

ACTIVITY 2.2.2.2: WILD MEAT BIOSAFETY INTERVENTION FINAL REPORT

A Report from STOP Spillover Sierra Leone
September 2023



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STOP SPILLOVER

Strategies to Prevent Spillover (or “STOP Spillover”) enhances global understanding of the complex causes of the spread of a selected group of known 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 proven 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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Cover Photo: A wild meat trader in the Kingsway Corner Market in Kenema District with PPE (Photo Credit: Mohamed Fofanah)

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LIST OF ACRONYMS

GRNP	Gola Rainforest National Park
OHDWG	One Health Design, Research, and Mentorship Working Group
OM	Outcome Mapping
PPE	Personal Protective Equipment
SBC	Social Behavior Change

EXECUTIVE SUMMARY

Wildlife species act as reservoirs for a range of pathogens, including zoonoses that can spillover to human populations and cause outbreaks (Kruse et al 2004; Karesh et al 2012). Wildlife are hunted in Sierra Leone and are an important source of animal protein for rural communities and urban dwellers (Cawthorn et al 2015; Sainge et al 2023). One of the largest markets for wild meat in Sierra Leone is in Kenema, a district in Eastern Province (Jagadesh et al 2023; Sainge et al 2023)¹. Most of the wild animals sold in the market come from the Gola Rainforest.

Actors involved in the wild meat trade do not use any form of protection to reduce contact with wildlife pathogens and diseases (STOP Spillover Activity 1.2.6.2 Ebola Formative Research Report). To address this gap, STOP Spillover designed an integrated package of interventions to reduce Ebola spillover risks by promoting the adoption and use of biosafety practices among wild meat traders and processors at the Kingsway Corner Wet Market in Kenema.

Interventions included: 1) distribution of locally available and affordable biosafety materials (personal protective equipment, or PPE) 2) training wild meat processors and traders on safe wild meat handling practices and use of PPE; 3) development of new wild meat market biosafety guidelines; 4) support to improve the enabling environment in the market to facilitate the sustained adoption and use of biosafety materials and practices; and 5) social behavior change (SBC) messaging and efforts to promote safe wild meat handling practices.

The STOP Spillover team and One Health Design, Research and Mentoring Working Group (OHDWG) members, including local stakeholders, assessed the social, economic, and cultural acceptability of each tested approach. During Phase I, initial findings indicated that the adoption of PPE among wild meat traders and processors increased from zero to 43% for full or partial PPE use, with a high degree of acceptance and willingness to pay for the cost of adopting these biosafety measures (STOP Spillover Activity 2.2.2.2 Interim Report).

This report summarizes results from the last three months of intervention implementation in the Kingsway Corner Market (July – September 2023; Phase II). This is the final report describing intervention implementation in the wild meat market; all interventions end on September 30 2023. The STOP Spillover team will continue to conduct light monitoring in the market using local OHDWG members and stakeholders, in order to validate the adoption of promoted behaviors, and to evaluate the efficacy of enabling environment efforts on the adoption of promoted behaviors. STOP Spillover will monitor the adoption of biosafety measures for 6 months. An evaluation/ validation report will document the level of sustained adoption of promoted biosafety measures and highlight significant challenges, lessons learned and recommendations to reduce zoonotic spillover risks in Sierra Leone.

¹ <https://politicosl.com/articles/hunters-and-butchers-put-sierra-leone-risk-ebola>

BACKGROUND



Figure 1: Improved food storage containers in the Kingsway corner market, with a dedicated butcher table and IEC materials in the background (STOP Spillover Sierra Leone).

The Kingsway corner wet market in Kenema is the largest and best-known market for wildlife consumption in Sierra Leone. During Outcome Mapping workshops in 2022 and formative research conducted in February 2023, it was determined that most of the wild meat consumed and sold in this market comes from communities around the Gola Rainforest. Formative research findings indicated that men and women butchered meat with their bare hands. Wastewater from butcher sites was not monitored or controlled, increasing zoonotic spillover risks. Utensils and containers used to butcher and sell wild meat were not regularly cleaned with soap and water. People engaged in the wild meat trade used no personal protective equipment, but they were aware of zoonotic spillover risks (Stop Spillover Activity 1.2.6.2 Formative Research Report, 2023).

Given this context, wild meat biosafety interventions were implemented at the Kingsway corner wet market to promote spillover risk reduction biosafety practices among wild meat traders and processors. The adoption of these biosafety practices could decrease the risk of filoviruses

transmission (such as Ebola and Marburg). Interventions were implemented in two phases. Phase I (April/May 2023) focused on the promotion and adoption of personal protective equipment (PPE) including gloves, aprons, face shields/masks, protective clothing and boots. During this phase STOP Spillover staff evaluated the social, cultural and economic acceptability of PPE use for processors, traders and consumers in the market. Phase II (July – September 2023) focused on improvements to the enabling environment within the market that could facilitate improved PPE adoption and use. These improvements included access to water and a hand washing station, wastewater drainage, dedicated slaughter sites and food safety certification.

This report summarizes results from the last three months of intervention implementation in the Kingsway Corner Market (July – September 2023; Phase II). A report from Phase I was submitted to USAID and approved in July 2023. This is the final report describing intervention implementation in the wild meat market; all interventions end on September 30 2023. A validation report will be submitted in Q3 FY24.

MATERIALS AND METHODS

2.1 INTERVENTION GOALS AND OBJECTIVES

In response to findings from STOP Spillover formative research with wild meat value chain actors, the STOP Spillover team designed and implemented interventions to reduce Ebola virus spillover risks. These risk reduction interventions included the promotion of improved biosafety practices (use of PPE, handwashing with soap, a dedicated slaughter location, a soak-away pit and covering butchered meat with plastic), and the development and dissemination of biosafety guidelines for wild meat traders in the Kenema market. The objectives of these interventions were twofold:

- To promote the adoption of biosafety practices among wild meat traders and bushmeat processors in the Kingsway corner market in Kenema city, to reduce human-wild animal contact and human exposure to wild animal fluids.
- To test the efficacy and sustainability of interventions to reduce wild meat traders' exposure to zoonotic spillover risks, using a risk-focused validation process.

The adoption of improved biosafety practices by wild meat traders and processors reduces their contact with wild animal tissue and fluids, thereby reducing their risk of exposure to Ebola and other zoonotic diseases.

2.2 PHASE I BIOSAFETY INTERVENTION IMPLEMENTATION

An OH-DReaM Working Group (OHDWG), which included people from the Kenema City Council, the Ministry of Health and Sanitation (MOHS), the Ministry of Agriculture and Food Security (MAFS), and local authorities, was created to work with wild meat value chain actors to design and test approaches including improved biosafety practices and guidelines for wild meat traders in the Kingsway Corner Market in Kenema. Initial stakeholder engagement included the selection of specific types of biosafety interventions sought by critical partners including wild meat traders and processors. Wild meat traders and processors were given a menu of options to test, along with evidence to support the efficacy of each intervention. During these discussions wild meat traders and processors were identified, and biosafety practices, including Personal Protective Equipment (PPE) (arm length gloves, gum boots, dedicated work clothes, aprons, face shields and masks) were selected. Participating wild meat actors (46 women) enrolled in the program. They received biosafety materials and training. To facilitate proper hand hygiene practices among wild meat traders and processors, a hand washing station was provided to the Kingsway Corner wet market. Wild meat traders and processors committed to upkeep and utilization.

Two data collectors were trained and deployed in the market to collect data. Data collection included weekly participant observation and consumer surveys. Data collectors documented PPE use by wild meat traders and processors when performing different activities such as wild meat processing, butchering wild meat, and trading wild meat. The tool included a checklist used to score the different types of PPE used by traders and processors.

A wild meat market in Bo town was used as a control. An initial engagement meeting was held with market leaders to explain the purpose of the study and to solicit permission to collect wild meat biosafety data. Most of the data collected in Bo town focused on biosafety practices and the frequency of wild meat trader contact with wild meat tissues and fluid. Data on biosafety practices were collected in the first and last weeks of the intervention.

2.2.1 Key Findings from Phase I Biosafety Interventions

- 46 participants, all women, were enrolled in biosafety interventions.
- After testing the biosafety equipment, 54% (25) of participants expressed a willingness to pay for it in the future.
- 45 out of 46 participants interviewed after 30 days said they were very satisfied with the biosafety intervention.
- Consumers frequently touch meat before buying it.
- Consumers believed that the contact they have with wild meat is too brief to pose any health risk. Nonetheless, almost half of all consumers surveyed indicated a willingness to pay slightly more for wild meat that is safely and hygienically processed.
- Consumers did not hesitate to purchase wild meat from traders using PPE, and said they were satisfied with the biosafety measures.

Overall findings confirmed the social, economic and cultural acceptability of PPE use in the wild meat market. However, several factors made it harder for wild meat processors and traders to limit their contact with wild meat fluids and tissue, including the lack of a designated slaughter site, the lack of wastewater drainage, and the lack of soap and water. Moreover, stakeholders felt that a biosafety certification program would increase incentives for new market actors to adopt biosafety measures, and encourage sustained adoption by existing market actors. These enabling environment factors were addressed during Phase II.

2.3 PHASE II BIOSAFETY INTERVENTIONS

Phase II interventions included:

- Promoting PPE use with informal participants involved in wild meat trading and processing (trader and processor assistants or helpers, who are often extended family members).
- Training on safe wild meat handling practices and proper PPE use, waste management, and the identification of endangered species.
- Promoting containers and plastic sheeting to cover wild meat that is for sale.
- Locating clean water in the market for easy clean-up and hand washing with soap.

Activity 2.2.2.2: Wild Meat Biosafety Interventions, Sierra Leone

- Creating a dedicated drainage area or “soak-away pit” using local materials to improve wastewater drainage from the wild meat market.
- Creating a designated space to butcher animals, with an easy to clean surface.
- Supporting a biosafety certification process with local government.
- Developing social behavior change communication approaches to facilitate sustained adoption of risk reduction practices.

The Directorate of Environmental Health and Sanitation, city council, and MECC completed an environmental impact assessment to explore areas in the market where wastewater and slaughter facilities should be situated. The STOP Spillover team received an assessment report, including recommendations for the soak-away pit and slaughtering table. Wastewater from slaughtering table runs through a pipe into the soak-away pit. The soak-away pit was constructed using local materials, in compliance with the STOP Spillover Environmental Mitigation and Monitoring Plan (EMMP) and the Integrated Waste Management Plan (IWMP). The soak-away pit consists of stones covering a drainage pit lined with clay (Figure 2).

Figure 2: Butcher block table (left) and soak-away pit (right).



2.4 PHASE II BIOSAFETY DATA COLLECTION

Data for Phase II was collected over a one month period (mid-August to mid-September). Several tools were used during the data collection process:

- An enrolment form was developed to enroll wild meat traders and processors who agreed to participate in Phase II of the program;
- An individual observation tool was used to record details about PPE use among wild meat traders and processors and the biosafety practices that were adopted;
- A general observation tool captured details about the species of wild meat sold each day, buyer handling practices, and the reaction of buyers to the use of transparent rubber containers for selling wild meat;
- A consumer satisfaction survey recorded the satisfaction of male and female consumers regarding the different biosafety interventions, including the butcher block slaughter table, transparent rubber containers for selling wild meat, PPE, and the soak-away pit for wild meat wastewater disposal.

Re-enrollment started in July with an explanation of Phase II interventions and informed consent. Two data collectors used the individual observation tool to collect information each day about PPE use. They were embedded within the market trading community to directly observe and record use of PPE, as well as observational data on wild animal species sold in the market each day. Consumer satisfaction was both observed and solicited. Data was recorded for each wild meat trader and processor in the market on a given day. Data was collected electronically using Kobo Collect. A data analyst analyzed the recorded data every weekend and presented findings to STOP Spillover and the OH-DReaM Working Group to improve adoption of biosafety practices. A total of 1552 separate data entries were made over the one month period.

PHASE II RESULTS

Overall, the most frequently used PPE were nitrile gloves, with a usage of 94% in the first 30 days of Phase II (Table 1). The apron was the next most frequently used PPE when handling wild meat. Use of face shields and masks was relatively low (10%), followed by safety boots (11%) and dedicated clothing (22%). Overall traders and processors were observed using some form of PPE 42% of the time. No participants used all of the PPE, all the time.

Table 1. PPE Use by wild meat traders.

Type of PPE	Use (Percent)
Nitrile gloves	94%
Apron	75%
Face shield/nose mask	10%
Safety boots	11%
Dedicated clothing	22%
Overall PPE usage	42%
Total observations	1540

Table 2 presents the different behaviors observed during the handling of wild meat. Overall, 95% of the traders washed their hands with soap and water after slaughtering wild meat. About 44% of wild meat processors contacted wild meat with their hands or their body during wild meat slaughtering. Observation of wild meat processing revealed that 2.5% of processors were wounded or cut while processing wild meat.

Table 2. Behaviors observed during wild meat handling (Phase II)

Biosafety Measure	Percent
Wash hands with soap and water after slaughtering	94.7%
Did the butcher contact wild meat or fluid during butchering?	43.5%
Bio-incident occurrence (e.g., wounds, cuts)	2.5%
Presence of vectors (e.g., flies, cockroaches, ticks, rodents)	32.8%
Total observations	1455

Table 3 presents data regarding the use of biosafety measures introduced in Phase II. According to data collected from direct observations, 99% of wild meat processors examined meat for suitability before slaughtering; 98% of processors properly disposed of solid waste after processing. Use of the new slaughtering tables was low, because they were introduced very late

in Phase II. Only 29% of users cleaned the butchering area after butchering. The low “uptake” of this practice may also be due to the short time that the tables were introduced in the market.

Table 3. Use of biosafety practices introduced in Phase II.

Biosafety Practice	Percent
Physical examination of animals prior to butchering for trading	99%
Used new slaughtering tables	15%
Cleaned the tables with water and soap after use	29%
Wastewater drained in soak-away pit	69%
Safe disposal of wild meat solid waste	98%
Total observations	709

The most common type of wild meat sold in the market during the period of data collection were bush hogs (*Phacochoerus* and *Hylochoerus*), which made up 38% of the total meat processed (Table 4); followed by deer (29%) and fritambo (Maxwell’s duiker) which made up 16% of wild meat processed. The number of individual pieces of wild meat brought to the market varied from week to week.

Table 4. Types of wild meat processed and sold by week (Aug 21 – Sept 18 2023).

Species of Wild Meat Processed	Week 1	Week 2	Week 3	Week 4	Grand Total
Deer	61	78	70	16	225
Fritambo (Maxwell’s Duiker)	24	35	55	9	123
Bush cow (short horned buffalo)	5	8	3	0	16
Bush hog/pig (<i>Phacochoerus</i> and <i>Hylochoerus</i>)	68	113	90	18	289
Bush goat (black duiker)	9	12	22	3	46

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Species of Wild Meat Processed	Week 1	Week 2	Week 3	Week 4	Grand Total
Monkey	12	3	16	2	33
Grass cutter	8	5	13	2	28
Porcupine	3	1	0	0	4
Antelope	1	0	0	0	1
Rabbit	0	1	0	0	1
Total	191	256	269	50	766

CONCLUSION

Tables 1, 2, and 3 indicate increased compliance among wild meat traders and processors for hand washing, use of nitrile gloves, aprons, and safe disposal of solid and liquid waste. However, use of face shields, boots, and dedicated clothing was low among both wild meat traders and processors. There are important differences in the use of PPE by wild meat traders vs. processors. Wild meat traders use less PPE than wild meat processors, and processors use maximum PPE while processing.

PPE and other biosafety measures are gradually being adopted in the market. A high number of women now practice handwashing after contacting wild meat, and use gloves. However, the use of masks or face shields, dedicated clothing, and boots is still poor. Direct observations indicate that even with the use of these biosafety measures, traders still come into contact with wild meat through splashing and directly touching wild meat when not using PPE.

The adoption of the entire suite of biosafety measures has not yet been determined, because they were so recently installed. Adoption of biosafety practices will be monitored for a period of six months. A final evaluation and validation exercise will be undertaken at the end of the six-month monitoring period to measure sustained use of PPE and the efficacy of biosafety measures and social behavior change efforts to reduce human-animal exposure. A risk matrix will be developed using final validation data, to determine the relative efficacy of each biosafety practice in reducing zoonotic spillover risks.

Next steps include:

- Bi-weekly monitoring of the adoption of biosafety practices and behaviors in the market, to measure both the adoption of biosafety practices and the impact of that adoption on the frequency of animal-human contact. Monitoring will continue for six months, followed by a formal validation event.
- STOP Spillover staff and OHDWG members will continue to check in with wild meat traders and processors and local council on a monthly basis, to discuss the sustainability of wild meat biosafety interventions.
- STOP Spillover will conduct a final intervention evaluation exercise to validate the efficacy of introduced biosafety measures and to assess the impact of SBC tools and approaches used on the adoption of biosafety practices.
- Local council will support efforts to certify wild meat traders and processors who have adopted improved wild meat biosafety practices at the end of the 6-month monitoring period

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