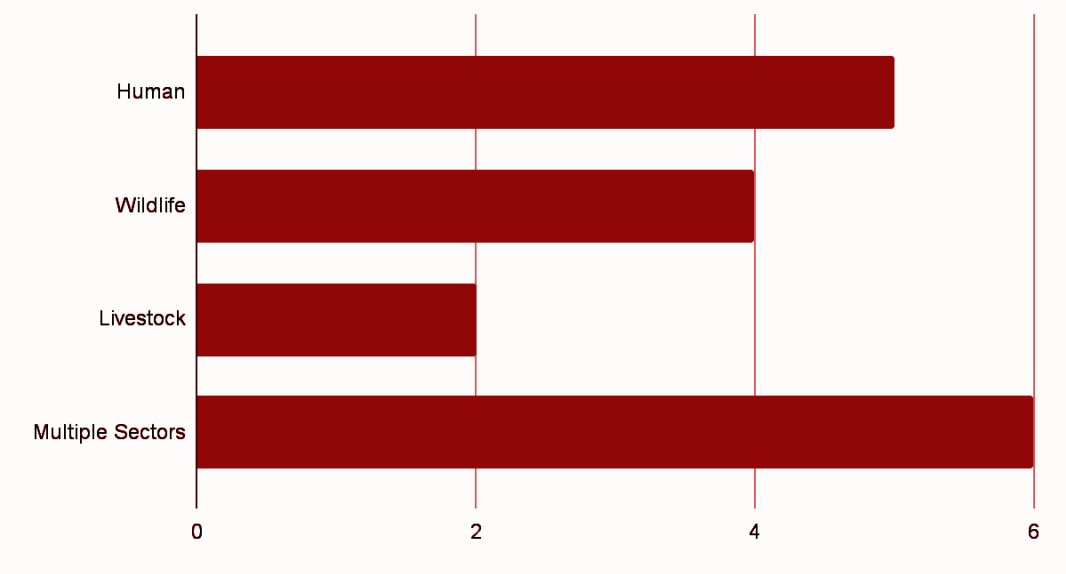
The Sierra Leone SA team communicated with multiple stakeholders (both public and private) through personal visits, phone calls and email. Based on surveillance assessment criteria, a pre-structured questionnaire was used for data collection. The same questionnaire was used across STOP Spillover countries, and adapted for each laboratory visited. Data were collected in four different segments: surveillance systems, surveillance projects, laboratories and outbreak investigation/response systems. Both in-person and virtual meetings were arranged to interview stakeholders. A subset of the SA team conducted semi-structured interviews via video conference with identified leads for STOP Spillover priority pathogens in Sierra Leone, to identify gaps in the current systems and to identify potential partners for collaboration during project implementation.

RESULTS

FINDINGS FROM THE SA ARE SUMMARIZED BELOW:

FIGURE 1: NUMBER OF INSTITUTIONS CONTACTED IN SIERRA LEONE, BY THEMATIC FOCUS (N= 17)

April – June 2022



Stakeholders involved in surveillance activities

- Government: 3 Ministries
- International organizations:11 different universities and international entities

Surveillance priorities by sector

- Human: 5 actors- WHO, CDC, Partners in Health, IFRC, MOHS
- Wildlife: 4 actors - Plan Verus, Forestry Division, FAO, Metabiota, UC Davis
- Livestock: 2 actors - FAO, MOAF
- All/cross-cutting: 3 actors - STOP Spillover, BI, CREID

Surveillance projects by sector

- Human (5)- COMSA, Post-Ebola Recovery Social Investment Project (PERSIP), Health Systems Strengthening and Epidemic Prevention phase 2 (HSS), Enable Lassa Research Study (ELRS), China CDC Sentinel Surveillance Project (SSP)
- Wildlife (3)- Tacugama Chimp Sanctuary, PREEMPT UC Davis, Plan Verus project
- Livestock (2)- Crimean Congo Haemorrhagic fever ecology project

- Multiple (human, wildlife, livestock, environmental)- (7) - Project 1808; West Africa Research Network for Infectious Diseases/CREID; Pan African Network for Rapid Research, Response, and Preparedness for Infectious Diseases (PANDORA); Community Epidemic and Pandemic Preparedness Project (CP3); Field Epidemiology Training Project (FETP); West African Centre for Emerging Infectious Diseases (WACEID); FAO/ECTAD program

Hosts of laboratories

- Government (Ministry of Health and Sanitation) labs: Public health reference lab, Kenema VHF lab, Connaught molecular lab, Makeni molecular lab, Military infectious diseases lab
- Government (Ministry of Agriculture) labs: Central Veterinary Lab
- University labs: Njala University One Health Serology Molecular Diagnostic Lab, Njala University Molecular Lab, University of Makeni Infectious Disease Research Lab

Labs doing conventional PCR: 4 labs- NU Molecular lab, UNIMAK lab, Njala OH Serology Molecular Diagnostics lab, Kenema VHF lab

Labs doing real-time PCR: all except the Central Vet Lab

Sequencing capabilities: 4 labs have sequencing capacity; Central Vet Lab, Njala OH Lab, Connaught Molecular Lab, Makeni Molecular Lab

Diseases prioritised for surveillance activities

- VHFs (6 labs)
- All diseases (1 lab; Public Health Reference Lab)
- Others- Anthrax, Rabies, HPAI (2 labs; Central Vet Lab, Njala University OH Serology Lab)

Source(s) of electricity in the labs

- Solar- exclusively (1 lab- Public Health Reference Lab)
- Generator (5 labs)
- Solar with back-up generator (4 labs)

Data management tools- excel spreadsheet, digital software systems, hardcopy

Record keeping and documentation

- Wildlife and livestock samples (EMAi and EMPRES-I systems)
- Human samples (DHIS2 system)

Types of surveillance systems

- Real-time surveillance (e.g., Integrated Animal Disease Surveillance and Response- IADSR- used for livestock surveillance reporting)
- Indicator-based surveillance systems (e.g., IDSR), event-based surveillance systems, and sentinel surveillance systems used for human surveillance reporting
- Sentinel surveillance systems used for wildlife surveillance reporting

TABLE 1: LIST OF PROJECTS, LOCATIONS, FUNDERS AND PRIORITY PATHOGENS CURRENTLY UNDER STUDY IN SIERRA LEONE

Project	Sites (districts)	Study type	Funder(s)	Priority pathogen
ELRS	Kenema	Serosurvey	CEPI	Lassa
Plan Verus	Karene	Wildlife monitoring		
SSP	Multiple	Sentinel surveillance	Government of China	EBV, Lassa, Marburg
CP3	Kambia, Kailahun	Community-based surveillance	USAID	All priority zoonotic diseases
FETP	Countrywide		US-CDC	HPAI, COVID, VHFs
CREID			CREID Network	
PREEMPT	Countrywide	Lassa ecology	DARPA	Lassa
PERSIP				
HSS			GIZ	
CCHF ecology	Countrywide	Surveillance		CCHF
Tacugama	Multiple	Wildlife monitoring		TB
Project 1808	Kenema	Wildlife sampling		
COMSA	Bo	Serosurvey		
ECTAD	Pujehun, Kenema, Kailahun		USAID	

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STOP SPILLOVER
Surveillance Activities in Sierra Leone

Tufts UNIVERSITY

A surveillance questionnaire was used to carry out the surveillance assessment. The Sierra Leone team engaged technical leads of clinical and public health laboratories at the national and district level. The results of the survey are summarized in the table below. With this information, we know who to engage for which type of surveillance work. We can reach out to the right partner to do analyses for our research activities such as where to send data and what kind of tests the lab can process.

SECTOR →	HUMAN	WILDLIFE	LIVESTOCK	MULTIPLE SECTORS
# PROJECTS BY SECTOR (17 total)	5	4	2	6
KEY ACTORS BY PROJECT SECTOR	WHO, China-CDC, Partners in Health, IFRC, Ministry of Health, GIZ	Forestry Division, Pan Verus, Metabiota	Ministry of Agriculture, FAO	CREID, Broad Institute, USAID, US-CDC
PRIORITY PATHOGENS PER SECTOR	Lassa, Ebola, Marburg	Lassa, Tuberculosis	Salmonellosis, Rabies, Anthrax, Avian Influenza, Rifts Valley Fever (VHF), Crimean Congo Fever (VHF)	Salmonellosis, Rabies, Anthrax, Avian Influenza, Rifts Valley Fever, Crimean Congo Fever
SURVEILLANCE SYSTEM TYPES	Indicator Based Surveillance and Case Based Surveillance, Event Based Surveillance, Sentinel Surveillance	Sentinel Surveillance	Real-time surveillance, Integrated Animal Disease Surveillance and Response	Ministry of Health, Ministry of Agriculture, Ministry of Environment
LABORATORIES (Host Institution)	Ministry of Health and Sanitation	Njala University	Ministry of Agriculture	Kenema VHF Lab, Njala University
CURRENT SURVEILLANCE STUDIES	• Enable Lassa Research Study • China CDC Sentinel Surveillance Project • Post-Ebola Recovery Social Investment Project • Health Systems Strengthening and Epidemic Prevention • COMSA	• Pan Verus Project • PREEMPT (UC Davis) • Sierra Leone Chimpanzee Rehabilitation Program/Tacugama Community Outreach Program	• Crimean Congo Haemorrhagic Fever Ecology Project (UC Davis)	• Community Epidemic & Pandemic Preparedness Program • Field Epidemiology Training Program • West African Centre for Emerging Infectious Diseases

The surveillance assessment revealed key challenges, listed in the table below, as well as the depth of current surveillance studies covering a range of diseases and using multiple surveillance system types. There are opportunities for the STOP Spillover team to collaborate with the studies listed above.

CHALLENGES TO EFFECTIVE SURVEILLANCE PRACTICES IDENTIFIED DURING ASSESSMENT

ENERGY	WASTE MANAGEMENT	HUMAN RESOURCES	INFRASTRUCTURE & EQUIPMENT
• Erratic electricity supply • High generator running cost	• Poor waste management • Broken incinerators	• Inadequate human resources • Lack of context specific skills and capacity	• Limited laboratory space & infrastructure • Inadequate supply chain access to equipment • Inadequate specimens

ANALYSIS & CONCLUSION

Challenges to effective and efficient surveillance

- Broken incinerators
- Poor waste management
- Erratic electricity supply
- High generator running cost
- Inadequate specimens
- Limited lab spaces
- Inadequate human resources

TABLE 2. GAP ANALYSIS

Ebola	Lassa
1. Lack of community-based surveillance	1. Lack of community-based surveillance
2. Lack of wild animal or bushmeat surveillance	2. No regular *Mastomys* surveillance
3. No reliable sustained source of funding. Work is currently donor-driven	3. No reliable sustained source of funding. Work is currently donor-driven
4. Lack of linkages between human and animal surveillance data	4. Lack of linkages between human and animal surveillance data
5. Other knowledge gaps were identified, but were not surveillance gaps: a. Transmission dynamics and spillover risk. We don't know much about the relative importance of endemic transmission from bats and other infected animals compared to human-human transmission.	4. Other knowledge gaps were identified, but these were not surveillance gaps: a. Community attitudes toward Ebola and Lassa. Does Lassa carry a similar stigma to Ebola that would cause people to avoid seeking care? b. Why are there so few new Lassa cases detected, given that Lassa fever has been endemic in the country? Are there really fewer cases, or just less identification and reporting? c. Transmission dynamics and spillover risk. We don't know much about the relative importance of endemic transmission from rodents compared to human-human transmission.

LASSA VIRUS

The Lassa virus surveillance system in Sierra Leone is relatively effective in identifying cases at participating regional and national hospitals. Case identification is essential for preventing secondary transmission and also for providing consistent surveillance data to detect changes in frequency or in spatial or temporal distribution of cases. The current system does not extend to the community level, which means many cases are missed (or attributed to malaria), and this limits the ability to characterize spillover risks. Currently all viral hemorrhagic fevers (VHF) are reported together in the national surveillance system (eIDSR), and fever cases are attributed to malaria. Routine surveillance targeting animals (*Mastomys* rodents) would enhance regional and local capacity to identify and characterize spillover risk. An expanded Lassa virus surveillance system would be costly, and the potential benefits have not been quantified. A pilot community-based surveillance could permit a cost-benefit analysis to inform decision-making on the value of an expansion of the current surveillance system.

FILOVIRUSES (Ebola and Marburg)

The filovirus surveillance system in Sierra Leone appears to be effective in identifying cases at regional and national hospitals. Case identification is essential for preventing secondary transmission and also for providing consistent surveillance data to detect changes in frequency or in spatial or temporal distribution of cases. The system does not extend to the community level, which means many cases are likely missed, and this limits the ability to characterize spillover risks. Surveillance targeting animals (bats, duikers and non-human primates) would also enhance local and regional capacity to identify and characterize spillover risk. Expanded EBV surveillance would be costly, and potential benefits have not been quantified. A pilot community-based or animal-based surveillance could permit a cost-benefit analysis to inform decision-making on the value of such an expansion of the surveillance system.