ACTIVITY 2.2.2.2: WILD MEAT MARKET BIOSAFETY INTERVENTION VALIDATION REPORT

A Report from STOP Spillover Sierra Leone

August 2024

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 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.

This report is made possible by the generous support of the American people through USAID. The contents are the responsibility of STOP Spillover and do not necessarily reflect the views of USAID or the United States Government.

Cover Photo: A wild meat trader in the Kingsway Corner Market in Kenema District wearing personal protective equipment (PPE) (Photo Credit: Mohamed Fofanah).

LIST OF ACRONYMS

FDG	Focus Group Discussion
KII	Key Informant Interviews
SLE	Leone (Sierra Leone's new currency)
OH	One Health
OHDWG	One Health Design, Research, and Mentorship Working Group
PPE	Personal Protective Equipment
SBC	Social Behavior Change
STOP Spillover	Strategies to Prevent Spillover
USAID	U.S. Agency for International Development

EXECUTIVE SUMMARY

In February 2023, the STOP Spillover Sierra Leone team conducted formative research with wild meat traders and processors in the Kingsway Corner market in Kenema town. To reduce wildlife-human zoonotic spillover risks in the market, stakeholders prioritized the following interventions: (1) improving adoption and use of personal protective gear including plastic gloves, face shields and masks, boots and dedicated clothing; (2) assisting in the design and development of an improved market system, including easily cleaned and disinfected butchering and processing surfaces, a hand washing facility, improved drainage, and suitable waste management options; and (3) creating market zoning for a separate area specifically for the sale of wild meat to prevent contamination of other market items with potentially infectious wild meat material.

From April – September 2023 the STOP Spillover team co-designed and implemented risk reduction measures in the Kingsway corner market. Results and recommendations from Phase 1 (April – June 2023) and Phase 2 (July – September 2023) implementation were shared in previous reports. From October 2023 – March 2024, light monitoring of risk reduction behaviors and practices in the market indicated seasonal variation in the use of PPE, and the use of different types of PPE by different actors within the market. In April 2024, the STOP Spillover team conducted a final validation exercise in the market, to determine key factors influencing the adoption of these co-designed risk reduction behaviors. This report summarizes findings from the validation exercise. The validation exercise focused on critical elements including intervention efficacy, efficiency, sustainability, scalability and cost effectiveness.

The data reveals a high rate of compliance with glove usage and handwashing protocols, a lower rate for usage of aprons and dedicated clothing, and the lowest rate for face shields and rubber boots. Possible reasons for this were that while all the traders and processors consider handwashing, gloves, and aprons protective for their work, but only butchers consider boots and face shields important for their work. Traders do not use rubber boots and face shields often because their feet and faces are not at risk of contamination when selling to customers. Seasonality and temperature also affect PPE use. Butchers and helpers are more likely to use their full PPE gear either when processing large quantities of meat or large animals because they are more likely to soil their body and clothes. Traders and processors view the intervention as successful due to protective benefits from PPE, improved hygiene practices, controlled waste disposal, and regained dignity.

Despite the intervention reducing contact with wild meat and its fluids (thus lowering zoonotic transmission risk), butchers still had significant contact. This could be because of blood and meat pieces splashing on them when they are not dressed in full PPE attire when butchering. Continued guidance/training in risk reduction butchering practices is needed.

Consumers are willing to pay more for wild meat when traders use PPE; this helps motivate traders to continue safe practices. Wild meat actors are willing to pay for PPE replacements, but their budget is less than market value for these items. Stakeholders may need to support them during this transition. Challenges to sustainability of the PPE usage include leadership gaps at the market, water availability, and market infrastructure.

Key recommendations in the report focus on local governance and leadership in the wild meat market, increasing and improving water access and affordability, the importance of continued support from OHDWG members and regular meetings with wild meat actors, continued training for new actors who enter the market, the enforcement of bylaws, and sourcing support for a freezer in the market to improve biosafety and reduce food waste. Although consumers are willing to pay more for a safer wild meat supply chain and wild meat actors are willing to pay for PPE. reducing the cost of PPE or sourcing subsidized PPE would improve sustainability.

SECTION 1: BACKGROUND

1.1 Background

Strategies to Prevent Spillover (STOP Spillover) is a five-year, U.S. Agency for International Development (USAID)-funded cooperative agreement to support priority countries in Asia and Africa to strengthen their capacities to identify, assess, and monitor risk associated with emerging zoonotic viruses and to develop and introduce proven and novel risk reduction measures. STOP Spillover promotes a multisectoral, One Health (OH) approach to addressing emerging zoonotic viruses before they pose an epidemic or pandemic threat. Led by Tufts University, STOP Spillover is a global consortium of multiple partner organizations with expertise in human, animal, and environmental health who support country teams and OH stakeholders to understand and address the risks posed by known zoonotic viruses that have the potential to spill over and cause pandemic crises.

STOP Spillover focuses on prioritized zoonotic viruses: Ebola, Marburg, Lassa, Nipah, animal-origin coronaviruses (including SARS-CoV, SARS-CoV-2, and MERS-CoV), and animal-origin zoonotic influenza viruses (HPAI, etc.). In each country supported by STOP Spillover, the specific viruses to be addressed, and the high-risk interfaces at which to focus, are determined with in-country stakeholders. By implementing locally designed interventions in each country over the life of the project, and evaluating the social, gender, economic, and environmental acceptability and effectiveness of each intervention, participating countries will strengthen their capacity to develop, validate, and implement interventions to reduce spillover.

The three core objectives of STOP Spillover are:

- **Objective 1:** Strengthen country capacity to monitor, analyze and characterize the risk of priority emerging zoonotic viruses spilling over from animals to people;
- **Objective 2:** Strengthen country capacity to develop, validate, and implement interventions to reduce risk of priority emerging zoonotic viruses spilling over from animals to people;
- **Objective 3:** Strengthen country capacity to mitigate amplification and spread of priority zoonotic disease in human populations.

STOP Spillover used participatory outcome mapping to engage a wide variety of stakeholders to co-design and co-create activities in support of project objectives. Each intervention relies on strong research and an empirical evidence base, and the engagement of stakeholders at the national, district, and local levels. STOP Spillover interventions are designed to fill knowledge gaps that address USAID's overarching goal of reducing the risk of zoonotic viral spillover, amplification, and spread, and strengthen the capacity development of country stakeholders.

The Kingsway Corner market in Kenema District is the largest market in Sierra Leone for the trade and consumption of meat from wild animals. Most wild animal meat sold is from communities around the Gola Rainforest. The wild animal meat trade is permitted and legal in Sierra Leone, as long as Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)-protected species are not captured, slaughtered or traded (GoSL 1972). In the market, one can find different species of animals sold in bulk and in pieces as described in the STOP Spillover Outcome Mapping report and initial formative research. Both men and women engage in wild meat processing, but women typically manage wild meat trading in Kenema. People engaged in the processing of wild meat often do so with their bare hands. Utensils and containers used to butcher and load wild meat are not regularly cleaned with soap. Most people engaged in wild meat trading and processing do not wear any personal protective equipment (PPE) and are not familiar with food safety practices. Wastewater from cleaning wild meat is not controlled, resulting in potential zoonotic spillover risks (Roche et al 2020).

In February 2023, the STOP Spillover Sierra Leone team conducted formative research including focus group discussions (FGDs) with 11 wild meat traders and processors (all women), and key informant interviews (KIIs) with two male market leaders, followed by participant observation in the Kingsway Corner market in Kenema town. To reduce wildlife-human zoonotic spillover risks in the market, stakeholders suggested the following measures: (1) improving adoption and use of personal protective gear including plastic gloves, face shields and masks, boots and dedicated clothing; (2) assisting in the design and development of an improved market system, including easily cleaned and disinfected butchering and processing surfaces, a hand washing facility, improved drainage, and suitable waste management options; and (3) creating market zoning for a separate area specifically for the sale of wild meat to prevent contamination of other market items with potentially infectious wild meat material.

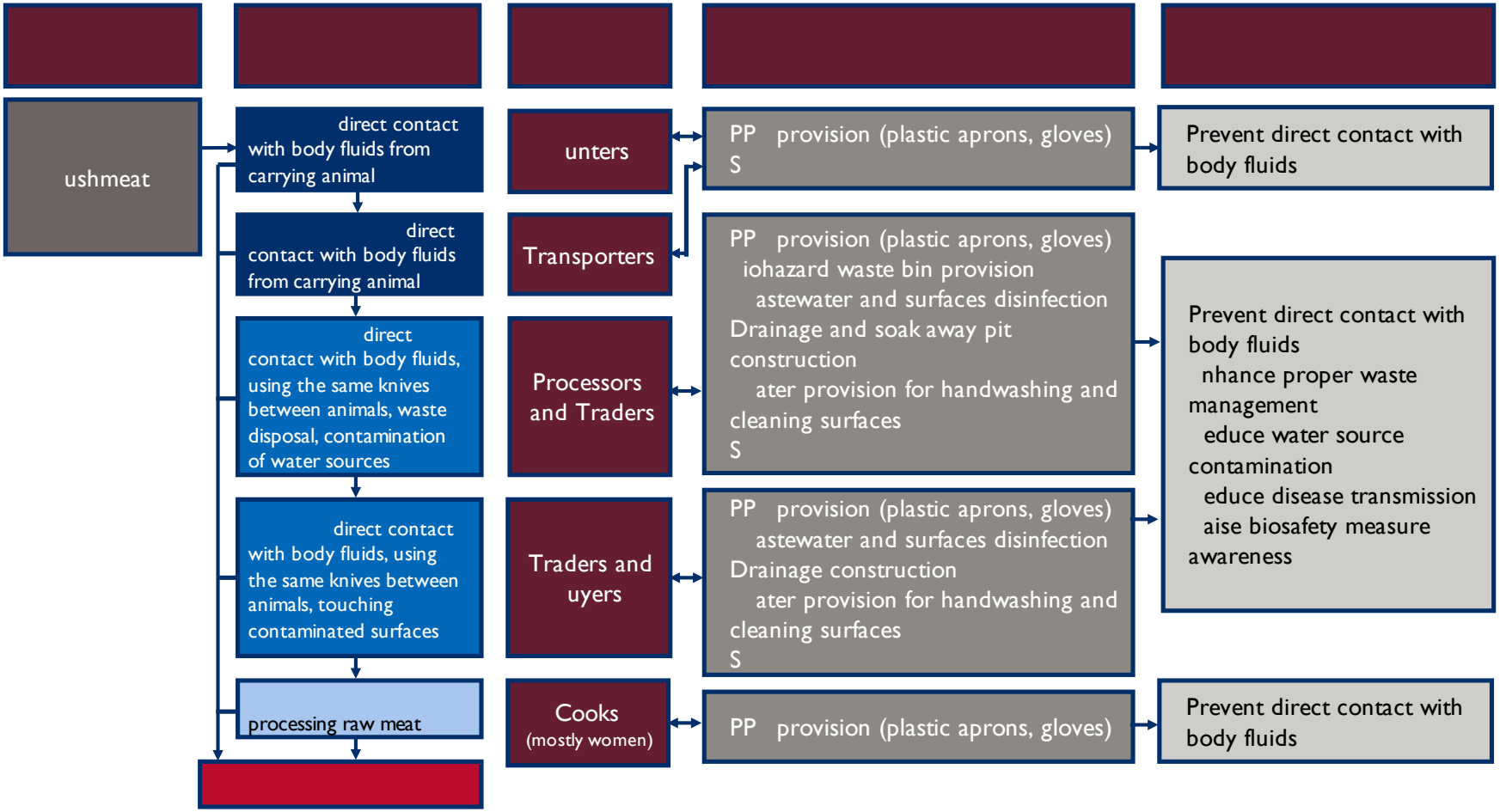
Using results from formative research, the STOP Spillover team identified key primary audiences: wild meat traders and processors, their influencers (women leaders, traditional chiefs, trade union chairmen, municipal council leaders, etc.), and consumers to target with proposed interventions.

The STOP Spillover team also used findings from formative research conducted in the market in February 2023 to design a social behavior change (SBC) strategy to target specific high-risk behaviors, barriers, and motivating factors that facilitate or inhibit the adoption of food safety practices in the wild meat market. SBC efforts were designed to support the adoption of risk reduction behaviors ultimately resulting in increased use of PPE and other biosafety measures (butcher blocks, handwashing with soap, and drainage/waste management systems) by market actors.

1.2 Findings Leading to Biosafety Interventions at the Wild Meat Market

Figure 1 below presents the results of risk pathway analysis along the wild meat value chain.

Figure 1. Risk pathway for the wild meat value chain



Formative research conducted in February 2023 revealed that communities in Kenema district participate in the wild meat trade and wild meat consumption in a complex value chain structure that varies between rural and urban communities. Key actors in the wild meat trade include hunters (rural), transporters (rural/urban), traders (urban), processors (rural and urban), chop-bar operators (urban), retailers (rural and urban), and consumers (rural and urban). The hunting and meat processing nodes along the value chain were identified as the two highest risk contact points due to the frequency and nature of human contact with animal fluids including blood, feces, and urine. Hunters and wild meat transporters are mostly young men, while wild meat retail traders and processors (both at the community level and in the wild meat market) are predominantly women.

1.3 Interventions Tested at the Wild Meat Market

Leaders of wild meat traders and processors and local market actors and STOP Spillover One Health Design, Research, and Mentorship Working Group (OHDWG) members designed initial interventions. The STOP Spillover team and OHDWG members explained interventions to stakeholders (section chief, market chair lady, District Council representative, and Ministry of Health representative) during an introductory meeting. After the meeting, wild meat traders and processors in the market individually agreed to test and adopt risk reduction intervention.

During Phase 1, from mid-April – mid June 2023, the STOP Spillover Sierra Leone team implemented a rapid intervention to test PPE adoption in the Kenema town wild meat market. The intervention included an early co-design process with local wild meat traders and processors to determine the intervention protocol.

In April 2023, the STOP Spillover Sierra Leone team procured and distributed PPE including face shields, plastic gloves, boots, and aprons to 46 wild meat traders (all women) in the Kingsway Corner market. In May 2023, the team collaborated with the Ministry of Health and other OHDWG members to donate a handwashing station to the Kingsway Corner market for World Handwashing Day.

Daily monitoring visits conducted in May–June 2023 showed that traders and processors used PPE to varying degrees. Some types of people adopted PPE more than others, and some types of PPE were more regularly used than others. Daily monitoring was conducted by local actors using a simplified checklist – data was collected for the entire market, and not for each individual butcher and trader.

In June 2023, the STOP Spillover team reviewed initial adoption data and submitted their initial PPE adoption and intervention efficacy report. The report included suggestions for additional interventions to support PPE adoption including improved hygiene, waste disposal, and local regulatory support. This led to the design of Phase 2 interventions (July–September 2023).

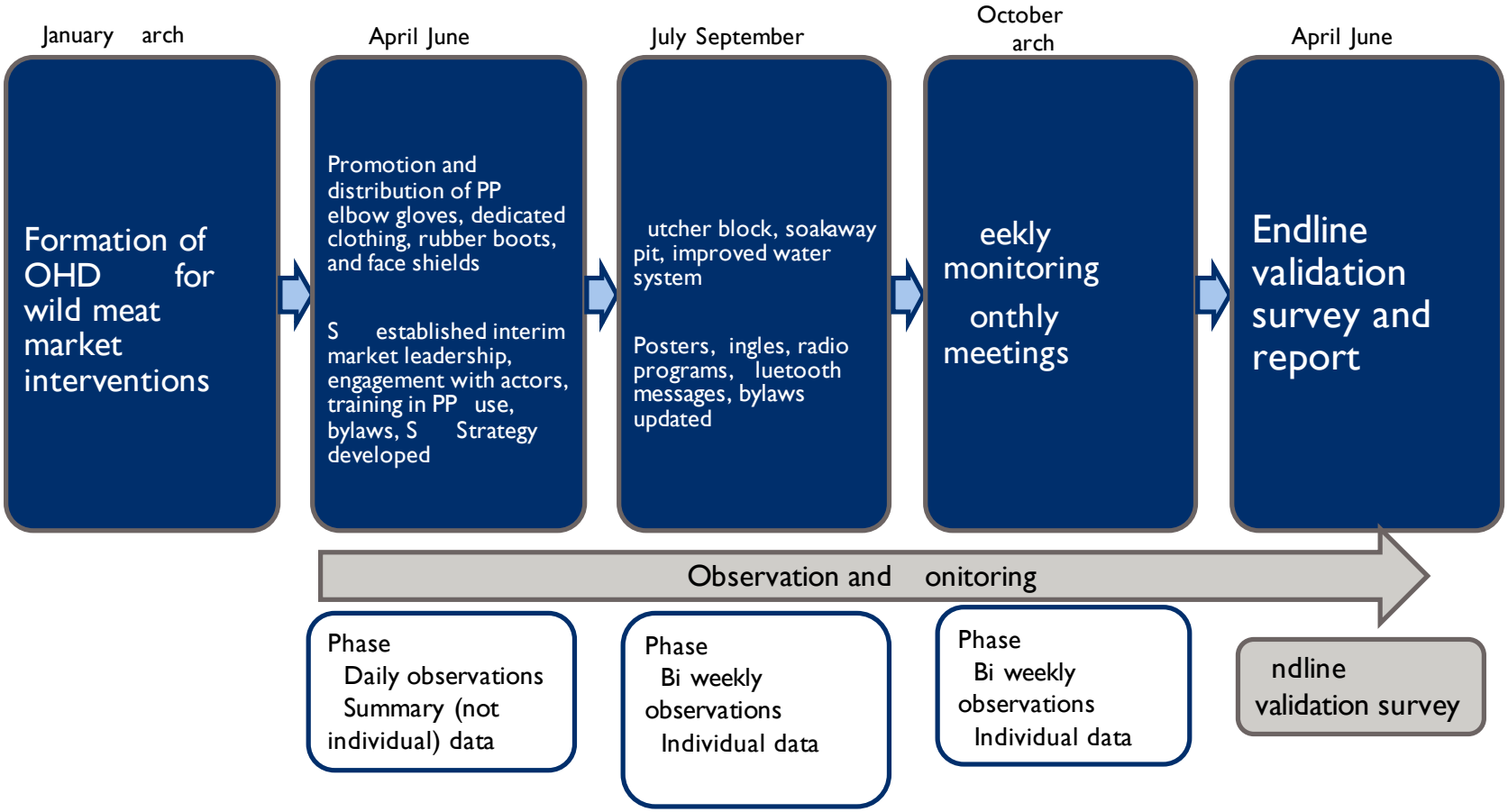
During Phase 2, additional interventions were layered into the market, including a soak-away pit for wastewater disposal, distributing easy-to-clean butcher block tables for wild meat processing, and developing market rules and regulations to promote PPE adoption and use. In addition, SBC messaging, materials, and communication strategies were developed and implemented. In August 2023, the team identified 19 additional wild meat handlers who typically assist traders, who requested PPE. The soak-away pit and butcher blocks were installed in August/September 2023.

From August to September 2023, there were ongoing efforts to facilitate the adoption of risk reduction behaviors through market meetings, interactive radio programs, bylaws, interpersonal communication with wild meat traders and processors, and celebrations related to the adoption of improved food safety measures. During Phase 2, data was again collected by local stakeholders, but data was collected less frequently (weekly vs. daily) and collected for each individual actor in the market (butchers, retailers and helpers).

In Phase 3 (November 2023–March 2024), efforts focused on light monitoring of intervention adoption. Weekly data collection was complimented by OHDWG surveillance of bylaw enforcement, counseling wild meat traders about PPE adoption and risk reduction behaviors, monthly meetings with district and chiefdom leaders to strengthen bylaw enforcement, and airing jingles and songs using a Bluetooth speaker and USB flash drive in the local wild meat market. During Phase 3, weekly monitoring visits found that traders and processors use PPE to varying degrees. Some types of people have adopted PPE use more than others, and some types of PPE are more regularly used than others. In October 2023 –March 2024, the STOP Spillover team and OHDWG members held monthly engagement meetings with wild meat traders to discuss PPE adoption and risk reduction behaviors.

In Phase 4, the final phase of the activity (April–June 2024), an endline validation survey was conducted and the final report developed. This report summarizes findings from the endline validation process.

Figure 2. Wild Meat Market Implementation Timeline



SECTION 2: VALIDATION METHODOLOGY

2.1 Objective

The objective of the validation exercise is to determine if wild meat traders and processors at the Kingsway Corner market adopted the use of PPE and other biosafety practices when working with wild meat over time, sustainably reducing zoonotic spillover risks. The validation exercise explored specific factors that contributed to PPE and other biosafety practice adoption.

2.3 Validation Questions

Research Design

- To what extent do wild meat traders and processors at the Kingsway Corner market adopt PPE (aprons, gloves, face shields, boots, and dedicated clothing) and other biosafety measures (e.g., handwashing with soap, use of a washable chopping board) when handling wild meat? How does adoption of these practices impact the frequency, type, and duration of human contact with potential filovirus reservoirs?
- What factors influence the adoption and use of these biosafety practices, including age, years of wild meat market experience, gender, level of perceived risk and risk comfort, cultural beliefs, and economic (cost) factors?
- Are wild meat traders and processors willing to buy PPE and replace biosafety materials when their current stock runs out? Why or why not? What factors influence these decisions?
- What is the consumer satisfaction level for PPE use/other biosafety measure use while handling and processing wild meat at the wild meat market? To what extent are wild meat buyers willing to pay for the adoption of improved biosafety measures in the market?
- How did SBC approaches contribute to or influence the adoption of biosafety measures in the market? Which SBC approaches were most effective in contributing to PPE adoption and use? Which SBC approaches should be prioritized for sustained adoption?

In addition to validation questions on research design, the validation process explored key questions related to intervention effectiveness, sustainability, scale-up, and cost-effectiveness.

Effectiveness

- Does the intervention result in the desired behavioral change among participants? If so, what factors facilitate its success? Why is it successful?

- How does the intervention reduce risk, or result in reduced risk? Can the degree of risk reduction be measured? If so, how? *Note*: intervention effectiveness can be measured with a variety of methods, featured in the "Measuring Change" section below.

Sustainability

To assess intervention sustainability, the STOP Spillover team collected data after a defined period to determine whether individual/group behavior change is maintained and continued to produce benefits for individuals, groups, or systems.

- Following an intervention, do participants have the knowledge, skills, tools, resources, and support needed to maintain changes in behavior?
- Do participants educate others in the intervention and is there additional community uptake?

Scale-up

- What factors facilitated or hindered the scale-up of the intervention?

Cost-effectiveness

- How much does the intervention cost to deliver per participant?
- Does the participant incur any immediate or long-term costs by implementing the intervention?

2.4 Validation design

The intervention was evaluated using a mixed methods approach, which involved gathering routine monitoring data longitudinally and conducting qualitative and quantitative data collection at the end of the activity.

Study subjects included wild meat traders and processors at the main wild meat market in Kenema town who were enrolled in the intervention. It also included wild meat consumers who use this market. All participants were adults, above 18 years of age. A total of 65 wild meat traders and processors enrolled in the intervention.

The validation process was conducted after 6-12 months of layered intervention implementation. There was no need for a comparison group because there was no use of PPE or biosafety practices in the market prior to STOP Spillover inventions. However, baseline data was also collected from a control group in the Bo wild meat market, which also indicated the absence of PPE use.

Independent variables include respondents' ages, sexes, roles in the wild meat market (wild meat traders, processors, or assistants), and education levels in addition to frequency and type of exposure to wild animal meat, exposure to SBC messages, perceived risk levels, and weekly wild meat sales.

In addition, a consumer survey was conducted for wild meat market consumers/buyers. Data was disaggregated by age, sex, type of employment, education level, and risk perception level.

2.5 Study Sample

The endline study included the wild meat traders and processors enrolled in the intervention who received training on biosafety measure adoption.

2.5.1 Phase 1: Initial Implementation Phase (April – June 2023)

At the start of the intervention, each trader/processor who agreed to participate in the study enrolled using a standard enrollment form. Two data collectors used an observation tool and direct observation to gather daily longitudinal data of wild meat traders and processors.

Two trained data collectors from Kenema township embedded within the market community directly observed and recorded PPE use and biosafety measures taken each day. Enumerators collected data using Kobo Collect. The STOP Spillover team and OHDWG reviewed monthly reports generated from the observation data on PPE and biosafety measure use, and discussed findings with traders/processors during weekly meetings. OHDWG members provided counseling to "low" users (those using PPE less than 50 percent of the time). During daily observations, enumerators also collected data on the number and type of wild meat sold in the market.

2.5.2 Phase 2: Intervention Adaptation, Layering and Sequencing (July – Sept)

During the second phase of the intervention, observational data was collected weekly in August and September 2023. Each participant received an identification code and enumerators recorded observations using a checklist. During this phase, data was recorded individually for each participant. Data regarding individual PPE usage and biosafety practices were analyzed and the results shared at stakeholder meetings at the end of each month. The meetings included representation from STOP Spillover, OHDWG members, district stakeholders (such as the City Mammy Queen, the head of the City Metropolitan police) and representatives from traders and processors at the wild meat market. OHDWG members often chaired these meetings.

2.5.3 Phase 3: Observation and Monitoring Data (October 2023 – March 2024)

Routine observational data collection during Phase 3 occurred starting in November 2023–March 2024. Two observers collected data on a twice weekly basis during this time period. At the end of each month, observational data was analyzed and presented at a monthly meeting with wild meat stakeholders. Each meeting included discussions of progress and challenges in the continued adoption and use PPE and biosafety measures in the market. The same type of stakeholders as in Phase 2 attended these meetings.

2.5.4 Phase 4: Endline/Validation Data (April 2024)

The STOP Spillover team conducted endline data collection from the intervention population in April 2024. The endline study included a quantitative survey with wild meat traders and processors who were enrolled in the intervention and received training on the adoption of biosafety measures, as well as consumers. Quantitative data also included previous monitoring data, to determine trends over time. Qualitative data included focus group discussions (FGD) and key informant interviews (KII) with traders and processors.

Four enumerators, trained to administer both the quantitative and qualitative data collection tools, conducted data collection. Training took place over three days. For the first two days the data collectors received briefings on the STOP Spillover project, the wild meat biosafety intervention at the market, and the validation questions that are intended to be answered. The enumerators learned to use the provided tools and practiced administering the tools both in Creole and Mende (the main languages spoken in the community). On the final day of the training, the enumerators tested the tools at a small wild meat market in Kenema town. After field-testing the tools, the team reassembled and feedback from the field testing was used to revise and finalize the tools (Annex 1 & 2). Enumerators were supervised by two OHDWG members, who were also part of the three-day enumerator training.

All of the wild meat actors enrolled in the intervention were approached during the survey, and 62 respondents participated in the survey (roughly 100% of all wild meat actors in the market during this time period). 100 percent of the wild meat actors were female. Quantitative data was collected to assess wild meat traders' perceptions of their use of various biosafety measures and their willingness to contribute financially toward replacing worn-out biosafety items. Quantitative data was also collected from 251 unique wild meat consumers to assess their willingness to pay a modest markup toward the cost of the biosafety measures, to sustain their usage.

The qualitative study included FGDs with the traders and processors, and KIIs with wild meat stakeholders. Qualitative information focused on the willingness of butchers and traders to

sustain the adoption of biosafety practices, approaches to cover the cost of sustaining these practices, and possible barriers to adoption and sustaining practices.

In total, three FGDs were conducted among traders and processors. Each FDG session included 6–10 respondents. KIIs were conducted with the chairlady of the wild meat market, the section chief, two "good" users (those using biosafety measures more than 50 percent of the time) and two "poor" users of the biosafety measures.

All data collection tools were installed on Kobo Collect. Two data collectors were dedicated to FDGs and KIIs. One data collector asked questions, while the other summarized responses in Kobo Collect. Interviews were also recorded. At the end of each day, the two enumerators listened to the recordings and reviewed the written summaries in Kobo Collect.

2.6 Data Analysis

A data analysis workshop was organized in May 2024. Participants included a data analysis advisor from the Tufts University Consortium, three STOP Spillover staff, and three OHDWG members. The team received a one-day orientation in qualitative data analysis. Each team received a set of validation questions to answer using summaries from Kobo Collect. Each team read the summaries, highlighted the section of the summaries in Kobo Collect that responded to the questions, and identified quotations from respondents. The highlighted responses for each question were transferred to the matrix. In the next stage, the teams summarized their responses and placed the quotations at the bottom of the summaries. The data analysis consultant reviewed these summaries to confirm that they truly responded to the questions and that the selected quotes were relevant and appropriate.

Quantitative analysis was done using excel pivot tables. The team of enumerators were trained in using pivot tables and in developing charts in excel. Each team was given the data and asked to use pivot tables to produce tables for assigned validation questions. The team developed tables and graphs summarizing the data. Consortium experts reviewed these tables and produced additional tables used in this report.

SECTION 3: RESULTS

3.1 Characteristics of Study Participants

Table 1 shows the demographic distribution of the wild meat actors that responded to the quantitative questions. A total of 62 market actors responded to the quantitative survey. Among them, 51 percent were married, 23 percent were single, and 26 percent were widowed or divorced. Additionally, 57 percent of the respondents had no formal education, while 33 percent had up to secondary level education.

Regarding occupations, 34 percent of the traders were butchers, 49 percent were wild meat traders who also sliced the meat into smaller pieces for retail sales, and 16 percent were butchers' helpers and aides (assisting with holding the meat when butchering and cleaning the meat before butchering).

Among the wild meat traders interviewed, 46 percent had been in the wild meat trade for over 10 years, 33 percent for 6–10 years, and 21 percent for less than 6 years.

In terms of earnings, 66 percent reported earning less than Leones (SLE) 500 (~$22 USD) per week from the wild meat trade, 18 percent reported earning between Le 500 and Le 1000 (22 - $44 USD), and 16 percent reported earning over Le 1,000 ($44 USD) per week.

Table 1: Sociodemographic characteristics of the wild meat traders interviewed (61)

Demographic characteristics	Number (n)	Percent (%)
Sex	**All female**	**100%**
Marital status		
Married	31	51%
Widow/divorce	16	26%
Single	14	23%
Age (average and range)	37.40 years (range 19 – 65)	
Education		
None	35	57%
Primary/complete	6	10%
Secondary/ complete/university	20	33%
Type of work engaged in wild meat market		
Butchering	21	34%
Trading/Slicing	30	49%
Skinning/Helping	10	16%
Length of time working in the wild meat trade		
More than 10 years	28	46%
6–10 years	20	33%
1–5 years	13	21%

Demographic characteristics	Number (n)	Percent (%)
Earning/Profit from selling wild meat (last week)		
SLE 0–499	40	66%
SLE 500–999	11	18%
SLE 1000 and above	10	16%
Place of activities		
Wild meat market	38	62%
Street trading	23	38%

3.2 Intervention Efficacy

Level of PPE adoption by wild meat traders and processors at the Kingsway Corner market (aprons, gloves, face shields, boots, dedicated clothing, and handwashing with soap)

Figure 3 presents trends in use of PPE by wild meat traders at the market based on observational data from Phase 2 and 3. While handling wild meat, wild meat traders and processors practiced frequent handwashing and use of elbow gloves. Apron use fluctuated between 94 percent in December 2023 to 78 percent in September 2023. Dedicated clothing use ranged from 74 percent in January 2024 to 55 percent in September 2023. Rubber boot use ranged from 10 percent in August to 40 percent in January 2024, with face shield use following the same pattern but ranging from 5 percent in August 2023 to 34 percent in January 2024. These results indicate a high level of compliance with glove usage and handwashing protocols with an average adoption of apron usage. Rubber boots and face shields were the least adopted. The use of dedicated clothing was moderately (50% or more) adopted by wild meat actors.

Phase I data was collected daily, but not at the individual level. Data was collected based on the total number of people seen using a given practice. Phase 2 and Phase 3 data was collected individually using participant identifiers. For that reason, Phase I data is not included in the same graph as Phase 2 and Phase 3 data.

Figure 3. Trends in PPE usage from direct observation of wild meat actors, Phase 2 and Phase 3 (Aug 2023 – March 2024).

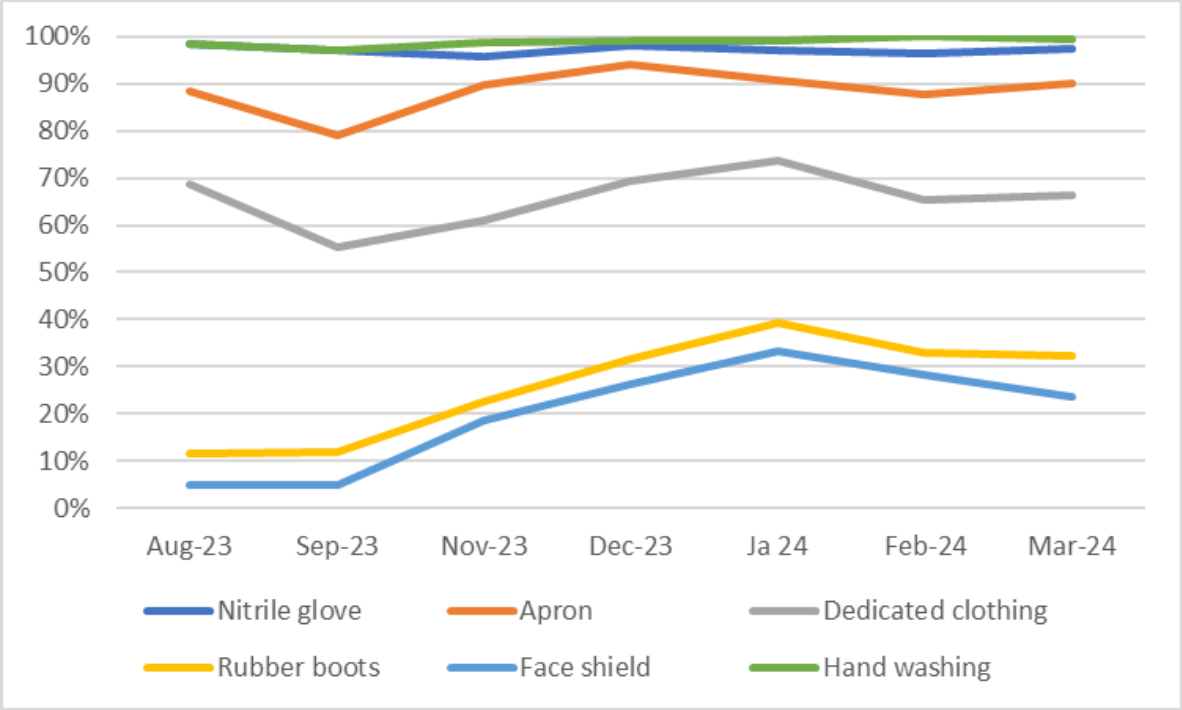


Table 2 shows the percentage of people among individual wild meat traders and processors who used different kinds of PPE consistently. For example, the first row shows the percentage of participants who used gloves less than 50 percent of the time, 50–89 percent of the time, 90 - 99 percent of the time, and 100 percent of the time, during individual observations from November 2023 - March 2024. The most frequently used risk reduction method was handwashing with soap and water, which was consistently practiced (90 – 100% of the time) by 98 percent of wild meat traders and processors between November 2023 to March 2024.

The next most commonly practiced PPE method was the use of rubber gloves, which were always used by 37 percent of the actors, and consistently used by 89% of wild meat actors. Aprons were used consistently by 66% percent of wild meat actors. Dedicated clothing, safety boots and face shields were used consistently by 15 percent, 2 percent and 2 percent of actors, respectively.

Table 2. PPE usage rate from observations of individual wild meat traders and processors from November 2023 to March 2024 (grey indicates high adoption consistency and red indicates low adoption consistency)

PPE Used	<50%	50-89%	90-99%	100%
Glove	0%	12%	52%	37%

PPE Used	<50%	50-89%	90-99%	100%
Apron	3%	30%	33%	33%
Dedicated clothing	43%	42%	8%	7%
Safety boot	83%	15%	0%	2%
Face Shield	87%	12%	0%	2%
Soap and water	0%	2%	43%	55%

Figure 4. Percentage of butchers and traders who used gloves when handling wild meat and who washed their hands with soap and water after handling wild meat in Phase 1

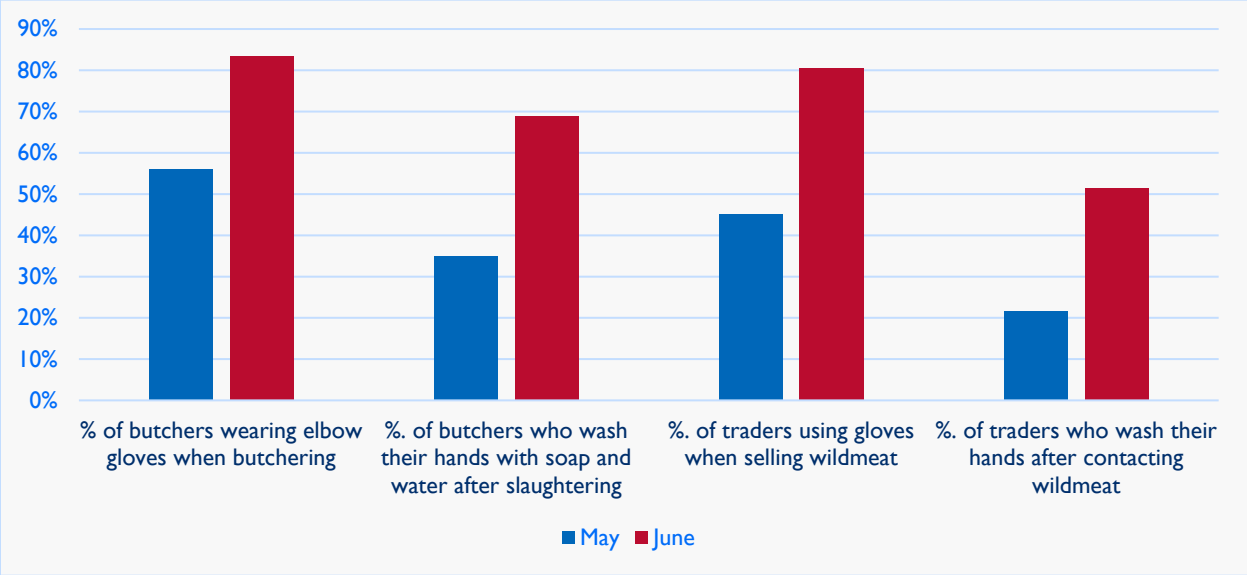


Table 3. Use of butcher block and soak-away pit

Activities performed	g. '23	Sep. '23	Nov. '23	Dec. '23	Jan. '24	Feb. '24	r. '24
Used new butcher block	67%	51%	85%	83%	88%	83%	80%
Cleaned butcher block after use	98%	98%	98%	99%	99%	97%	98%
Drained blood in soak-away pit	100%	100%	99%	100%	100%	100%	100%

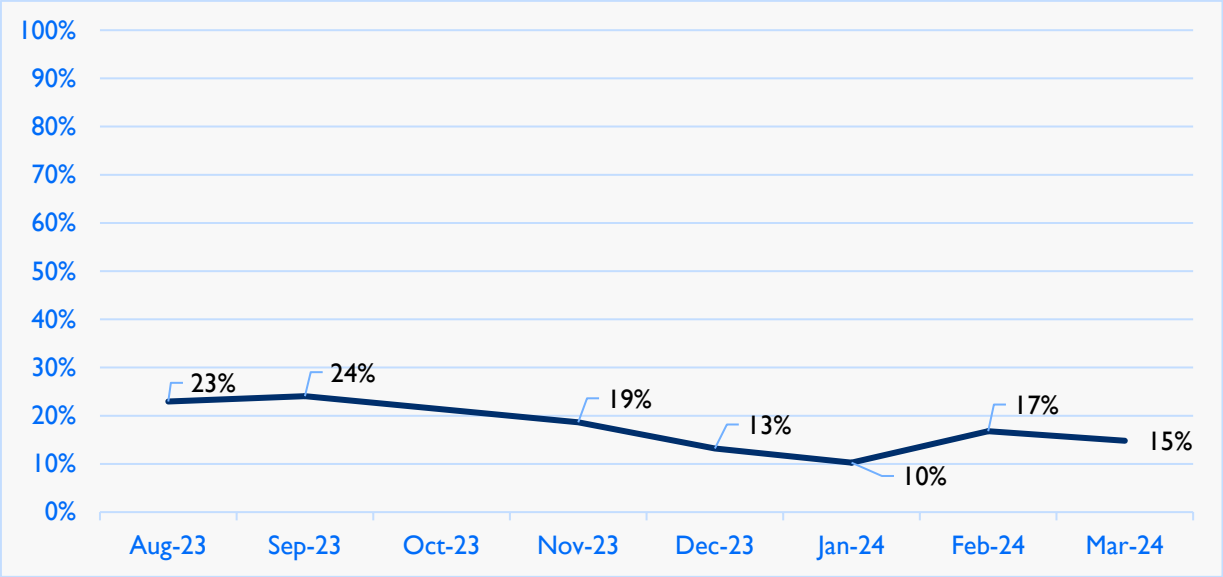
Table 3 shows the use of the new butcher block by wild meat actors. According to the table, the percent of meat butchered on the new butcher blocks was less than 70 percent in Phase 2 when they were just constructed. Usage of the new butcher block remained steady above 80 percent from November 2023 – December 2024 (Phase 3). Cleaning the butcher block and

drainage of animal blood in the soak-away pit during and after butchering were very high and can be described as "fully adopted."

3.3 Contact with Animal Fluid

The main objective of the biosafety intervention in the wild meat market was to reduce contact with wild meat and fluid from wild animals. Figure 5 shows the percentage of times butchers contacted either wild meat or their fluids during butchering, based on observational data. The percentage contact with wild meat reduced from a peak percentage contact of 24 percent in September 2023 to a low of 10 percent in January 2024. It then increased from 10 percent in January 2024 to about 15 percent in March 2024. The reason for this fluctuation is not clear, but it seems to suggest that wild meat butchers may need additional guidance or training in risk reduction butchering practices.

Figure 5. Percentage of times when wild meat butchers came in contact with wild meat and wild meat fluids during butchering in Phase 2 and 3

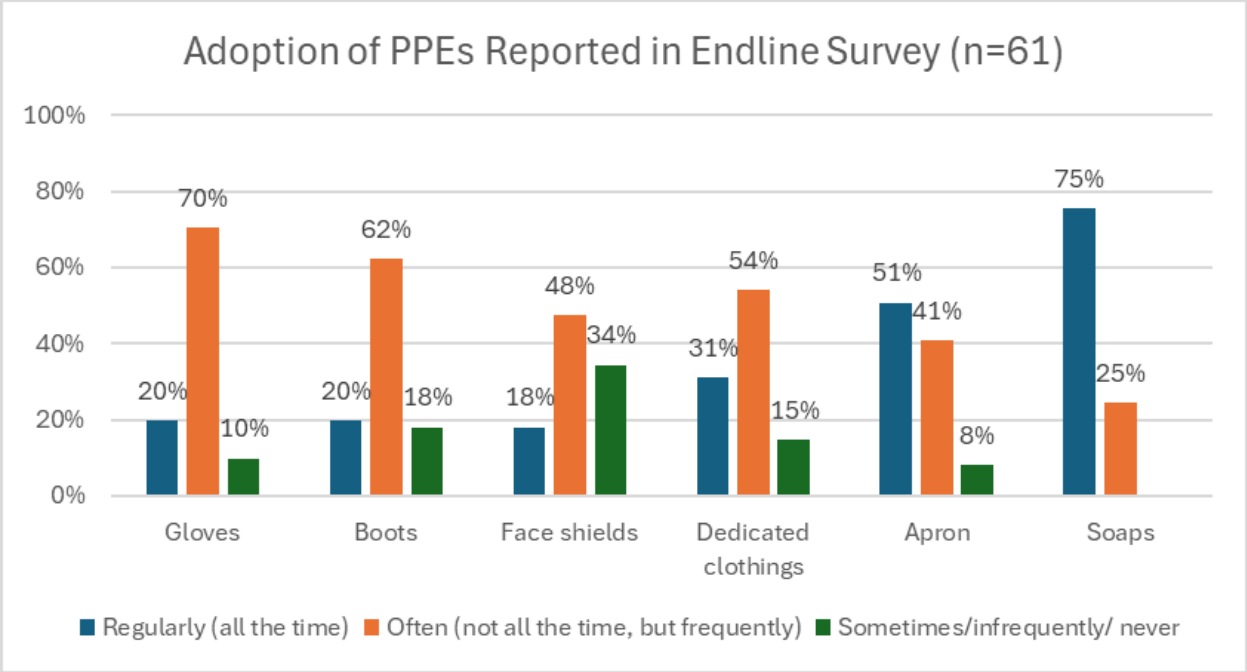


3.4 Wild Meat Traders and Processors' Perceptions of PPE Usage According to the Endline Survey

Respondents reported individual adoption of PPE during the endline survey. According to Figure 5, approximately 75 percent reported regularly washing their hands after touching wild meat, while 25 percent reported that they often wash their hands after handling wild meat. Additionally, 51 percent reported regularly using aprons, 41 percent reported often using aprons, and 15 percent reported sometimes using aprons. About 31 percent reported regular use of dedicated clothing, 20 percent reported regular glove use, and a similar percentage reported regular boot use. Furthermore, 18 percent reported regular face shield use.

Comparing reported PPE usage with observational data presented in the figures above, it is evident that wild meat traders and processors tend to overreport their usage of dedicated clothing, face shields, and rubber boots.

Figure 6. Reported level of adoption of various PPE by market traders (N=61)



FGD and KII participants reported actively using gloves, which is considered a successful outcome. Respondents perceived the benefits of using the PPE in several ways.

The PPE ensures protection against getting diseases. Butchers felt a high level of success regarding the intervention. Most butchers use PPE, including safety boots, nitrile gloves, face shields, dedicated clothing, and aprons. They felt these items are effective in protecting them against various hazards, including providing protection during cool weather and in conditions during the rainy season and potential diseases like Ebola. The safety boot was highlighted as a crucial protective gear against contact with contaminated animal blood. According to one butcher:

> *''Before now there were a lot of difficulties in our operations but then all that changed because of the intervention. We used to cut ourselves a lot, but all that no longer happens. Plus, you also motivated us to be decent and take care of the meat we butcher, we no longer cut meat on the bare ground but on a butcher table."* – a wild meat butcher

Respondents considered the importance of this intervention to extend beyond individual well-being; it impacts the entire country and all Sierra Leoneans. The majority expressed the view that proper protection through PPE prevents the spread of sickness to others.

Some respondents mentioned that the PPE helped them improve their personal hygiene and to stay clean which enhanced their dignity and social acceptance. The provision of running water, hand washing stations, and soak away pits enhanced personal hygiene practices among butchers.

Regular monthly meetings and calls – in radio programs reinforced butchers' commitment and compliance with the use of PPE and the promotion of personal hygiene.

Similarly, traders expressed positive impacts of the intervention on their practices. Most traders use rubber gloves and aprons during trading. These PPE help protect them against diseases and promote personal hygiene. Before the intervention, traders often had traces of blood in their nails and caught frequent colds. According to traders interviewed, the provision of PPE has mitigated these issues. The availability of water reduced the pressure of fetching water from long distances and improved sanitary conditions in the market. According to traders interviewed, before the STOP Spillover intervention, traders used to handle meat with their bare hands, leading to unpleasant smells in social gatherings. The provision of PPE has helped them regain their dignity in society. One trader said, "*Before now, I used my bare hands to handle animal's blood, feces etc., but now, because I used the PPE, the blood and related wastes no longer splash on my clothes, body or even got cut.*"

Previously, wastewater was indiscriminately disposed of in the market. Now, with the provision of a soak-away pit, there is controlled wastewater disposal. The constant reminder of how and when to use PPE using Bluetooth messages contributed to PPE adoption. Another meat trader shared, "*Initially when I received the gloves, I didn't know how to use them, but because of constant learning and encouragement, I was able to learn the use of all the PPE correctly.*"

Overall, the traders viewed the intervention as successful due to the protective benefits of the PPE, improved hygiene practices, controlled waste disposal, and regained dignity in society.

Butcher's aides and helpers similarly expressed positive impacts of the interventions on their practices. Most of the helpers understand that PPE serves as a source of protection for them, their families, and consumers. According to them, the constant reminders through radio discussion programs, Bluetooth jingles, and posters contributed to the adoption of PPE. Overall, the helpers viewed the intervention as successful due to the protective benefits of the PPE and the effective communication strategies used to promote adoption.

3.5 Factors Influencing the Adoption and use of these Biosafety Practices

Table 4 shows wild meat traders and processors' reported use of various PPE by demographic and other characteristics. Analysis shows that wild meat traders and processors with no formal education (those who did not go to school) generally reported higher regular PPE usage than those who went to school. The table also shows that risk perception of wild meat traders and processors did not adversely affect their reported PPE usage; PPE usage levels between the two

groups were quite similar. Table 4 also shows that wild meat traders and processors based at the Kingsway Corner market reported higher usage of all PPE than those who trade wild meat along the street.

Table 4 also shows that the reported usage of gloves, aprons, and dedicated clothing was higher among wild meat traders who earned over SLE 500/week ($22 USD) than those who earned less than SLE 500/week. Conversely, face shield and rubber boot usage was higher among those earning less than SLE 500/week than those earning more than Le 500/week. The differences in earnings by wild meat traders was related to the traders' capital, as traders with more capital could buy bigger meat and make more profit, whereas those with lower capital could only buy smaller meat, and make relatively less profit.

The table also reveals that self-reported PPE usage was generally higher among butchers than traders or those who skin wild meat. This is not surprising as butchers are more likely to contact wild meat fluid while butchering than those who trade or skin the meat. The table shows that self-reported PPE usage was higher for traders and processors 18–24 years of age and those over 45 years of age than those between 25–44 years of age.

Table 4: Percentage who reported regularly or often using PPE by demographic and other characteristics

Variables	Breakdown	Gloves	Boots	Face shields	Dedicated clothing	Apron	Soap	N
Education	None	94%	86%	66%	89%	91%	100%	35
	Primary/secondary above	85%	77%	65%	81%	92%	100%	26
Risk Perception of getting disease from wild meat handling	No	87%	91%	70%	83%	91%	100%	23
	Yes	92%	76%	63%	87%	92%	100%	38
Place of primary business	Street Trading	76%	71%	59%	71%	82%	100%	17
	Wild meat Market	95%	86%	68%	91%	95%	100%	44
Earning (Profit) from selling wild meat last week	Le 0–500	75%	86%	75%	77%	80%	100%	44
	Le 501 and above	88%	80%	41%	88%	88%	100%	17
Primary work in the meat market	Butchering	90%	100%	76%	95%	90%	100%	21
	Skinning	80%	100%	60%	80%	100%	100%	10
	Trading	77%	80%	60%	80%	90%	100%	30
Age	18–24	90%	90%	70%	90%	100%	100%	10
	25–34	88%	75%	56%	88%	88%	100%	16
	35–44	89%	74%	53%	79%	95%	100%	19
	45 over	94%	94%	88%	88%	88%	100%	16

Figure 7. Use of PPE by time of day from observational data (Phase 1, 2 and Phase 3)

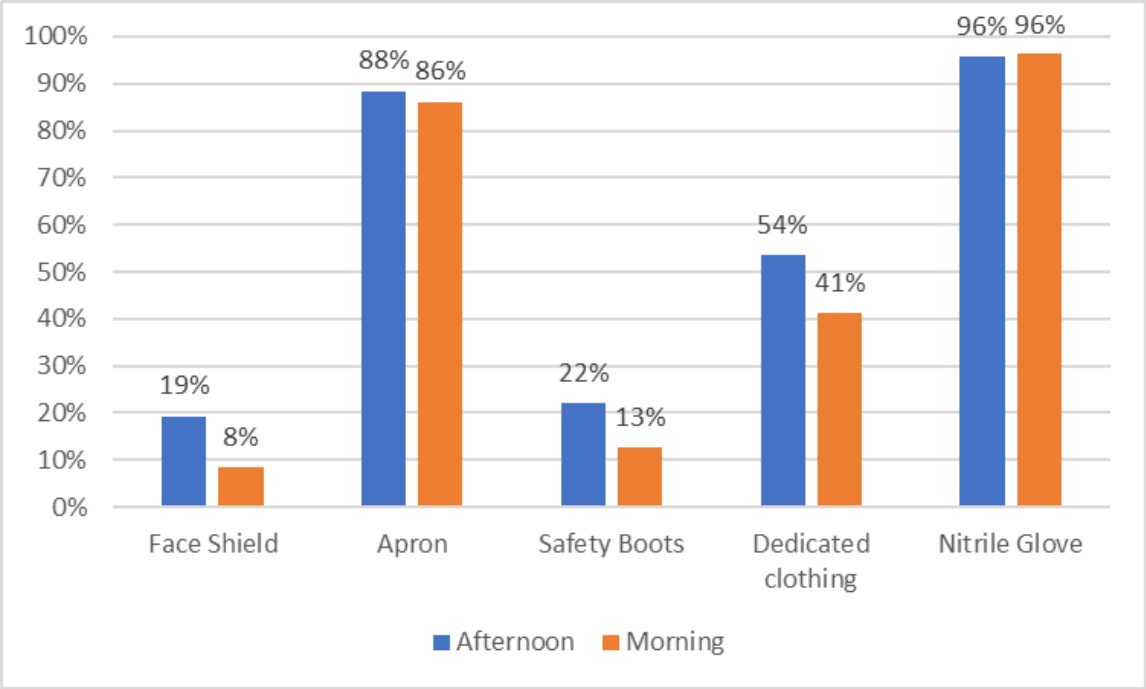


Figure 7 compares the percentage usage of various PPE in the morning versus the afternoon at the wild meat market. According to the table, there was higher PPE usage in afternoon hours than in the morning hours. However, the use of gloves was the same in the morning and afternoon. These results conflict with data from FGD and KII, where most traders reported higher temperatures and humidity in the afternoon compared to the morning hours, making most PPE use inconvenient.

Use of personal protective equipment (PPE) during the wet and dry season

FGD and KII findings revealed that respondents use PPE less frequently during the dry season, partly because there is less meat available in the market during this time. Dedicated clothing can produce a lot of heat during hot weather, and this discomfort makes it challenging to use throughout the day. One wild meat trader mentioned using PPE even during the dry season when going to villages to buy meat. Other respondents said they use boots more often in the wet season, to protect their feet. In summary, while usage may decrease during the dry season due to heat discomfort, some traders prioritize safety regardless of weather.

3.6 Perceived Risk of Being Infected with Zoonotic Disease while Trading Wild Meat

About 62 percent of traders reported that trading wild meat puts them at risk of getting zoonotic diseases (see Figure 8). About 68 percent of traders, 67 percent of butchers and 50

percent of helpers perceived themselves to be at risk of being infected by zoonotic diseases from their work (see Figure 9).

Figure 8. Perceived risk of traders of being infected with zoonotic diseases

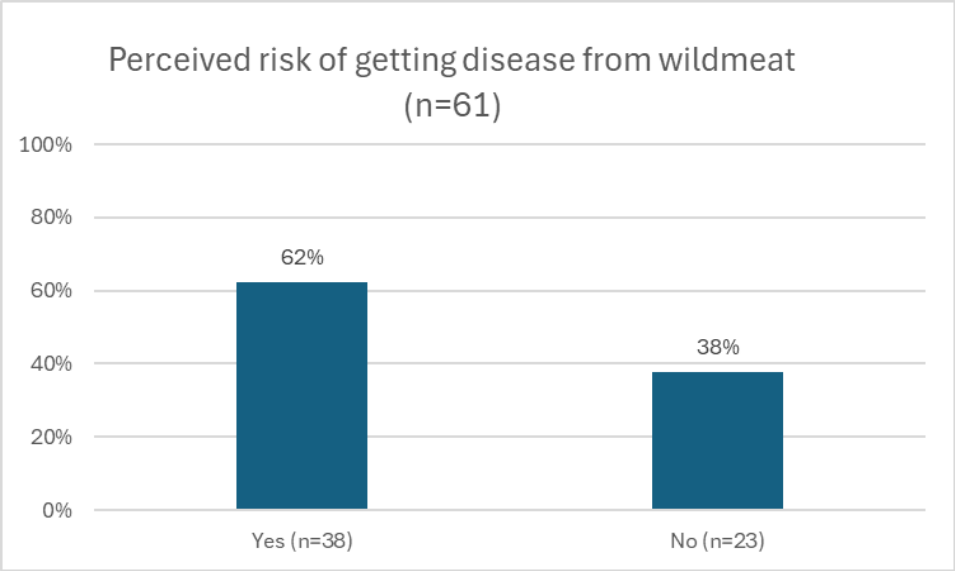
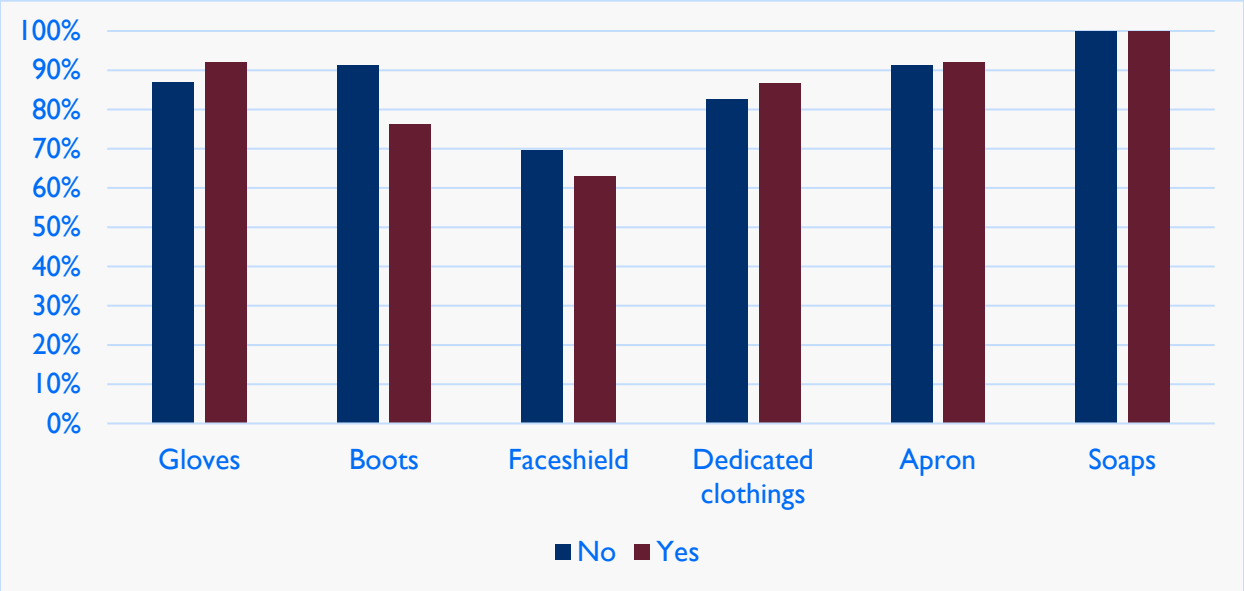


Figure 9. Perceived risk of zoonotic infection by wild meat traders by activity performed at wild meat market

Figure 10. PPE usage (regular and often) by perceived risk of being infected



Traders and processors who perceived themselves to be at risk of getting infected by zoonotic disease were slightly more likely to report using gloves, dedicated clothing, and aprons, while traders who did not perceive risks were slightly more likely to use face-shields and rubber boots (Figure 10). Use of soap and water after wild meat handling was universal. Everyone reported consistent use of soap and water before and after handling wild meat.

3.7 Impact of the Intervention on Risk Tolerance and Infection Prevention

Respondents emphasized that the use of biosafety measures such as PPE made it less likely for them to transmit sickness to others. The use of PPE and other biosafety items ensures their safety and prevents wounds and injuries. Previously, they faced cuts and injuries while butchering meat with their bare hands. PPE adoption has significantly reduced this risk. The biosafety measures helped them to consistently maintain cleanliness and protection. By dressing fully in PPE, including gloves, when they arrive at the market, traders minimized the risk of transferring sickness to others. The protective gear acts as a barrier against potential infections. Gloves are essential when handling meat directly, as they prevent direct contact with pathogens and reduce the risk of cuts or contamination. Gloves are particularly crucial during meat butchering, processing, and handling. Masks become more crucial in crowded or enclosed spaces as they protect against respiratory droplets and airborne particles. When interacting closely with others, masks play a vital role in infection prevention.

Before the intervention, traders lacked awareness of how to protect themselves. Now, thanks to STOP Spillover, they understand how to safeguard against sickness transmission. Traders recognize the importance of self-protection before safeguarding others. Their commitment to using PPE reduces the risk of transmitting sicknesses to others. The intervention also

empowered traders with knowledge, tools, and practices to prevent infections and prioritize safety. Gloves act as a barrier which reduces the risk of cuts, wounds, and contamination. The use of gloves likely contributes to overall hygiene and safety during meat handling. Traders responded that they now know that by wearing gloves, they can prevent direct contact with meat and potential pathogens.

Safety boots protect traders' feet from germs in the water around the butchering area. Preventing foot injuries and maintaining cleanliness are crucial for infection prevention by reducing the risk of infections. These two PPE items are essential for minimizing risks and ensuring safe practices in the wild meat market.

3.8 Wild Meat Butchered at the Market

Table 5 shows the types and quantities of wild meat sold at the market on the days of observation. Deer and bush hog were the most common meat sold during the period of observation, accounting for 31 percent and 27 percent, respectively, of the total meat butchered and sold. The Maxwell duiker accounted for 14 percent of the total meat butchered during the period of observation. February reported the highest number of animals butchered, while January had the lowest number of animals butchered (*Note: data collection in August 2023 was for only 3 days*).

Processors could identify banned animals, and they stated emphatically that they no longer trade in banned animals. Wild meat processors and traders received training from STOP Spillover and other partners on banned animals and were aware of the consequences of trading in banned wild animal meat.

The table also reported butchering of pigs, goats and cows (which are not wild meat) at the market, because people sometimes bring their domestic meat to the wild meat processors to butcher for commercial purposes.

Table 5. Types of animals and quantities sold at the Kingsway Corner market at the time of observation, by month

Animal Sold in Market	**Aug. '23** (last week only)	**Sep. '23**	**Nov. '23**	**Dec. '23**	**Jan. '24**	**Feb. '24**	**Mar. '24**	**Grand Total**
Buffalo				4		1	2	7
Bush cat (African palm civet)		6	4	2		1	3	16
African Buffalo (Bush cow)		9	6	9	6	16	8	54
Bay Duiker (Bush goat)	3	17	15	15	13	21	18	102
Red river hog (Bush hog)	16	128	113	103	92	159	126	737
Snake						1	1	2
Rabbit	1	1						2

Animal Sold in Market	Aug. '23 (last week only)	Sep. '23	Nov. '23	Dec. '23	Jan. '24	Feb. '24	Mar. '24	Grand Total
Cow			1					1
Bushbuck (Deer)	18	172	148	140	94	166	135	873
Maxwell duiker (Fritambo)	12	74	73	58	47	70	59	393
Goat		2	1	1			1	5
Grasscutter	5	31	12	15	18	28	28	137
Monkey	3	36	25	26	35	39	27	191
Pig	1	21	32	32	27	53	24	190
Brush-tailed Porcupine	1	13	13	10	12	13	9	71
Grand Total	**60**	**510**	**443**	**415**	**344**	**568**	**441**	**2781**

Table 6. Percentage of wild meat actors willing to pay for PPE (in Sierra Leonean Leones; ~23 SLE = 1 USD)

Gloves		Boots		Face shields		Dedicated clothing		Aprons	
Amount in SLE	%	Amount in SLE	%	Amount in SLE	%	Amount in SLE	%	Amount in SLE	%
30–50	50%	100 and above	48%	3 and above	38%	21–40 and above	28%	11 and above	33%
10–20	26%	50 and 51–99	30%	1 and 2–3	30%	20	19%	6–10	37%
5–10	24%	Don't know/other	22%	Don't know/ others	32%	Don't know/ other	53%	5	14%

Table 7. Market prices of individual PPE and the average price that traders are willing to pay for individual PPE

Biosafety Items	Market Value (SLE)	Average Willingness to Pay Price (SLE)
Gloves	30–60	19
Safety boots	150–230	80
Dedicated clothing	100–600	34
Apron	80–180	8
Face shield	20–50	3
Soap	2–3	3

Willingness to pay data indicates that most wild meat butchers and traders are willing to pay a modest amount for rubber gloves ($0.5 – 2 USD), boots (2 – 5 USD), face shields (0.4 – 0.13 USD) and aprons (0.22 – 0.5 USD). Willingness to pay for dedicated clothing was less frequent than for other PPE. However, the amounts wild meat actors are willing to pay are generally less than the market value or cost of these items. Wild meat actors discussed ways to reduce the

cost associated with purchasing PPE using grouped purchases or identifying cheaper market options.

3.9 Willingness Among Consumers to Cover Cost of PPE in their Wild Meat Purchase

The validation survey included a total of 251 wild meat customers from a wide range of backgrounds, including farmers, laborers, traders, public and private sector workers, students, and unemployed persons (Table 8). As outlined in Table 9, 50 percent of wild meat consumers reported that they were willing to pay SLE 20 (~$1 USD) more per meat purchase for improvements at the wild meat market; 6 percent said they would pay SLE 11–19 (~$0.5 – 1 USD) more; and 45 percent said they would pay SLE 1–11 (less than 0.5 USD) more to sustain improved biosafety practices at the market (Table 9). Reasons for their willingness to pay more for wild meat were as follows:

- So traders can make some profit (55.5 percent)
- To motivate traders to continue the practice (42.1 percent)
- In appreciation of good hygiene practices (2.4 percent)

Table 8. Percentage of wild meat customers willing to pay more for wild meat when PPE are used.

Occupation	Total Respondents
Farmer/Agricultural Worker	15
Government and other employees	29
Skilled laborers/traders	109
Students/Unemployed	98
Total	**251**

Table 9. Additional amount in Leones (SLE) that customers are willing to pay for wild meat when PPE are used, by occupational group. (1 USD = ~23 SLE)

Occupation	SLE 1–10	SLE 11–20	Over SLE 20	Total Respondents
Farmer/Agricultural Worker	27%	7%	67%	15
Government and other employees	55%	10%	34%	29
Skilled laborers/Traders	45%	6%	50%	109
Students/Unemployed	44%	4%	52%	98
Grand Total	**45%**	**6%**	**50%**	**251**

Not surprisingly, people who buy wild meat more frequently (daily or weekly) preferred to pay slightly less for biosafety practices in the market than people who buy wild meat less frequently (every month or occasionally)(Table 10).

Table 10. Additional amounts people are willing to pay for wild meat when PPE are used (by frequency at which respondents buy wild meat)

Frequency of visit	SLE 1–10	SLE 11–20	Over SLE 20	Total Respondents
Daily	65%	4%	31%	48
Weekly	58%	4%	39%	80
Every month	30%	4%	66%	93
Occasionally	23%	17%	60%	30
Grand Total	**45%**	**6%**	**50%**	**251**

3.10 Effectiveness of SBC Approaches

3.10.1 How did SBC approaches contribute to or influence the adoption of biosafety measures in the market?

Respondents considered the meetings, Bluetooth jingles, and radio programs very useful. They served as frequent reminders of the importance of wearing PPE like gloves, aprons, and masks during operations and maintaining a clean environment. Radio programs and discussion sessions provided valuable information on biosafety measures in the market as well as reminding butchers and traders about safe practices for handling and treating meat to ensure it remains safe for consumption. However, unfortunately not many market actors listen to the radio.

Respondents found posters and Bluetooth messages to be educational as they emphasized safety measures and proper use of project-provided materials while acting as constant reminders for butchers, customers, and the wider community to continue with biosafe practices and providing guidance on how to use the project-provided materials effectively. Respondents found Bluetooth messages most effective as they provided advice and reminders for safety practices. Posters illustrated what to do during meat butchering and selling.

Some respondents saw handwashing stations and butcher tables as sources of encouragement. These physical infrastructure elements contributed to maintaining hygiene and safety practices. The handwashing station provided water and the butcher blocks were cleanable.

Stakeholders' own active involvement in creating and participating in radio programs motivated and encouraged others to proudly adopt biosafety measures. Overall, a combination of communication channels (radio, posters, Bluetooth messages) effectively reminded participants of best practices and safety measures.

According to **butchers**, the provision of PPE, regular meetings, and Bluetooth messages encouraged them to adhere to biosafety measures. The introduction of PPE and other biosafety measures like tap water and handwashing stations changed their perception and reduced stigmatization in social gatherings. The use of safety boots reduced foot infections that were common when processing wild meat in sandals, especially in the rainy season. Most butchers said that because PPE usage was voluntary, not forced, they quickly saw the benefits and used them when handling meat. The improved sanitary conditions through the STOP Spillover intervention also reduced the presence of flies in the market.

Traders reported that Bluetooth messages, posters, and the waste collection arrangement in the market encouraged them to adopt biosafety measures. The use of utility gloves also prevented wounds from cutting meat for retail purposes.

The **butchers' helpers** were encouraged by the posters around the market, the handwashing stations, and one-on-one counseling provided by OHDWG members. They reported that the use of PPE reduced their exposure to blood stains from handling wild meat. One butcher helper said, *"I have been into butchering for over 15 years; this was the first time I was provided with PPE and encouragement to protect myself*."

Regular meetings and radio programs involving wild meat actors enhanced intervention ownership. Their active participation contributed positively to its success. Also, the continuous engagement of OHDWG members played a crucial role. Their efforts sustained the positive impact of the intervention.

The provision and acceptance of PPE, especially safety boots, prevented foot infections. This, along with other biosafety measures like controlled disposal of wild meat waste and the provision of running water, were seen as key facilitators to the adoption of risk reduction behaviors. The promotion of personal and environmental hygiene, including weekly waste collection in the market, was appreciated. Actively involving wild meat actors in meetings and radio programs enhanced ownership and intervention acceptability. Continued OHDWG engagement and Bluetooth message deployment encouraged respondents to adopt biosafety measures in the market. The availability and accessibility of tap running water in the market promoted personal and environmental hygiene, including regular waste collection and disposal. The provision and continuous adoption of PPE during butchering helped prevent exposure to wounds, cuts, blood fluid, and bad smell.

3.10.2 "Which SBC (radio programs, meetings, handwashing stations, jingles) approach did you not find useful?"

Respondents found all approaches (radio programs, meetings, handwashing stations, and jingles) to be valuable and recognized SBC materials as sources of education and awareness. These materials guided them in their daily activities within the market. These approaches consistently

reminded them of best practices and safety measures. Monthly meetings held significant value for participants. Missing a meeting caused frustration because they felt they were missing out on important information. A wild meat trader said "*For me, the monthly meetings mean a lot. When I was unable to attend meetings, I became very angry because I felt I had missed a lot*."

One respondent did not find the radio discussion program very useful. The reason cited was that she does not have a radio at home. Overall, while most SBC materials were valued, the radio discussion program did not resonate with some respondents due to the lack of access to a radio.

3.10.3 "What needs to happen for traders to continue using the biosafety measures?"

According to the wild meat stakeholders, there should be continuous engagement with wild meat traders and processors for them to continue using PPE and other biosafety measures. There is also the need to give the wild meat market a "face lift" (e.g., pouring concrete on the floor to make the market look decent) and create a separate market to make wild meat traders and processors feel more professional and distinct from other market traders. The traders' union and the local authority must work together to form a strong market committee that will enforce rules and regulations. Continuing regular monitoring meetings with wild meat stakeholders and the City Council should ensure safety bylaw enforcement at the wild meat market.

3.11 Challenges to Adoption

Despite progress, challenges related to waste management, especially wild meat wastewater, persisted. Some traders and helpers lacked full awareness of the importance of PPE and hygiene measures. The cost and accessibility of PPE remained concerns for certain individuals. A few people resisted changing established habits, making adoption of PPE and other biosafety measures challenging. While the availability of tap water improved hygiene, the overall market infrastructure needs further development. Implementing efficient waste collection systems and sanitation facilities are essential.

The intervention successfully promoted safety and health awareness, but ongoing efforts are necessary to address remaining challenges. By actively involving stakeholders and improving infrastructure, local leaders can continue making a positive impact in the wild meat market.

3.12 Sustainability of PPE Usage by Wild Meat Traders and Processers

Butchers feel they can afford to buy PPE when they wear out, as it helps prevent injuries. Traders said that they have been trained on the use of PPE and now have knowledge to use PPE

correctly. The butchers' helpers feel that they have the knowledge and resources to buy and continue using PPE.

Respondents, particularly wild meat traders, are knowledgeable about using PPE. They feel confident enough to teach others how to use these items. Respondents emphasized their desire to protect themselves from sickness. Safety boots were highlighted as essential for safeguarding feet from germs in the water around the butcher area. A butcher shared his personal experience: since using gloves, he and other butchers no longer suffered frequent cuts while butchering meat. This positive impact reinforced his and others' commitment to continued PPE use.

Wild meat traders are knowledgeable about using PPE and can also teach others how to use it. They mentioned that with the proceeds from their bushmeat trading, they can purchase the items after the project ends. Traders confirmed that they have the knowledge and skills to continue using PPE. Most traders said that they knew where to purchase the PPE and could buy it independently for their own safety. A trader said, "*I can buy the items even if the project is not here anymore.*" However, one high adopter helper expressed awareness of the usefulness and proper usage of all the items, but stated that affordability is a challenge, and they hope for continued assistance. However, if it becomes mandatory by law to use the items, they will find a way to acquire them. Overall, health concerns, positive experiences, and self-reliance contribute to their dedication to using PPE.

Respondents expressed optimism that traders and processors would continue using PPE and adhering to other biosafety measures in the market as many individuals are already adopting these safety materials, indicating a positive trend. One respondent personally committed to continuing the use of safety materials after the project ends. This commitment reflects an individual's awareness and dedication to safety. The awareness campaigns, including posters and Bluetooth messages, effectively informed wild meat actors about biosafety measures. This knowledge is expected to contribute to sustained adoption.

Ongoing involvement of OHDWG members will play a crucial role in adoption of these measures. Support from stakeholders such as the Ministry of Health which has recently provided hand gloves and aprons to traders and processors, demonstrated the commitment of the health sector to biosafety. If this continues, traders and butchers will continue using these measures. OHDWG members expressed willingness to support traders and processors in monitoring the market operation. This collaborative effort can help ensure continued adherence to safety practices.

The OHDWG's existence ensures continuous market monitoring. Their involvement ensures support to biosafety measures beyond the duration of the project. Leadership roles among market women fosters responsibility and commitment to enforcing safety practices. Most

traders and processors readily accept PPE due to their importance. Traders know where to buy PPE; consistent availability and affordability encourages ongoing use. Traders and processors understand that PPE protects against diseases like foot infections and colds. Awareness campaigns emphasize the dignity and cleanliness associated with PPE use. Willingness to invest in maintaining water availability demonstrates commitment to hygiene. Regular handwashing and meat cleaning contribute to safety. Recognizing the importance of biosafety measures motivates traders and processors as they know that using PPE is a way to protect themselves and their families. Participation of local authorities (e.g., trader's union chairman, mammy queen, city council, chiefs) creates ownership. Their continuous support ensures adherence to laws and safety measures.

3.13 Educating Others in PPE Use

Respondents actively taught others about PPE use, especially about using gloves and boots. They thought new traders joining the market should receive guidance on safety practices, and they educated other traders at the Kamara town wild meat market. One butcher shared an experience in Kailahun where she was fully dressed in PPE and people were initially scared but were receptive when educated about PPE importance. Traders from other markets had varied reactions to education on PPE. While some were initially fearful of PPE, the educational approach helped dispel misconceptions and promote awareness about safety practices. Overall, traders actively shared knowledge within their market and are willing to extend that education beyond their immediate community.

3.14 Additional Measures to Ensure PPE Usage Sustainability

Market stakeholders emphasized the importance of continuous meetings and engagements with traders. These regular interactions can help address stubbornness and reinforce the use of PPE. They also suggested the need for strong market leadership with clear rules and regulations to motivate traders. Coupled with continuous monthly meetings, this approach can encourage adherence to safety practices.

The OHDWG and community leaders will provide guidance and advocacy to promote sustained use of PPE. Stakeholders, especially in the health and environment sectors, should collaborate to enforce laws related to PPE use. Legal enforcement can ensure continued adherence to safety practices. The role of the city council is important to enforcement.

Providing freezers for meat preservation can enhance hygiene and safety as proper storage prevents spoilage and supports overall biosafety practices. Strict bylaws and regulations on PPE use contribute to ongoing adoption. Continuous engagement with traders, even after the project ends, is crucial. The traders' union should assist in forming a governing body for bushmeat traders while the city council's role includes ensuring the enforcement of laws related

to biosafety practices. Overall, a combination of education, leadership, legal enforcement, and practical support can facilitate sustained PPE use among traders.

SECTION 4: DISCUSSION

The data reveals a high rate of compliance with glove usage and handwashing protocols, a lower rate for usage of aprons and dedicated clothing, and the lowest rate for face shields and rubber boots. Possible reasons for this were that while all the traders and processors consider handwashing, gloves, and aprons protective for their work, only butchers consider boots and face shields important for their work. Traders do not use rubber boots and face shields often because their feet and faces are not at risk of contamination when selling to customers.

Traders and processors view the intervention as successful due to protective benefits from PPE, improved hygiene practices, controlled waste disposal, and regained dignity.

There was high preference for using the cleanable butcher block provided and traders and processors fully adopted the practice of cleaning the butcher block and the drainage of animal blood in the soak-away pit during and after butchering.

Butchers and helpers are more likely to use their full PPE gear either when processing large quantities of meat or large animals because they are more likely to soil their body and clothes.

Despite the intervention reducing contact with wild meat and its fluids (thus lowering zoonotic transmission risk), butchers still had significant contact. This could be because of blood and meat pieces splashing on them when they are not dressed in full PPE attire when butchering. Continued guidance/training in risk reduction butchering practices is needed.

Data from self-reported PPE usage was higher than observed usage. Traders and processors overreported their usage of dedicated clothing, face shields, and rubber boots.

A typical PPE user trades at the Kingsway Corner market, earning over Le 500/week from the wild meat trade and is illiterate. PPE usage is inconvenient during the dry season due to heat discomfort, but safety and hygiene remain a priority.

More PPE usage occurs in the afternoon than in the morning, but rubber glove usage remains consistent. Wild meat traders and processors are more likely to use rubber boots and dedicated clothing in the rainy season when the weather is cooler and the ground is wet/muddy, to protect their body and feet from the dampness.

Butchers with higher perceived risk of zoonotic disease regularly use gloves, dedicated clothing, and aprons. Those who perceive lower risk prefer face shields and rubber boots.

Wild meat actors understand the benefits of using PPE so even though PPE usage is highly inconvenient during the dry season due to discomfort in hot weather, traders prioritize safety regardless of weather.

The deer and bush hog were the most common meats sold during the period of observation, accounting for 31 percent and 27 percent respectively of the total meat butchered and sold. February had the highest number of animals butchered, while January had the lowest number of animals butchered.

Consumers are willing to pay more for wild meat when traders use PPE; this helps motivate traders to continue safe practices.

Wild meat actors are willing to pay for PPE replacements, but their budget is less than market value for these items. Stakeholders need to support them during this transition.

Posters and Bluetooth messages serve as constant reminders for butchers. Radio programs are less useful due to limited access to radios.

Challenges to sustainability of the PPE usage include leadership gaps at the market, water availability, and market infrastructure.

SECTION 5: CONCLUSIONS AND RECOMMENDATIONS

In conclusion, wild meat actors have fully adopted handwashing with soap and using rubber gloves, partially adopted the wearing aprons and dedicated clothing, but have yet to adopt wearing of rubber boots and face shields when handling wild meat. The adoption of these practices has reduced the frequency and contact of wild meat actors with wild meat and wild meat fluids. Before the intervention, no one was using any PPE. As a result, contact with wild meat and wild meat fluids was 100 precent; with frequent PPE use and encouragement, this has been reduced to 15 percent.

Wild meat traders are willing to buy the PPE to continue using them, but the amount they are willing to pay is much less than the market price for the items. Therefore, they will still need partners to fund the purchase of these items. Traders with no formal education, those who earn Le 500/week ($23/week) and those who trade at the Kingsway Corner market are more likely to use PPE. Wild meat traders and consumers were all pleased with the use of PPE by the traders and are willing to pay a little extra for the wild meat to help them sustain the practice.

All the SBC measures were useful to some extent, but the Bluetooth messages and community meetings were more useful for reinforcing messages. The radio programs were less useful because some traders do not have radios.

5.1 Recommendations

Leadership Election: The Local Council and other wild meat stakeholders should lead a process to elect substantive leadership for the wild meat market.

Water Access: The market leadership should consult with the local water company (SALWACO) to find out ways of providing affordable pipe-borne running water for the market.

Biosafety Measures: OHDWG members should continue holding regular meetings with wild meat traders and processors to ensure that they adopt PPE and other biosafety measures.

Butcher Training: Provide training for wild meat butchers on low risk butchering practices to minimize contact with wild meat and its fluids during the process.

Subsidized PPE: OHDWG members and market leadership should engage stakeholders to provide PPE to wild meat traders at a subsidized price, encouraging continued adoption.

Enforce Bylaws: City Council should collaborate with the market leadership to enforce bylaws that improve PPE adoption among wild meat traders and processors.

Supervision and Training: The wild meat unit of the Ministry of Environment and the Ministry of Health should collaborate and conduct regular supervision and training to emphasize the importance of continuous PPE use.

Freezer provision for wild meat storage: Providing freezers for meat preservation can enhance hygiene and safety as proper storage prevents spoilage and supports overall biosafety practices.

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ANNEX 1: QUANTITATIVE TOOLS

QUANTITATIVE QUESTIONS FOR WILD MEAT TRADERS AND PROCSSORS ON ADOPTION OF BIOSAFETY MEASURES.

Declaration of the Purpose for study:

Seeking consent for participation and taking of photos by reading the consent information sheet to study participants and obtaining verbal consent.

Introduction of data collector.

Consent Information Sheet-Wild meat Traders and Processors

Strategies to Prevent Spillover (STOP Spillover) Filovirus Research Study: Ebola Biosafety Intervention at Kingsway Corner Wild meat Market in Kenema.

My name is …… and conducting interviews for STOP Spillover on adoption of biosafety measures introduced in this market.

You are being invited to take part in a study being done by Dr. Edward Magbity and the STOP Spillover team in Sierra Leone, and by Dr. Amuguni, Janetrix Hellen from Tufts University (USA) because you trade wild meat in this market.

If you decide to be in this study, you will be invited to participate in a trader and processor questionnaire. This will help us learn about the extent of adoption of the biosafety measure STOP Spillover has introduced into the market and what has aided or deterred adoption. The study will target all wild meat traders and processors in the market and will last about 5 days, though your questionnaire will only last for about 30 minutes.

Your participation is completely voluntary. You can skip questions that you do not want to answer or stop participating at any time with no penalty to you.

We anticipate taking photographs of wild meat, wild meat handling practices, hygiene of soak-away pit, hygiene of handling butchered block for wild meat, and utilizing pipe running water for hygiene. However, any photo that will be taken of your face will be blurred when published in any report.

There is a risk of loss of confidentiality, however we are not collecting your name or telephone number, or any identifying information. All electronic files of notes, photographs, and other related records will be stored on password-protected Tetra-tech-encrypted computers to protect your privacy.

There are no direct benefits to you from taking part in this research. We cannot promise any benefits to others from your taking part in this research. You will not be paid for your participation.

If you have questions, concerns, or complaints, or think the research has hurt you, please contact Dr. Edward Magbity at +23278434267 or Dr. Helen Amuguni at Janetrix.Amuguni@tufts.edu

If you have questions about your rights as a research study subject, call the Tufts Medical Center and Tufts University Health Sciences Institutional Review Board (IRB) at (617) 636-7512. This study has been reviewed by the Tufts Health Sciences IRB.

Do you consent to participate in this study? Yes No

Tool 3: Endline Quantitative Data Collection from wild meat traders and processors

#	QUESTION	RESPONSE
I. QUESTIONNAIRE IDENTIFICATION		
01	ID of Participant	
02	Sex	1.Male 2.Female
03	Age (number of years)	
04	Marital Status	1.Single 2.Married 3.Divorced 4.Widow
05	Education	1.None 2.Partial Primary 3.Complete Primary 4.Partial Secondary 5.Complete Secondary 6.University
06	How long have you sold wild meat? (number of years)	
07	Amount of wild meat sold per week, in Leones	1.< 1000 Le 2.1000 - 2000 Le 3.>2000 Le

#	QUESTION	RESPONSE
08	Location	
09	Indicate the role of respondent being interviewed {*SELECT ALL THAT APPLY*}	1. Skinning/burning/Helper 2. Butchering 3. Slicing/Trading
10	Place of activity	1. Wild meat Market 2. Street trading 3. Restaurant
11	Do you think you at risk of disease from wild meat?	1. Yes 2. No If no, skip to Q13
12	If Yes. How large is your risk?	1. Very high 2. Not high/medium 3. Low risk
II. BIOSAFETY PRACTICES		
13	Did you receive training in PPE use?	1. Yes 2. No If NO, Skip to Q17
14	How many trainings did you receive? (number of training events)	#
15	Was the training sufficient to help you use the materials provided?	1. Yes 2. No
16	What additional training, if any, would you suggest to help promote PPE use?	*Open Response:*
17	Did you receive any mentoring support from STOP Spillover staff or partners?	1. Yes 2. No If No skip to Q19.
18	If so, how often?	1. Once 2. Twice 3. Many times

#	QUESTION	RESPONSE
19	Did you receive peer support from your colleagues in the market to help you remember to use PPE?	1. Yes 2. No
20	Did you hear any PPE jingles in the market?	1. Yes 2. No If No, skip to Q22
21	If yes, were they helpful in reminding you to use PPE?	1. Yes 2. No
22	Did you see any PPE posters in the market?	1. Yes 2. No If No, skip to Q24
23	If yes, did they help remind you to use PPE materials?	1. Yes 2. No
24	Did anyone else encourage you to use PPE (local leaders, chairlady?)	1. Yes 2. No
25	Did you receive any sanctions for not using PPE?	1. Yes 2. No
26	Which activity/message/item put in place by STOP Spillover really helped/encouraged you to use the PPE?	
27	How did it help you to adopt the use of PPE and other materials provided?	
28	Which activity/message/item you didn't find helpful to use the PPE?	
29	Why were they not helpful?	

#	QUESTION	RESPONSE
30	Since you received PPE, how often have you used it? (check each below)	
31	Gloves	1. Regularly (all the time) 2. Often (not all the time, but frequently) 3. Sometimes (Not frequently) 4. Very infrequently 5. Never
32	Can you explain the reasons for choosing your response to the previous question? ***Probe*** *[Ask the users 1 and 2]* What are the motivations for using this biosafety measure? *[Ask infrequent and never users (4 and 5)]* What are some reasons for not using this biosafety measure?	*Open response:*
33	How comfortable do you feel when you use gloves?	1. Very comfortable 2. Manageable 3. Not comfortable
34	Boots	1. Regularly (all the time) 2. Often (not all the time, but frequently) 3. Sometimes (Not frequently) 4. Very infrequently 5. Never
35	Can you explain the reasons for choosing the response in the previous question? ***Probe*** *[Ask the users 1 and 2]* What are the motivations for adopting this biosafety measure? *[Ask infrequent and never users (4 and 5)]* What are some reasons for not using this biosafety measure?	*Open response:*
36	How comfortable do you feel when you use rubber boots?	1. Very comfortable 2. Manageable 3. Not comfortable

#	QUESTION	RESPONSE
37	Face shield	1. Regularly (all the time) 2. Often (not all the time, but frequently) 3. Sometimes (Not frequently) 4. Very infrequently 5. Never
38	Can you explain the reasons for choosing the response in the previous question? ***Probe*** *[Ask the users 1 and 2]* What are the motivations for adopting this biosafety measure? *[Ask infrequent and never users (4 and 5)]* What are some reasons for not using this biosafety measure?	*Open response:*
39	How comfortable do you feel when you use Face shield?	1. Very comfortable 2. Manageable 3. Not comfortable
40	Dedicated clothing	1. Regularly (all the time) 2. Often (not all the time, but frequently) 3. Sometimes (Not frequently) 4. Very infrequently 5. Never
41	Can you explain the reasons for choosing the response in the previous question? ***Probe*** *[Ask the users 1 and 2]* What are the motivations for adopting this biosafety measure? *[Ask infrequent and never users (4 and 5)]* What are some reasons for not using this biosafety measure?	*Open response:*
42	How comfortable do you feel when you use dedicated clothing?	1. Very comfortable 2. Manageable 3. Not comfortable
43	Apron	1. Regularly (all the time) 2. Often (not all the time, but frequently) 3. Sometimes (Not frequently)

#	QUESTION	RESPONSE
		4. Very infrequently 5. Never
44	Can you explain the reasons for choosing the response in the previous question? ***Probe*** *[Ask the users 1 and 2]* What are the motivations for adopting this biosafety measure? *[Ask infrequent and never users (4 and 5)]* What are some reasons for not using this biosafety measure?	*Open response:*
45	How comfortable do you feel when you use Apron?	1. Very comfortable 2. Manageable 3. Not comfortable
46	Soap	1. Regularly (all the time) 2. Often (not all the time, but frequently) 3. Sometimes (Not frequently) 4. Very infrequently 5. Never
47	Can you explain the reasons for choosing the response in the previous question? ***Probe*** *[Ask the users 1 and 2]* What are the motivations for adopting this biosafety measure? *[Ask infrequent and never users (4 and 5)]* What are some reasons for not using this biosafety measure?	*Open response:*
48	How comfortable do you feel when wash your hands with soap and water?	1. Very comfortable 2. Manageable 3. Not comfortable
49	**Challenges and Barriers** What are some challenges or barriers in adopting biosafety practices? • Are there any specific obstacles that have hindered the adoption of certain biosafety practices? – Gloves: – Apron:	

#	QUESTION	RESPONSE
	– Dedicated clothing: – Face Shield: – Rubber boots: – Soap and water: *Probe for each biosafety measure.*	
50	**Support** • What types of support or additional resources do you feel are needed to improve the adoption of biosafety practices? – Gloves: – Apron: – Dedicated clothing: – Face Shield: – Rubber boots: – Soap and water: *Probe.* • Programmatic/ intervention related support • Community support	
51	**Feedback on training** • What aspects of the biosafety training were most useful to you? • Are there any specific areas you would like to see addressed in future training?	
52	**Recommendations/Suggestions** • Do you have any other comments or suggestions on how to increase the adoption of biosafety practices in your working environment?	
53	Do you think you might get sick or make others sick if you don't use PPE? *(perceived risk)* 1. No 2. Not much 3. Somewhat Yes	

#	QUESTION	RESPONSE
54	How often do you come into contact with wild animal fluids now? *(if never, skip to 57)* 1. Daily 2. Weekly 3. Rarely Never	
55	If you do come into contact with wild animal fluids now, what type are you exposed to? 1. Blood 2. Feces 3. Saliva Other (please describe)	
56	If you do come into contact with wild animal fluids, for how long are you in contact with them? 1. Not long (a few minutes) 2. Up to one hour per day Several hours per day	
III. SATISFACTION		
57	How satisfied/happy are you with the Gloves?	1. Very Satisfied 2. Satisfied 3. Neutral 4. Unsatisfied 5. Very Unsatisfied 6. Unsure/Don't know
58	How satisfied are you with the Boots?	1. Very Satisfied 2. Satisfied 3. Neutral 4. Unsatisfied 5. Very Unsatisfied 6. Unsure/Don't know
59	How satisfied are you with the Face Shield?	1. Very Satisfied 2. Satisfied 3. Neutral 4. Unsatisfied 5. Very Unsatisfied 6. Unsure/Don't know
60	How satisfied are you with the Dedicated clothing ?	1. Very Satisfied 2. Satisfied 3. Neutral 4. Unsatisfied

#	QUESTION	RESPONSE
		5. Very Unsatisfied 6. Unsure/Don't know
61	How satisfied are you with the Apron?	1. Very Satisfied 2. Satisfied 3. Neutral 4. Unsatisfied 5. Very Unsatisfied 6. Unsure/Don't know
62	How satisfied are you with hand washing with soap and water?	1. Very Satisfied 2. Satisfied 3. Neutral 4. Unsatisfied 5. Very Unsatisfied 6. Unsure/Don't know
IV. PPE REPLACEMENT		
63	What is the condition of the glove supplied to you by STOP Spillover?	1. Good 2. Worn-out
64	If worn-out, have you replaced it with another set of gloves?	1. Yes 2. No
65	What is the condition of the Apron supplied to you?	1. Good 2. Worn-out
66	If worn-out, have you replaced it with another set of aprons?	1. Yes 2. No
67	What is the condition of the dedicated clothing supplied to you?	1. Good 2. Worn-out
68	If worn-out, have you replaced it with another set of aprons?	1. Yes 2. No
69	What is the condition of the boot supplied to you?	1. Good 2. Worn-out
70	If worn-out, have you replaced it with another set of boots?	1. Yes 2. No
71	What is the condition of the face shield supplied to you?	1. Good 2. Worn-out

#	QUESTION	RESPONSE
72	If worn-out, have you replaced it with another set of face shield?	1. Yes 2. No
73	What is the condition of the dedicated clothing supplied to you?	1. Good 2. Worn-out
74	If worn-out, have you replaced it with another set of dedicated clothing?	1. Yes 2. No
75	What do still have the soap supplied to you?	1. Yes 2. No
76	If no, have you ever replaced the soap?	1. Yes 2. No
78	Would you be willing to buy a pair of gloves?	1. Yes 2. No 3. Don't Know
79	What is the reason for your answer above?	
80	Would you be willing to buy boots?	1. Yes 2. No 3. Don't Know
81	What is the reason for your answer above?	
82	Would you be willing to buy a face shield?	1. Yes 2. No 3. Don't Know
83	What is the reason for your answer above?	
84	Would you be willing to buy dedicated clothing?	1. Yes 2. No 3. Don't Know
85	What is the reason for your answer above?	
86	Would you be willing to buy an apron?	1. Yes

#	QUESTION	RESPONSE
		2. No 3. Don't Know
87	What is the reason for your answer above?	
88	Would you be willing to buy soap?	1. Yes 2. No 3. Don't Know
89	What is the reason for your answer above?	
90	Why would you not be willing to pay for	
91	*[ASK if Q8.1=0 or =99]* What price would you pay for a pair of gloves?	**Price** 1. 5-10 SLE 2. 10-20 SLE 3. 30-50 SLE 4. Other [be precise] 5. Don't know
92	*[ASK if Q8.2=0 or =99]* What price would you pay for boots?	**Price** 1. 50 SLE 2. 51-99 SLE 3. 100 SLE and above 4. Other [to precise] 5. Don't know
93	*[ASK if Q8.3=0 or =99]* What price would you pay for a face shield?	**Price** 1. 1 SLE 2. 2-3 SLE 3. 3 SLE and above 4. Other [to precise] 5. Don't know
94	*[ASK if Q8.4=0 or =99]* What price would you pay for dedicated clothing?	**Price** 1. 20 SLE 2. 21-40 SLE 3. 40 SLE and above 4. Other [to precise] 5. Don't know
95	*[ASK if Q8.5=0 or =99]*	**Price**

#	QUESTION	RESPONSE
	What price would you pay for an apron?	1. 5 Le 2. 6-10 Le 3. 11 Le and above 4. Other [to precise] 5. Don't know
96	*[ASK if Q8.6=0 or =99]* What price would you pay for soap?	Price 2-SLE 2-4 SLE 5 SLE and above Other [to precise] Don't know

QUANTITATIVE QUESTIONS FOR WILD MEAT CONSUMERS WHO BUY THE MEAT AT THE KINGSWAY CORNER WILD MEAT MARKET IN KENEMA

Declaration of the Purpose for study:

Seeking consent for participation and taking of photos by reading the consent information sheet to study participants and obtaining verbal consent.

Introduction of data collector.

Consent Information Sheet-CONSUMERS

Strategies to Prevent Spillover (STOP Spillover) Filovirus Research Study: Ebola Biosafety Intervention at Kingsway Corner Wild meat Market in Kenema.

My name is …… and conducting interviews for STOP Spillover on adoption of biosafety measures introduced in this market.

You are being invited to take part in a study being done by Dr. Edward Magbity and the STOP Spillover team in Sierra Leone, and by Dr. Amuguni, Janetrix Hellen from Tufts University (USA) because you buy and consume bushmeat from this market.

If you decide to be in this study, you will be invited to participate in a consumer questionnaire. This will help us learn about ways to know how acceptable these biosafety measures might be to you as a customer. The study will target 300 participants in Kenema in total, and the entire study will last about five days, though your questionnaire will only last for about 10 minutes.

Your participation is completely voluntary. You can skip questions that you do not want to answer or stop participating at any time with no penalty to you.

We anticipate taking photographs of wild meat, wild meat handling practices, hygiene of soak-away pit, hygiene of handling butchered block for wild meat, and utilizing pipe running water for hygiene. However, any photo that will be taken of your face will be blurred when published in any report.

There is a risk of loss of confidentiality, however we are not collecting your name or telephone number, or any identifying information. All electronic files of notes, photographs, and other related records will be stored on password-protected Tetra-tech-encrypted computers to protect your privacy.

There are no direct benefits to you from taking part in this research. We cannot promise any benefits to others from your taking part in this research. You will not be paid for your

participation, however, reimbursements for expenses such as transportation, accommodation, and food will be available for participants, per USAID guidelines.

If you have questions, concerns, or complaints, or think the research has hurt you, please contact Dr. Edward Magbity at +23278434267 or Dr. Helen Amuguni at Janetrix.Amuguni@tufts.edu

If you have questions about your rights as a research study subject, call the Tufts Medical Center and Tufts University Health Sciences Institutional Review Board (IRB) at (617) 636-7512. This study has been reviewed by the Tufts Health Sciences IRB.

Do you consent to participate in this study? Yes No

Tool 4: Consumer Willingness to Pay

NO.	QUESTION	RESPONSES
1	Age in years	
2	Gender	1. Male 2. Female
3	Occupation	
4	How often do you buy wild meat in this market?	1. Daily 2. Weekly 3. Every few weeks 4. Every month 5. Occasionally 6. Rarely/special occasions)
5	How do you feel about the use of PPE and other biosafety measures in the market?	1. Positive 2. Negative 3. Neutral
6	Give reasons for your answer above.	
7	How much more are you willing to pay to buy wild meat that is handled more safely?	
8	Give reasons for your response above	
9	Any thoughts or suggestions to share with us?	

ANNEX 2: QUALITATIVE TOOLS

FOCUS GROUP DISCUSSIONS QUESTIONS WILD MEAT TRADERS ON ADOPTION OF BIOSAFETY MEASURES.

Questions for focus group discussion (FDG) for TRADERS (6-10 participants)

Declaration of the Purpose for FGD:

Seeking consent for participation and taking of photos by reading the consent information sheet to study participants and obtaining verbal consent

Introduction of participants and facilitators

Consent Information Sheet-Traders

Strategies to Prevent Spillover (STOP Spillover) Filovirus Research Study: Ebola Biosafety Intervention at Kingsway Corner Wild meat Market in Kenema.

Our names are …… and conducting interviews for STOP Spillover on adoption of biosafety measures introduced in this market.

You are being invited to take part in a study being done by Dr. Edward Magbity and the STOP Spillover team in Sierra Leone, and by Dr. Amuguni, Janetrix Hellen from Tufts University (USA) because you trade bushmeat in this market.

If you decide to be in this study, you will be invited to participate in a trader FGD session. This will help us learn about the extent of adoption of the biosafety measure STOP Spillover has introduced into the market and what has aided or deterred adoption. The study will target 6-10 wild meat traders, in the market and will last about 5 days, though the FGD will only last for about 60 minutes.

Your participation is completely voluntary. You can skip questions that you do not want to answer or stop participating at any time with no penalty to you.

We anticipate taking photographs of wild meat, wild meat handling practices, hygiene of soak-away pit, hygiene of handling butchered block for wild meat, and utilizing pipe running water for hygiene. However, any photo that will be taken of your face will be blurred when published in any report.

There is a risk of loss of confidentiality, however we are not collecting your name or telephone number, or any identifying information. All electronic files of notes, photographs, and other

related records will be stored on password-protected encrypted computers to protect your privacy.

There are no direct benefits to you from taking part in this research. We cannot promise any benefits to others from your taking part in this research. You will not be paid for your participation, however, reimbursements for expenses such as transportation, accommodation, and food will be available for participants, per USAID guidelines.

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If you have questions about your rights as a research study subject, call the Tufts Medical Center and Tufts University Health Sciences Institutional Review Board (IRB) at (617) 636-7512. This study has been reviewed by the Tufts Health Sciences IRB.

Do you consent to participate in this study? Yes No

Illustrative qualitative questions:

Tool 5: FGDs for traders

- What would you say about the level of success of the intervention? Why?
- What encouraged you to adopt PPE and other biosafety measures in the market? (rank in order of priority)
- What discouraged you from adopting PPE and other biosafety measures in the market? (rank in order of priority)
- Do you feel you are less likely to be infected or infect others (risk tolerance) as a result of this intervention? Why/why not?
- When do you use the items most? When do you use it less? (Probe: Season, time of day; type of animal)
- If we implement a similar intervention in another market, what should we do differently? What should we do the same?
- What can you tell us about your ability/readiness to continue using the biosafety measures after this project (Do you have the knowledge of its usefulness; skills to use them; items to use and can you replace them; Is there a source to get them: and what will support you to maintain behavior changes)
- Did you educate others in the intervention and did wild meat traders outside of this market start using it?
- Which SBC approach did you find useful? Why?
- Which SBC approach did you find not useful for adoption? Why
- Which type of meat do you prefer to sell more, and which one would you not like to sell? Why?

- Are there any cultural beliefs or practices that promote or discourage use of the biosafety measures?
- Are there any cultural beliefs that make you not to sell or eat certain species of meat? Please explain more.

Questions for FDG for Processors (6-10 participants)

Declaration of the Purpose for FGD:

Seeking consent for participation and taking of photos by reading the consent information sheet to study participants and obtaining verbal consent

Introduction of participants and facilitators

Consent Information Sheet-Processors

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You are being invited to take part in a study being done by Dr. Edward Magbity and the STOP Spillover team in Sierra Leone, and by Dr. Amuguni, Janetrix Hellen from Tufts University (USA) because you trade bushmeat in this market.

If you decide to be in this study, you will be invited to participate in a Processor FGD session. This will help us learn about the extent of adoption of the biosafety measure STOP Spillover has introduced into the market and what has aided or deterred adoption. The study will target 6-10 wild meat processor, in the market and will last about 5 days, though the FGD will only last for about 60 minutes.

Your participation is completely voluntary. You can skip questions that you do not want to answer or stop participating at any time with no penalty to you.

We anticipate taking photographs of wild meat, wild meat handling practices, hygiene of soak-away pit, hygiene of handling butchered block for wild meat, and utilizing pipe running water for hygiene. However, any photo that will be taken of your face will be blurred when published in any report.

There is a risk of loss of confidentiality, however we are not collecting your name or telephone number, or any identifying information. All electronic files of notes, photographs, and other

related records will be stored on password-protected encrypted computers to protect your privacy.

There are no direct benefits to you from taking part in this research. We cannot promise any benefits to others from your taking part in this research. You will not be paid for your participation, however, reimbursements for expenses such as transportation, accommodation, and food will be available for participants, per USAID guidelines.

If you have questions, concerns, or complaints, or think the research has hurt you, please contact Dr. Edward Magbity at +23278434267 or Dr. Helen Amuguni at Janetrix.Amuguni@tufts.edu

If you have questions about your rights as a research study subject, call the Tufts Medical Center and Tufts University Health Sciences Institutional Review Board (IRB) at (617) 636-7512. This study has been reviewed by the Tufts Health Sciences IRB.

Do you consent to participate in this study? Yes No

Illustrative qualitative questions:

Tool 5: FGDs for Processors

- What would you say about the level of success of the intervention? Why?
- What encouraged you to adopt PPE and other biosafety measures in the market? (rank in order of priority)
- What discouraged you from adopting PPE and other biosafety measures in the market? (rank in order of priority)
- Do you feel you are less likely to be infected or infect others (risk tolerance) as a result of this intervention? Why/why not?
- When do you use the items most? When do you use it less? (Probe: Season, time of day; type of animal)
- If we implement a similar intervention in another market, what should we do differently? What should we do the same?
- What can you tell us about your ability/readiness to continue using the biosafety measures after this project (Do you have the knowledge of its usefulness; skills to use them; items to use and can you replace them; Is there a source to get them: and what will support you to maintain behavior changes)
- Did you educate others in the intervention and did wild meat traders outside of this market start using it?
- Which SBC approach did you find useful? Why?
- Which SBC approach did you find not useful for adoption? Why
- Which type of meat do you prefer to sell more, and which one would you not like to sell? Why?

- Are there any cultural beliefs or practices that promote or discourage use of the biosafety measures?
- Are there any cultural beliefs that make you not to sell or eat certain species of meat? Please explain more.

Questions for Key Informant Interview for High adopters (3 participants)

Declaration of the Purpose for KII:

Seeking consent for participation and taking of photos by reading the consent information sheet to study participants and obtaining verbal consent.

Introduction of participants and facilitators.

Consent Information Sheet-High Adopter

Strategies to Prevent Spillover (STOP Spillover) Filovirus Research Study: Ebola Biosafety Intervention at Kingsway Corner Wild meat Market in Kenema.

Our names are …… and conducting interviews for STOP Spillover on adoption of biosafety measures introduced in this market.

You are being invited to take part in a study being done by Dr. Edward Magbity and the STOP Spillover team in Sierra Leone, and by Dr. Amuguni, Janetrix Hellen from Tufts University (USA) because our data shows that you are one of the high adopters of biosafety measures in this market.

If you decide to be in this study, you will be invited to participate in high adopter questionnaire. This will help us learn about ways to know how acceptable these biosafety measures might be to you as a trader/processor. The study will target 3 high adopters at the Kingsway Corner market in Kenema, and the entire study will last about five days, though your questionnaire will only last for about 1hour minutes.

Your participation is completely voluntary. You can skip questions that you do not want to answer or stop participating at any time with no penalty to you.

We anticipate taking photographs of wild meat, wild meat handling practices, hygiene of soak-away pit, hygiene of handling butchered block for wild meat, and utilizing pipe running water for hygiene. However, any photo that will be taken of your face will be blurred when published in any report.

There is a risk of loss of confidentiality, however we are not collecting your name or telephone number, or any identifying information. All electronic files of notes, photographs, and other related records will be stored on password-protected encrypted computers to protect your privacy.

There are no direct benefits to you from taking part in this research. We cannot promise any benefits to others from your taking part in this research. You will not be paid for your participation, however, reimbursements for expenses such as transportation, accommodation, and food will be available for participants, per USAID guidelines.

If you have questions, concerns, or complaints, or think the research has hurt you, please contact Dr. Edward Magbity at +23278434267 or Dr. Helen Amuguni at Janetrix.Amuguni@tufts.edu

If you have questions about your rights as a research study subject, call the Tufts Medical Center and Tufts University Health Sciences Institutional Review Board (IRB) at (617) 636-7512. This study has been reviewed by the Tufts Health Sciences IRB.

Do you consent to participate in this study? Yes No

Tool 6: KII with high adopter

1. What factors motivated you to use PPE regularly? (try to rank them by most important, least important factors)
2. Were you ever discouraged to use PPE? How did you overcome it?
3. Do you feel you have the knowledge, skills, tools, resources, and support to continue using PPE when handling wild meat? Please explain.
4. How do other biosafety measures affect PPE usage?
5. Are you able to train others to use PPE? Have you spoken to others about these biosafety measures? What was their response?
6. Were you ever encouraged to use PPE? By whom? How?
7. What advice would you give to inspire other wild meat market actors in wild meat markets in Sierra Leone to use PPE regularly?
8. Which SBC approach did you find useful? Why?
9. Which SBC approach did you find not useful for adoption? Why?

Questions for Key Informant Interview for low adopters (3 participants)

Declaration of the Purpose for KII:

Seeking consent for participation and taking of photos by reading the consent information sheet to study participants and obtaining verbal consent.

Introduction of participants and facilitators.

Consent Information Sheet-Low Adopter

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If you decide to be in this study, you will be invited to participate in the adopter questionnaire. This will help us learn about ways to know how acceptable these biosafety measures might be to you as a trader/processor. The study will target 3 low adopters at the Kingsway Corner market in Kenema, and the entire study will last about five days, though your questionnaire will only last for about 1hour minutes.

Your participation is completely voluntary. You can skip questions that you do not want to answer or stop participating at any time with no penalty to you.

We anticipate taking photographs of wild meat, wild meat handling practices, hygiene of soak-away pit, hygiene of handling butchered block for wild meat, and utilizing pipe running water for hygiene. However, any photo that will be taken of your face will be blurred when published in any report.

There is a risk of loss of confidentiality, however we are not collecting your name or telephone number, or any identifying information. All electronic files of notes, photographs, and other related records will be stored on password-protected Tetra-tech-encrypted computers to protect your privacy.

There are no direct benefits to you from taking part in this research. We cannot promise any benefits to others from your taking part in this research. You will not be paid for your participation, however, reimbursements for expenses such as transportation, accommodation, and food will be available for participants, per USAID guidelines.

If you have questions, concerns, or complaints, or think the research has hurt you, please contact Dr. Edward Magbity at +23278434267 or Dr. Helen Amuguni at Janetrix.Amuguni@tufts.edu

If you have questions about your rights as a research study subject, call the Tufts Medical Center and Tufts University Health Sciences Institutional Review Board (IRB) at (617) 636-7512. This study has been reviewed by the Tufts Health Sciences IRB.

Do you consent to participate in this study? Yes No

Tool 7: KII with a low adopter

1. What factors discouraged you from using PPE regularly (try to rank them from most to least important factors)?
2. Were you ever encouraged to use PPE? By whom? How?
3. Do you feel you have the knowledge, skills, tools, resources and support to continue using PPE when handling wild meat? (Do you have the knowledge of its usefulness; skills to use them; items to use and can you replace them; Is there a source to get them: and what will support you to maintain behavior changes).
4. When are you most likely to use biosafety measures? Why?
5. When are you most unlike to use Biosafety measures? Why
6. Can you name the SBC measures used in this project
7. What approaches would help you reduce your exposure to potential diseases from wild meat?
8. What can you say about the profitability of the bushmeat trader? (How much do someone make a week?)
9. What advice would you give to us to promote risk reduction behaviors and practices in other markets in Sierra Leone?

Questions for Key Informant Interview for Wild meat Stakeholders (6 participants)

Declaration of the Purpose for KII:

Seeking consent for participation and taking of photos by reading the consent information sheet to study participants and obtaining verbal consent.

Introduction of participants and facilitators.

Consent Information Sheet-Low Adopter

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You are being invited to take part in a study being done by Dr. Edward Magbity and the STOP Spillover team in Sierra Leone, and by Dr. Amuguni, Janetrix Hellen from Tufts University (USA) because our data shows that you are one of the key stakeholders at this market.

If you decide to be in this study, you will be invited to participate in Key Stakeholders questionnaire. This will help us learn more about ways on acceptable and adoption of these biosafety measures and how to improve future interventions. The study will target five Key Stakeholders at the Kingsway Corner market in Kenema, and the entire study will last about five days, though your questionnaire will only last for about 1hour minutes.

Your participation is completely voluntary. You can skip questions that you do not want to answer or stop participating at any time with no penalty to you.

We anticipate taking photographs of wild meat, wild meat handling practices, hygiene of soak-away pit, hygiene of handling butchered block for wild meat, and utilizing pipe running water for hygiene. However, any photo that will be taken of your face will be blurred when published in any report.

There is a risk of loss of confidentiality, however we are not collecting your name or telephone number, or any identifying information. All electronic files of notes, photographs, and other related records will be stored on password-protected encrypted computers to protect your privacy.

There are no direct benefits to you from taking part in this research. We cannot promise any benefits to others from your taking part in this research. You will not be paid for your

participation, however, reimbursements for expenses such as transportation, accommodation, and food will be available for participants, per USAID guidelines.

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If you have questions about your rights as a research study subject, call the Tufts Medical Center and Tufts University Health Sciences Institutional Review Board (IRB) at (617) 636-7512. This study has been reviewed by the Tufts Health Sciences IRB.

Do you consent to participate in this study? Yes No

Tool 8: KII for wild meat stakeholders

1. What can you tell us about the STOP Spillover intervention at the wild meat market in Kenema?
2. Will you describe it as useful to the market? Why?
3. What did you like about the project? Why?
4. What do you not like about the project? Why?
5. Do you think the traders and processors will continue using these measures after project ends? Reasons for answer?
6. What do you think needs to happen for the traders to continue using the biosafety measures? Who will provide it?
7. What do you think was most useful for the adoption of the PPE and biosafety measures by market women?
8. What message would you like to pass on to STOP spillover on this project?

ANNEX 3: PICTURES OF ACTIVITIES AT THE WILD MEAT MARKET IN KENEMA

Photo A3-1. Picture of OHDWG member training wild meat traders and processors in PPE use.

Photo A3-2. A wild meat trader receiving PPE including soap, gloves, apron, dedicated clothing, rubber boot and a face shield.

Photo A3-3. Picture of STOP Spillover staff and cross-section of wild meat traders after receiving PPE.

Photo A3-4. Picture of STOP Spillover staff and USAID Global Health Security Adviser visiting the wild meat market in Kenema

Photo A3-5. Picture of a butcher at the wild meat market butchering a deer

Photo A3-6. Picture of STOP Spillover Staff, OHDWH members and stakeholders of the wild meat market in Kenema after a monthly stakeholders meeting.