

PARTICIPATORY SURVEILLANCE AT THE BAT-HUMAN INTERFACE IN BUNDIBUGYO DISTRICT, UGANDA

A Report from STOP Spillover
May 2023



Photo credits: Arthur Mukunya, Uganda

Report compiled by:

1. Kato Charles Drago
2. Naluwagga Flavia
3. Ochieng James Robert
4. Amuya Norah
5. James Bugeza

Supported by National and Local OH-DReaM team.

CONTENTS

CONTENTS.....	1
STOP SPILLOVER.....	1
ACRONYMS.....	2
INTRODUCTION.....	3
Activity objectives.....	3
Activity outputs.....	4
Data collection.....	4
KEY FINDINGS.....	8
<i>Community livelihood and economic activities</i>	8
<i>Human-wildlife interactions</i>	10
<i>Mapping resources</i>	14
<i>Selecting monitoring agents and sentinel surveillance sites</i>	15
ANALYSIS OF FINDINGS.....	16
CONCLUSION AND NEXT STEPS.....	19
Annex One: List Of Participants.....	1
Annex Two: Summary Of Focus Group Discussion Findings Per Study Site.....	3
Annex Three: Key Informant Interviews For Bat Hunters.....	9
Annex Four: Key Informant Interviews For Bat Consumers.....	12
Annex Five: Key Informant Interviews For Traditional Healers.....	14
Annex Six: Bat-Human Interaction Data Capture Tool For Monitoring Agents ...	16
Annex Seven: List Of Bat Monitoring Agents.....	18

STOP SPILLOVER

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

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.

ACRONYMS

AFROHUN:	Africa One Health University Network
FGD:	Focus Group Discussion
GPS:	Global Positioning System
ODK:	Open Data Kit
OH-DReaM:	One Health Design Research and Mentorship
PE:	Participatory Epidemiology
PS:	Participatory Surveillance
SBC:	Social and Behavior Change
SOP:	Standard Operating Procedure

INTRODUCTION

Participatory surveillance (PS) makes use of direct observation and local knowledge systems to develop best bet scenarios on local issues. The PS is implemented by surveillance professionals trained in the techniques of participatory epidemiology. It makes use of the range of interview activities and direct observation techniques utilized in participatory epidemiology. We plan to use PS tools to develop overviews of bat population ecology, bat-human interactions and the associated risks for spillover of infectious agents. The PS practitioners will visit communities at risk and bat sites in the area. They will be able to photograph bats and will have phone apps for analyzing bat calls. It should be noted that the database of bat calls for Uganda is incomplete at present and the PS activity will assess this technology's suitability given the current database. For Uganda, participatory surveillance and community science will be used to investigate bat host ecology and human behavioral risk factors associated with human-bat interaction to concurrently inform the community-based bat-human interface monitoring program. The information obtained will also be useful in the triangulation to validate the modelling and mapping approaches to studying bat distribution.

Key considerations are highlighted below.

- **Bat ecology:** Information of interest on bats includes species through bat physical characteristics, behaviors, and species-specific calls. Data collected will include species (if possible), GPS location, type of roost (cave, tree, behind loose bark on trees, hollow trees, cliff walls, rock crevices, artificial structures including homes, schools, etc.), and data to assess distribution and differences between seasons.
- **Human exposure:** Information of interest on human livelihoods and behavior in regard to potential exposure to bats includes livelihoods and cultural practices that create exposure to segments of bat habitats as well as the nature and drivers of those exposures. The level of traditional knowledge of regarding bats, their identification and knowledge of bat behaviour will also be included.

ACTIVITY OBJECTIVES

During this activity, participants will acquire the skills to conduct participatory surveillance (PS) using participatory epidemiology (PE) methods through guided practice at the bat-human interface in Bundibugyo district. Each day the participants will meet and present the results of the day's work. Over the course of the 10 days, the participants will develop and test the methodology for the surveillance activity. On the last day of the course, the participants will present their initial findings and the agreed methodology for the surveillance.

The specific objectives of the activity are indicated in Table I below.

Table 1: Activity specific objectives

- Objective 1:1. To apply the concepts of participatory epidemiology/surveillance to understand the ecology and risk associated with bats in the three interface communities.
- Objective 2:2. To utilize direct observation as a tool for learning from communities including observation during semi-structured interviews, transect walks and participation in community activities.
- Objective 3:3. To demonstrate the use of participatory exercises including ranking, scoring, and visualization tools.
- Objective 4:4. To analyze and report the results of participatory surveillance to guide development of an SOP for bat monitoring

ACTIVITY OUTPUTS

1. A preliminary participatory assessment with a tested methodology for bat surveillance.
2. At least Fifteen Certified PS practitioners with the skills and knowledge needed to implement the participatory surveillance activity. Individuals will be certified upon completion of an initial period of mentored implementation of the surveillance activity.
3. An agreed SOP and interview guide for the bat participatory surveillance activity.

DATA COLLECTION

Participants

Up to 19 professionals coming from a range of One Health disciplines appropriate to address the mitigation of spillover risk from bats to man were selected to attend the 10-day training. Participants included Veterinarians, bat ecologists, conservation biologists, ICT, social workers, medical personnel, environmentalists, public health practitioners and administrators. Participants were drawn from local government officials at the interface district, One Health-Design Research and Mentorship (OH-DReaM) working groups, tour guides, park rangers, surveillance focal persons, Red Cross community surveillance volunteers, and parish administrators. The list of participants is attached as Appendix I.

Training modalities

The PS was conducted over a 10-day period. The first 3 days involved training participants in a number of skill sets that included:

- Participatory epidemiology (PE) tools: This session was facilitated by Jeff Mariner (Tufts University) and James Bugeza (National Livestock Resources Research Institute,

Uganda). Participants were introduced to participatory epidemiology as a tool for participatory rural appraisal techniques. Participants were then taken through the different participatory epidemiology data collection tools including: Informal interviewing (semi-structured interviews, with key informants, focus group discussions), ranking and scoring tools (simple ranking, pairwise ranking, proportional piling, matrix scoring), visualization tools (Mapping, and seasonal calendars), direct observation (transect walks and examination). Figure 1 shows the class demonstration on the use of PE tools.



Figure 1. Participants were grouped into 3 groups in line with the intervention sites, each group was tasked to create a topic of interest and demonstrate on the use of participatory epidemiology tools. Photo credits: Country team.

- **Basic bat ecology:** This was an interactive discussion led by Mr. Bernard Matovu (Makerere University) who made a presentation on basic bat ecology in line with community knowledge as documented in the participatory assessment. The presentation and discussion rotated around; bat species, characteristics, feeding habits, reproductive behavior, bat roost definitions, seasonal variations, echolocation, importance and dangers associated with bats among others. Participants were shown pictures of bats and asked to comment if they can describe the characteristics or if they have observed such general features among bats at the interface area.
- **Mapping resources:** This session was led by Mr. Allan Mbabani (OpenStreet Map Uganda) who presented and discussed an interactive map of the interface area showing key infrastructure like churches, hospitals, schools, waterbodies, main roads, community markets, households, and national parks among others. Map sketches of the 3 sub-counties (Ntandi, Burondo, and Harugale) were displayed showing mapped bat roosts that could be improved by the surveillance teams. Once the monitoring agents are recruited, these paper maps will be used to pinpoint bat roost locations by the community.
- **Development of PS data capture tools:** Using the participant groups created in line with the 3-interface sites, participants were requested to develop participatory

surveillance data collection tools. After the group discussions, plenary presentations were made by each group, and later the data capture tools were harmonized and the final participatory surveillance tools were developed, ready for field deployment. Developed tools included a checklist for the focus group discussion (Box I, Appendix II), key informant interview guides (bat hunters, consumers, and traditional healers, Appendix III-V), and a questionnaire for capturing bat information (Appendix VI).

Box I. Participatory surveillance checklist at the bat-human interface

1. Welcome remarks by contact persons
2. Introduction
3. Overview of the activity and consent
4. Livelihood/economic activities
5. Challenges faced by the community.
6. Human-wildlife interaction
 - Common wild animals in your area.
 - Where they are found
 - How commonly do they see the bats,
 - Bat (probe for the types, sizes, colours, roosts, and characteristics)
 - Importance of bats.
 - Norms and cultural beliefs.
 - Dangers of bats to the community.
7. Human-bat interaction points in relation to specific activities.
 - Hunting, who hunts, why they hunt, methods of hunting, handling, preparation, and the trade chain.
 - Farming; levels of interaction, dangers, control measures.

Field data collection methods

Having been taken through the use and development of PE tools, participants carried out guided field practice for a period of 5 days in Harugale subcounty, Ntandi Town council and Burondo Subcounty.

- Focus group discussions: On each of the field days, the team held community discussions using the checklist indicated in Box I above as a guide. Communities were mobilized within purposively selected villages across the 3 study sites. In total, for each study site, 4 interviews were conducted with community members ranging between 10-15 participants per meeting. Community participants comprised of both males and females of varying ages, ethnicity and religious beliefs. For each interview, the study team selected an interviewer and a note taker as demonstrated in Figure 2, with focus group discussions taking between 2-3 hours per meeting.



Figure 2. A focus group discussion and community use of proportional pilling in ranking commonly destroyed fruits by bats. Photo credits: Country team

- **Key informant interviews:** After conducting a few focus group discussions, key informants from each of the different groups were identified to dig deeper in the bat-human interactions points at the interface area. Key informants included bat hunters, consumers, traditional healers, tourist guides, and selected participants living with bats in households. The checklist used for the different categories is shown as Appendix III-V and a sample key informant interview is indicated in Figure 3.



Figure 3. A key informant interview for a bat consumer in Ntandi Town Council. Photo credits: Country team

- **Transect walks, direct observations and bat roost mapping:** This was done after every focus group discussion to explore the patterns and coherence among all information provided to enable triangulation of key aspects. The team together with selected community key informants visited bat roosts that included trees, households, gardens and caves. Each roost was observed, photographed, GPS coordinates taken, and an ODK data capture form (Appendix VI) was recorded by the OpenStreet Map team. Figure 4 demonstrate an example of this PE method in Semuliki National Park and Harugale Subcounty.



Figure 4. Transect walks, direct observations and bat roost mapping in Semuliki National Park and Harugale subcounty bat cave observation and mapping. Photo credits: Country team.

KEY FINDINGS

Community livelihood and economic activities

- **Economic activities:** The major source of livelihood in the 3 study sites (Burondo, Harugale and Ntandi) was crop farming, fishing, hunting and livestock farming (Box 2). However, site specific variations in economic activities were observed depending on Presence of protected areas, waterbodies, mountains and urban or rural areas. Major crops farmed included cash crops like cocoa, vanilla and coffee and food crops like bananas, beans and sweet potatoes. Common livestock kept included cattle, goats and poultry depending on the terrain. Figure 5 demonstrates some of the major crops and livestock kept.

Box 2. Major economic activities at the bat-human interface in Bundibugyo



Figure 5. Goat farming and crop farming showing vanilla, coffee and banana plantations. Photo credits: Country team

- Challenges faced by the community: Communities across the 3 study sites sited a number of livelihood challenges as summarized in Box 3.

Box 3. Challenges faced by the community.

- ❖ Lack of safe water
- ❖ Insufficient or no health facilities
- ❖ Disease burden like malaria, typhoid, cough, flu, high blood pressure, ulcers, diabetes, and Hepatis B.
- ❖ Food insecurity due to reduced farmland as a result of the mountainous terrain.
- ❖ Landslides. Common in villages next to the hills of Mountain Rwenzori National Park.
- ❖ Crop pests and diseases affecting crops like bananas, cocoa, coffee, cassava, cabbage and vanilla leading to low crop yield.
- ❖ Crop destruction by wild animals like monkeys, rodents, bats, elephants, buffalos and wild pigs
- ❖ Price fluctuations of cash crops like vanilla and coffee
- ❖ Animal diseases like diarrhea, cough and eye diseases

Human-wildlife interactions

- **Common wild animals:** Most common wild animals observed by the communities included rodents (edible rats), non-human primates and bats (Figure 6). Among these most consumed included monkeys, baboons, wild rats, bats and wild pigs, Wild birds, bats, toads, squirrels, and snakes.

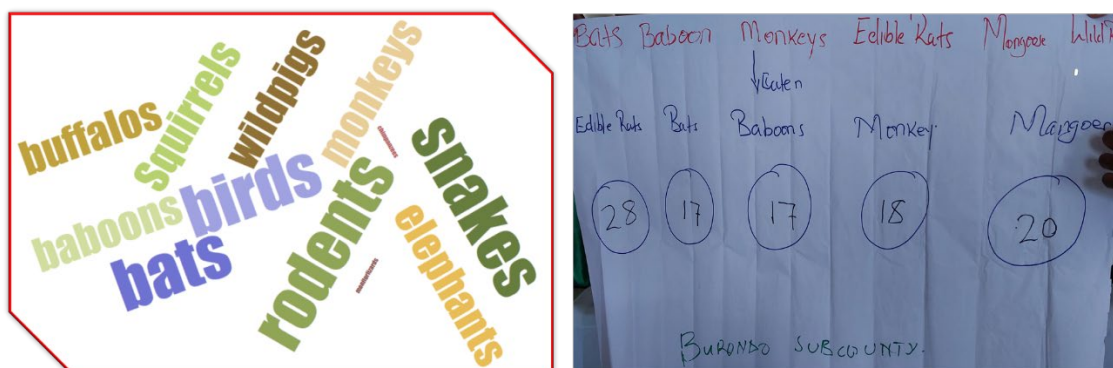


Figure 6. Showing a Wordle and community proportional pilling for most common wild animals.

- **Bat species and characteristics:** Communities generally identified and described characteristics of 2 bat types 1) big bats commonly termed as “Omulima” brown or black in colour, have a dog like face, big wings with umbrella like shape, big eyes and sharp teeth big and feed on crops and fruits. These are mainly found hanging upside down in trees. 2) small bats commonly termed as “akakorokombe” that are black and small in size, nostrils short with split lips, produce rat like sounds, live in dark places and feed on insects like mosquitoes and mainly found in houses. Figure 7 shows some of the

observed bats. The big sized bats (“Omulima”) are preferred for consumption because they have more muscle and are more testy compare to the small sized bats.

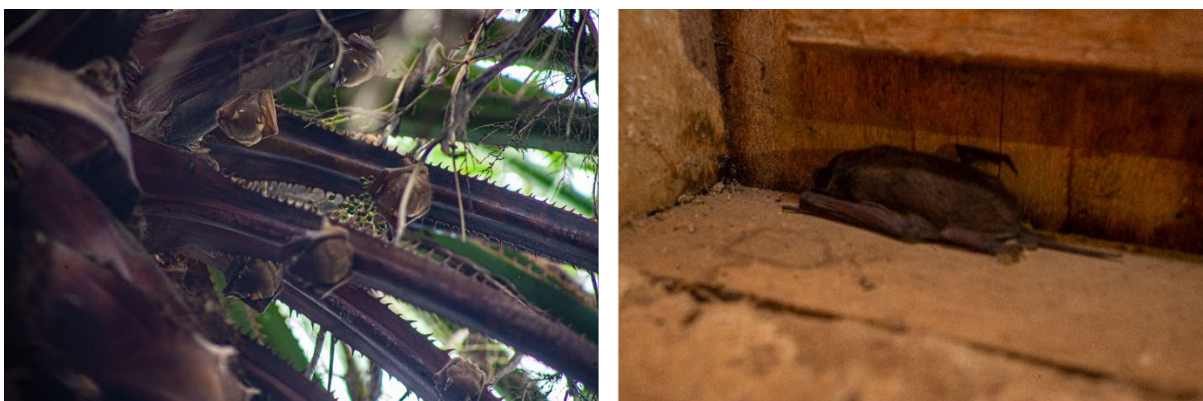


Figure 7. Pictures of observed bats in a tree roost (left) and a household (right).

- Main crops destroyed by bats:** The main crops destroyed by bats within the 3 study sites included guavas, mangoes, coffee and bananas (Figure 8). According to one key informant in Harugale sub-county, bats are consumed as a revenge approach for crop destruction by bats.

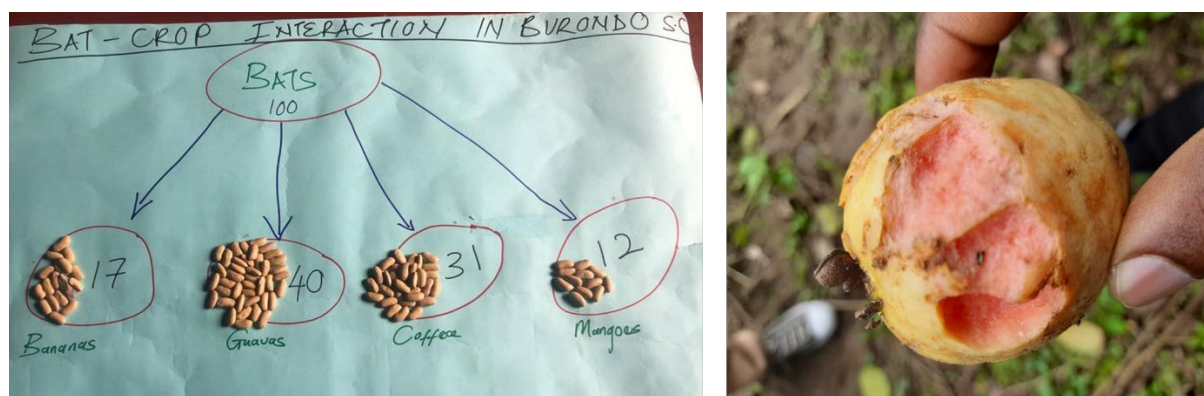


Figure 8. Proportional pilling for main crops destroyed by bats (left) and a guava perceived to be destroyed by wild animals (right).

- Risk activities and groups for bat-human interactions.** The community associated a number of activities and population groups to the risk of interacting with bats in the study area. These are summarized in Box 4. Bat hunting and consumption was common across the 3 study sites. Number of bats captured per month ranged between 10-20 depending on availability, season and demand. Bat prices ranged from \$0.8-3.5 depending on size and availability.

Box 4. Risk activities and groups for bat human interactions

- Crop Harvesting as bats come to feed on fruits, is usually done by women.
- Bat hunting is done by men and young boys.
- Fetching firewood by women and young girls
- Fetching water from streams by women and young children
- Visiting caves for tourism and cultural rituals by traditional healers, rangers, tour guides, school children, and tourists.
- Consumption of bats especially by men and women of advanced age.

- **Cultural beliefs and myths associated with bats.** Communities associated bats with a number of myths as indicated in Box 5.

Box 5. Myths associated with bats

- ❖ **Bats are used by traditional healers to pick hairs from target people as they fly around**
- ❖ **Believed to be drivers of night dancers**
- ❖ **It is believed that visiting caves harboring bats is a source of wealth.**
- ❖ **Bat meat when given to children cures a number of diseases.**
- ❖ **Raw bat blood is believed to cure anemia in children.**
- ❖ **Raw bat blood increases human blood in the body when consumed.**
- ❖ **Bats are used as love potions to strengthen relationships between a man and woman**
- ❖ **Bat meat consumption is associated with increased life span**

- **Perceived benefits and dangers of bats.** Within the study communities, bats were perceived to have both positive and negative roles as summarized in Box 6.

Box 6. Communities' benefits and dangers associated with bats.

Benefits associated with bats

- Bats reduce malaria as they feed on mosquitoes as prey,
- Bats are important in seed dispersal and fruit pollination.
- Bat guano is a good source of manure
- Bats are a source of food for some people and the soup treats malnutrition and boosts immunity.
- Bat tourism and hunting are a source of income for communities
- In the morning hours, bats make noise that acts as an alarm

Dangers of bats

- Bat excreta weakens ceilings in construction.
- Bat guano has a pungent smell and causes respiratory problems
- Bats destroy fruits and red bellies of coffee
- Bats are associated with diseases like Marburg, Ebola, cholera, and scabies from bat urine.
- Bat excreta contaminates food and water
- Bat guano dirtens buildings and surfaces complicating their cleaning.

- **Community bat control practices.** Some of the identified bat control practices are summarised in Box 7. However, it should be noted that some communities were against control of bats as bats are a source of food and thus should be left within the community settings, plus bats in houses were seen as an easy target for capturing and consumption.

Box 7. Identified bat control practices

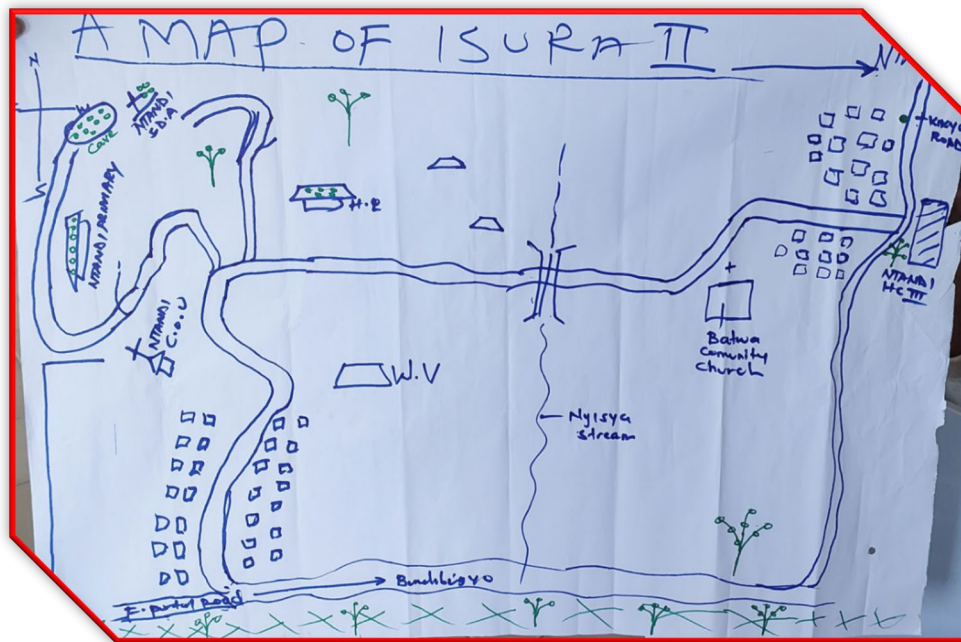
- Bat populations are controlled through bat hunting and consumption
- Bats in houses are killed by using sticks
- Construction using transparent iron sheets
- Pruning of gardens adds more lightening that chases away bats
- By covering the space between the house and the beam.
- Closing their doors early in the evening.
- Fumigation by spraying using local herbs mixed with ash or smoking bats out through the use of carbon-containing materials and in some cases, spraying with hot water.

“No need to chase away our source of food”, said a key informant in Burondo subcounty

Mapping resources

During the focus group discussions, communities were requested to identify bat roosts within their communities. This was followed by requesting these communities to draw a community map indicating the different resources within their surroundings. See Box 9 for an example of a community developed map. After each interview, with the help of key informants, the team visited identified roosts that included trees, households and caves. GPS coordinates for each roost were taken data captured pertaining to the identified bat roost. See Figure 9 for update maps showing key places and bat roosts within the study site.

Box 9. A community map showing key infrastructure.



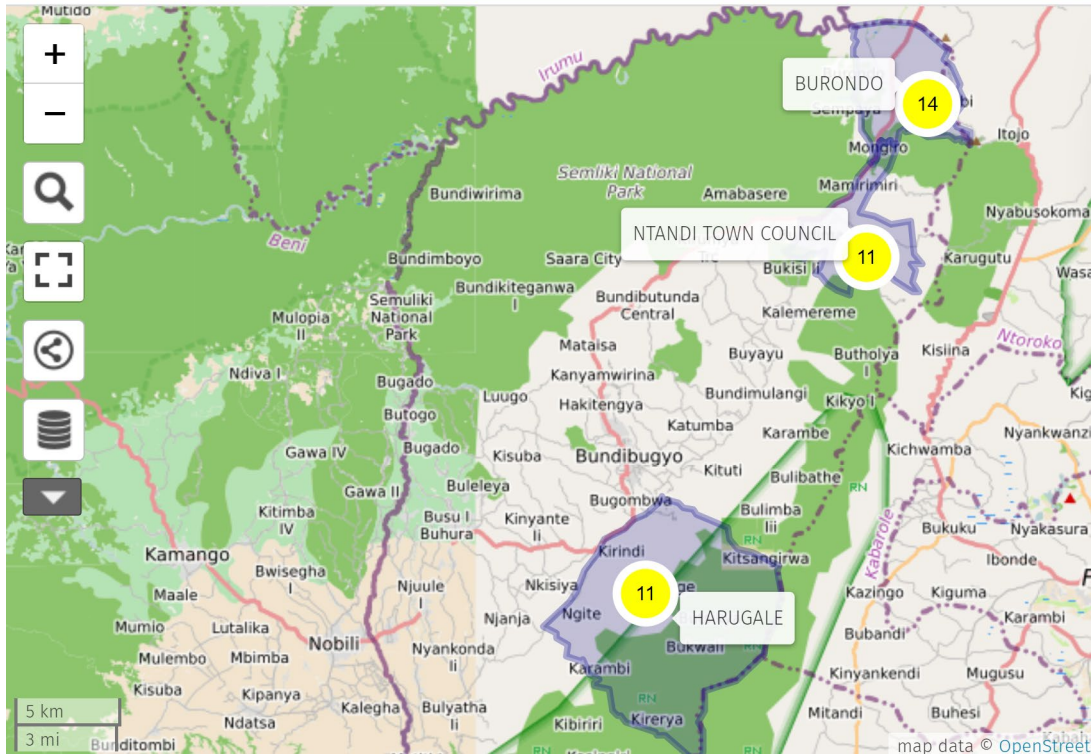


Figure 9. A map of Bundibugyo district showing the 3 study sites (Ntandi Town Council, Burondo and Harugale Sub counties) and the number of mapped bat roosts per site.

Selecting monitoring agents and sentinel surveillance sites

During the workshop the project team together with the community held brainstorming discussions on who should become a monitoring agent and how the surveillance sentinel sites should be selected. A tentative plan for the monitoring and surveillance was shared by Dr. Kato Charles, it was agreed that agents should represent a parish and then each parish should have sentinel surveillance villages. Since each study site has several parishes, a criterion for selecting parishes was discussed, and another criterion for selecting the monitoring agents as indicated in Box 10. Based on these criteria, the community was given 3 days to submit a list of selected agents and sentinel monitoring and surveillance sites (see Appendix VII)

Box 10. Considerations for selecting monitoring agents and sentinel sites

<p>Key considerations for selection of sentinel parishes.</p> <ul style="list-style-type: none"> • The parish should have a history of having a considerable bat population. • The parish should have prominent bat roosts • The parish should have a number of households to be considered for household-based bat surveillance. • The parish should have manageable villages in terms of commitment, terrain, and village numbers. • The parish should have easy accessibility to the bat roosts to avoid agents and supervisors climbing a great distance on the hills. <p>Key considerations for selecting monitoring agents.</p> <ul style="list-style-type: none"> • The potential agent should have some basic knowledge on the use of smart mobile phones or easily trained. • The potential agent should have some basic knowledge about bats in the local context. • The potential agent should have some involvement in prior participation in data collection for other agencies. • The potential agent should be willing to work and communicate as observed from previous engagements with other agencies. • The potential agent should have a good knowledge of the area and preferably a resident in the parish for easy monitoring. • The potential agent should be a person of high integrity as observed from prior experience from other duties or recommendations. • The potential agent should be stable and reliable to the community in the parish of choice. • Gender sensitivity. Equal chances should be provided to cater for gender. Considerations could be that women monitor roosts like houses, gardens, and churches and men handle rough terrains that include cave and tree roosts. It was also considered that monitoring may be done very late in the evening or early morning when bats are active and this might present a threat to women.
--

ANALYSIS OF FINDINGS

Lessons learnt from the community interaction

Our community interaction indicated that communities associate bats with a number of both positive and negative information that presents as opportunities to capitalise on during intervention implementation. The positive aspects are important to the STOP Spillover project in designing SBC strategies or in the implementation of the different interventions. The negative information indicates aspects that might hinder the implementation of SBC strategies and might thus require a mindset strategy to be incorporated in SBC interventions.

Table I. Showing positive and negative lessons learnt from the community

Positives	Negatives
<ul style="list-style-type: none"> • Communities associate bats with a number of medicinal roles. • Within the community, bats are taken as a source of food. • The community has diverse cultural beliefs regarding how bats are perceived. Interaction with bats varies in relation to ethnic groups, 	<ul style="list-style-type: none"> • Communities associate bats with Ebola and cholera outbreaks as they hang in unhygienic places like pit latrines. • Bats are perceived by communities as a cure for conditions like malnutrition and anemia

<p>gender e.g., women and girls, and religious beliefs e.g., the Seventh Day Adventists don't eat bats, but they interact with them in different ways.</p> <ul style="list-style-type: none"> • When food insecurity is available, communities always eat what is available. • Bats are important in seed dispersal • The community is knowledgeable about bats in the local context. There is a variation in the bat breeds across the different communities and the people have the capacity to identify a particular breed depending on the phenotypic characteristics like color • Bats are a tourist attraction • Bats are used as alarm clocks for awakening farmers. This is common where bats live in peoples' houses. • Bats contaminate food and water within the community. • Bats are destructive in terms of destroying crops, fruits and houses 	<ul style="list-style-type: none"> • Bats are a source of income for some people who trade in bats, they concentrate on buying and selling. • Bats are associated with traditional healing and are thus used by traditional healers on a regular basis. • Bat consumption is associated with longevity and increased manpower/fertility.
--	---

Key challenges identified

Some challenges are forecasted regarding the implementation of the proposed monitoring program and participatory surveillance. These are summarized below.

1. Incentives are needed in most communities, especially regarding roost location as individuals with roosts might require incentives to enable access.
2. Land wrangles where the roosts are or with no clear land ownership as this might prevent access to the roost.
3. Challenges in reaching the roosts and key informants by the monitoring agents as in most cases the mountainous terrain is not conducive.
4. Some key informants have negative attitudes on sharing information with the project team

Identified spillover risks at the bat-human interface

It was noted that the bat-human interface in Bundibugyo involves interactions like bat hunting, bat consumption, farming, bats in household and community structures, traditional healers, and local and foreign tourism among others. At this bat-human interaction value chain, the following spillover risks were identified that could be capitalized on by the STOP Spillover project.

1. Hunting of bats with risks of bat bites and contact with bat fluids like saliva and blood
2. Bat consumption, especially during handling to remove viscera and actual consumption, especially if not well cooked.
3. Consumption of raw blood from bats as this is assumed to treat neonatal anemia and malnutrition.
4. Consumption of damaged fruits, in most cases by children who are not aware of the risk. Observations indicated that adults either discard or clean damaged fruits.
5. Interaction with bat guano and bat aerosols in households and community structures like schools, churches, and mosques.
6. Consumption of water and food contaminated with bat guano. This is common in households and community water collection points where bats go to feed or bat roosts found at watering points.
7. Cave tourism especially in communities and National parks. Exposure risk is common to foreign tourists, and local tourists especially school children, tour guides, and rangers.
8. Traditional Healers that utilize bats and bat products as ailments

Future suggested surveillance activities

Based on the observation from the participatory surveillance, a number of potential PS activities were identified and suggested by the community. These included:

1. Hospital community surveillance of anemia and malnutrition as a common observation was the use of bat blood to treat neonatal anemia.
2. Surveillance of bat movement, as Bundibugyo was close to Congo and other districts that have reported disease outbreaks associated with bats.
3. Regular monitoring of the bat species diversity, seasonal abundance, and bat-human interactions in the study areas.
4. Surveillance of bat pathogens, from bats, guano, and water and food sources.
5. Identification and Mapping of all available bat roosts to select sentinel hotspot areas.
6. Surveillance of bat consumption behavior.

CONCLUSION AND NEXT STEPS

We used a participatory surveillance approach to investigate bat host ecology (based on community knowledge) and human behavioral risk factors associated with human-bat interaction to concurrently inform the community-based bat-human interface monitoring program, SBC strategies, and waste and surface water surveillance.

The key outputs achieved during the PS activity included:

1. A set of preliminary information to guide the implementation of interventions in Bundibugyo.
2. An initial list and map of sentinel surveillance sites.
3. A list of bat monitoring agents across the different parishes and villages.
4. A list of key informants across the bat-human interaction value chain for follow-up.
5. A draft bat monitoring framework to guide the community bat-human interface monitoring program.
6. A documentation of potential spillover risks for the STOP spillover project.
7. A list of suggested future surveillance activities for the STOP spillover project.

The next steps after the PS activity will include:

- Finalizing the bat monitoring framework that will work as a guide for the community-based bat-human interaction monitoring program.
- Finalizing the selection of sentinel monitoring sites and bat roosts within the 3 study site areas.
- Commissioning and training of monitoring agents in basic bat ecology, bat roost identification, mapping, and mobile-based collection of data.
- Initiation of the community-based bat-human interaction program for continuous monitoring and participatory surveillance up to September 2023.

ANNEX

ANNEX ONE: LIST OF PARTICIPANTS

S/N	Name	Address/Role	Contact
Tufts			
1	Jeff mariner	Tufts:	Tufts
2	Gherzi Chavez, Bruno	Tufts:	Tufts
AFROHUN			
1	James Bugeza	NALIRI: Trainer	0772523516
2	Bernard Matovu	OHDREAM team	0701919675
3	James Robert Ochieng	OHDREAM team	0752583626
4	Nalukenge Lillian	OHDREAM team	0773043255
5	Kato Charles D	OHDREAM team/Team Lead	0703320705
6	Amuya Norah Joyce	ICT and digital data capture tools	0778798945
7	Naluwagga Flavia	Research Assistant-Surveillance/rappattoire	0703120527
8	Tubihemukama Methodius	Statisitic and data handling	0750681822
9	James Baguma Natweta	Social Behaviour Change	0775989895
Bundibugyo			
1	Bwambale Robert	District Surveillance Focal Person (vet). Bundibugyo	0773981298
2	Rusamba Johnson Ndyanabo	Rwenzori and Semiliki Ecotourism and Disaster management (CBO), Huragale.Bundibugyo	0772528123
3	Samson Ndyanabaisi	District Veterinary Officer. Bundibugyo	0774681995
4	Muhindo David Kasumba	District Surveillance Focal Person (medical). Bundibugyo.	
5	Alex Sekalombi	Redcross CP3 community surveillance program volunteer and Ranger. Bundibugyo	770863976
6	Kule Joshua	Redcross CP3 community surveillance program volunteers Coordinator. Bundibugyo	0771973168

Uganda Participatory Surveillance | May 2023

7	Kabasinguzi Kuluthum	Environmental Officer. Bundibugyo	0772966096
8	Bagonza Majid	District Health Educator. Bundibugyo	0772364148
9	Kule Charles	Surveillance focal person Bughendera sub county. Bundibugyo	
10	Muhindo Samuel	Parish Admin Burondo. Bundibugyo	0779557136
11	Tham Anzire Bwambale	Parish Admin Ntandi. Bundibugyo	0779784341

ANNEX TWO: SUMMARY OF FOCUS GROUP DISCUSSION FINDINGS PER STUDY SITE

No.	Parameter	Subcounty or Town Council		
		Harugale	Ntandi	Burondo
1	Ethnic groups (Rank)	Bakonjo	Bakonjo, Babwisi and Bamba	Bakonjo, Babwisi, and Batuku.
2	Religious beliefs (Rank)	1.SDA, 2. Anglicans and 3. Catholics and 4. Moslems	SDA, Anglicans Catholics, and Moslems	SDA, Anglicans and Catholics and Moslems
5	Major source of livelihood	Bricklaying Farming (cocoa, bananas, beans, vanilla matooke, passion fruits, cabbage, eggplants, and coffee) Animals rearing [cattle, goats] Trade in cocoa, vanilla, poultry, goats, sheep, and chicken Saving groups and credit schemes Food relief from NGOs like world harvest mission. Offering manual labor in people's gardens to earn money Charity support from neighbors and well-wishers especially when hit by landslides	Farming (cocoa, bananas, beans, soya beans and coffee, cassava, vanilla, sweet potatoes) Livestock rearing which included goat rearing. Trading majorly in agricultural produce, fish, eggs, and meat. Bricklaying Fishing Hunting Charcoal burning Sand mining and stone quarrying Electrical installation and mechanics. Lumbering Herbalist Saloon Whole selling of cocoa and coffee	Farming (coffee, beans, sweet potatoes, bananas, and cocoa) Livestock; (goats and chicken) Fishing (river semiliki), Hunting (not common as they are restricted by UWA), Business (fish mongering, Saloon Whole selling of cocoa and coffee). Charcoal burning, Brick laying and stone quarrying Selling of firewood Farming, hunting, Trading
6	Main livelihood challenges identified	Theft from cocoa companies and other individuals which brings about premature harvesting, especially for the cocoa	Accidents during lumbering Price fluctuations for cocoa,	Limited extension services for they are cattle farmers Theft Poverty,

		<p>Destruction of crops by wild animals Poverty Poor yields of crops Food insecurity Landslides Bananas affected by bacteria wilt Animal diseases like diarrhea cough and eye disease) Crop pests and diseases affecting cocoa, coffee, cassava, cabbage, and vanilla especially flowering stage The war which has destructed growth of agricultural produce, The unstable market for vanilla and other cash crops Poor health services.</p>	<p>Poor transport network Landslides Overtaxing by the government. Destruction of crops by wild animals Bad weather conditions Food insecurity Bats feeding on their crops Bat excreta spoiling ceiling and clothes.</p>	<p>Poor yields of crops in times of heavy rains and drought Inaccessible water services and health services, Landslides (the place is mountainous), Scarcity of trees for timber, Poor transport wild animals escape from the park and eat their livestock and as well destroy their crops, Food insecurity, Inaccessibility to health and education services, and Over-dependence on NGOs.</p>
7	Common wild animals	Squirrels, buffalos, wild pigs, baboons, Monkeys, Bats, Mangoes and edible rats, snakes, ostriches, Chimpanzees	Elephants, warthogs ,buffalos ,baboons, monkeys and bats, bush pigs, and giant rats	Squirrels, Buffalos ,wild pigs, baboons, monkeys and bats Mangoes, edible rats, wild birds, snakes, buffalos, tortoises
8	Bat types identified	Small bats(insectivorous) are white or grey, especially on the abdomen. Big bats (fruit-eating bats) black bats living in caves, big trees, rivers, and valleys	<ul style="list-style-type: none"> • Small bats. • Big bats. • Medium bats 	Small bats (insectivorous) locally known as kakelibho Big bats (fruit-eating bats) locally known as mulubu
9	Bat characteristics (according to local knowledge)	<p>Small bats: black in color, and small in size, live in dark places and also feed on mosquitoes, and also produce rat-like sounds, they also have small eyes, noses, and ears. Weak and move only during the day.</p> <p>Big bats: both brown and black in color locally known as “emirima”, big in size, keep knocking the walls thus causing a lot of disturbance don’t live in houses, feed on</p>	<p>Big bats: both brown and black species, big in size, feed on crops and fruits, have a dog-like face, big wings with umbrella-like shape, big eyes with sharp teeth, produce a bell-like ultrasound, dog-like face, they move at night, defecate through the mouth</p>	<p>Big bats: both brown and black species, big in size, feed on crops and fruits, have a dog-like face, big wings with umbrella-like shape, big eyes with sharp teeth, and produce a bell-like ultrasound, dog-like face.</p> <p>Small bats: black and brown in color and small in size, nostrils short with split lips have an anus and defecates small droppings, Dog-like eyes, produce</p>

		<p>fruits, some feed on nectar and they are also the eaten type, they rest facing upside down and produce a base-like sound. slow flying speed 10 bats exchanged for one chicken, 1 bat costs 1000shs, lower limbs have claws, big eyes, nose, and ears, very strong, move only at night</p> <p>Both; stay together in groups as a family and fight non-family members (group of 15 members, they don't feed in groups, rest facing upside down</p>	<p>Small bats: black and small in size locally known as “obukorokombi” seen at night, usually stay in houses, nostrils short with split lips, playful, produce rat-like sounds, and are noisy at night.</p>	<p>rat-like sounds, small wings, rat-like ears, black and brown in color, rest upside and down, live in dark places, and feed on mosquitoes.</p>
10	Roost types	<p>Caves, coffee, cocoa, and banana plantations, holes in the backs of trees, house ceiling, churches and hospitals, Forests, House toilets, and depressions left by landslides Trees, bushes, palms, trees, oyster shells, buds of bananas, stones, or rocks.</p>	<p>Caves, trees, , houses, and Banana plantations, Churches and mosques Trees, houses, churches Schools, Oyster shell, Toilets Buds of bananas.</p>	<p>Caves (kikoni cave,kanyabukoko cave), coffee and banana plantations, holes in the backs of trees, house ceilings, churches, and hospitals Trees, Forests, House toilets, and depressions left by landslides</p>
11	Bat fruit preference	<p>Mangoes, Avocados, guavas, papaws straw berries, omutambo tree.</p>	<p>Mangoes, Avocados, omutambo tree fruits, guavas, pawpaw</p>	<p>Mangoes, avocados, omutambo tree fruits, guavas, pawpaw,</p>
12	Main Crops destroyed	<p>Coffee, maize destroyed by monkeys, bananas.</p>	<p>Coffee, destroy cocoa cassava, and bananas, especially in the flowering stage</p>	<p>Bananas, flowering maize, and cocoa, Coffee</p>
13	Activities/points associated with bat-human interactions	<p>Harvesting as bats come in big numbers to collect ripe crops. Rainy seasons are when small bats come to feed on the insects. Vending in markets and farming. visiting caves for cultural rituals. Hunting Fetching firewood Fetching water</p>	<p>Farming Fetching water, Visiting caves for cultural Rituals Schooling and teaching, Vending Hunting</p>	<p>Harvesting as bats come in big numbers to collect ripe crops. Rainy seasons are when small bats come to feed on the insects. Hunting as they trap bats for food, Fetching firewood by women Fetching water, Visiting caves for cultural rituals.</p>

14	Risk groups identified	<p>Women, men, boys as they also hunt, and girls when fetching firewood and water. Children, as they follow their culture that fruit eaten by the bats helps in teeth growth. Community members and farmers Hunters Witch doctors</p>	<p>Children and staff in Ntandi primary school, People in bundimasole marketplace where huge populations gather Women (fetching water), Witch doctors Men hunt the bats, but women don't hunt the bats</p>	<p>Women, Men, boys as they also hunt, and Girls when fetching firewood and water. Children, as they follow the culture that fruit eaten by bats, helps in teeth growth. Witch doctors</p>
15	Cultural beliefs and myths associated with bats	<p>Bats are believed to be drivers of night dancers as sacrifices are made. They are also considered a love potion. Bats are used by witch doctors to pick hair and other materials from their target people. Believe that visiting caves with bats is the beginning of wealth. Bat meat cures in children when eaten. Believed to cure anemia in children. Increases blood in the body when consumed. Used as medicine by the traditional healers</p>	<p>Bats are associated with cannibalism, Presence of bats seen flying is a security alarm that something is not right, They are said to pick hair when they randomly pass by your head. Bats are also said to be used by wizards as means of transport. Bats are believed to have a chemical that treats wounds Used to hide husbands and stick to one woman, Drivers of bad spirits Used by witch doctors to cast mad spells on people.</p>	<p>They believe that small bats are drivers for which to carry charms to their target people. Eating bats is a sign of keeping culture and is seen as a source of happiness in the kingdom. It is believed that visiting caves with bats is the beginning of wealth as sacrifices are made. Drivers of bad spirits, used by witch doctors to cast mad spells on people. They are also considered a love potion</p>
16	Perceived benefits of bats	<p>Bats reduce malaria as they feed on mosquitoes as prey Their droppings are a Source of manure Source of food for some people They bring new tree species e.g. mangoes and guavas from Congo. Used to make men strong Exchanged for chicken in Congo.</p>	<p>Bats pollinate fruits, feed on mosquitoes, Source of food, Improve the strength of manhood, Used as a love potion Manure from their dropping.</p>	<p>Bats reduce malaria as they feed on mosquitoes as prey, Help in seed dispersal, Droppings are a Source of manure, a source of food for some people, Soup treats malnutrition They are also an important source of income</p>

		Pollinates flowers	Study and tourist attraction, Used by traditional healers as medicine. Drivers for witches. Used in the treatment of asthma, Raw blood used in the treatment of anemia	Source of income (one bat=2000ugshs) Source of medicine (treat anemia) Used by witch doctors. Used in barter trade
17	Bat markets/value chains	Bats are exchanged with people from Congo for chicken. 10 bats exchanged for one chicken 1 bat costs 1000shs.	Hunters are mostly the consumers 10 bats were exchanged for 1 chicken. 1 bat costs 1000 in seasons of abundance.	One bat = 2000ugshs Used in barter trade
18	Disadvantages/Dangers of bats	Destroy fruits and red berries of coffee Associated with diseases like Marburg and Ebola Transmit infectious agents in bananas and coffee thus spreading diseases in plants such as wilt. Cause dirtiness on floors and utensils Make a lot of noise in houses.	Bats enter houses and contaminate the uncovered foods, Guano for bats is corrosive to iron sheets causing leakage of roofs. Droppings dirt the walls, Destroy fruits and crops. Water contamination by bat excreta Discomfort as they are flying. Associated with diseases like Marburg Urine causes respiratory problems.	Weaken ceilings as they urinate Their guano is smelly Destroy fruits and red berries of coffee Associated with diseases like Marburg and Ebola Urine causes scabies Contamination of food and water in streams Dirt people's houses with their excreta, No danger apart from people scaring them that causing Ebola
19	Bat control practices	Eating them as food Using sticks to beat them Construction using transparent iron sheets Pruning of gardens,	Fumigation (burning carbon-containing materials)	Eating them as food Using sticks to beat them Construction using transparent iron sheets Pruning of gardens,

		<p>Covering pit latrines, Covering space between the roof and the beam, and Closing their doors early in the evening.</p>	<p>Spraying using a concoction (ash+mululuza+bhapi plants) Pruning gardens to reduce darkness and eliminate roosts. Culturally stopping women and children from eating bats is a mean of controlling the bats</p>	<p>Covering pit latrines, Cover space between the roof and the beam, Closing their doors early in the evening.</p>
--	--	---	---	--

ANNEX THREE: KEY INFORMANT INTERVIEWS FOR BAT HUNTERS

No.	Parameter	Subcounty or Town Council		
		Harugale	Ntandi	Burondo
1	Ethnic group	Mukonjo	Bwamba	Batwa
5	Major source of livelihood	Farming (cocoa, bananas, sweet potatoes, beans, and cassava), hunting	Crop growing (cocoa, matooke, beans) Animal rearing (goats and chicken) on small scale. Hunting: wildlife hunted when they escape from the national park.	Farming (beans, sweet potatoes, bananas, cassava), hunting, trading in crafts, fishing down the valleys, entertaining tourists.
7	Common wild animals hunted (rank)	Bat (big and small), monkeys and squirrels	Baboons, wild pigs, buffalos, bats, monkey ,giant rats and elephants if they die. Ranked in terms of consumption; bats, giant rats, baboons, buffalos and monkeys.	Majorly wild rats, toads, bats, birds, squirrels and kobs.
8	Where is hunting done (rank)	Gardens, cocoa trees, never caves	Hunts from trees, “I move with a catapult and hunt whenever I bump into a bat” Houses, trees, and school.	Bushes, fruits trees, semuliki national park
9	What bat species are preferred for hunting and why	Big bats (locally called omulima, black and brown in color) <ul style="list-style-type: none"> • Too destructive crops. (Revenge by eating them) • tastier and big enough for all family. Small bats (locally known as akakorokombe and black in color) ranked second because they are small and not too tasty (hunted as option in lack for big bats)	Big bats preferred for consumption because they are medicinal, increase longevity and highly nutritious. Small bats are preferred by witch doctors in their traditional roles.	Brown bats (big bats) because they are big in size thus a few can make a family meal, have a better taste compared to the small bats, are readily available.
10	Why is bat hunting done (incentives)	<ul style="list-style-type: none"> • Bats are a source of food to the family, 	Hunting is done for food and medicine It has been done from generations to generations	It is a culture. Source of income. Source of food.

		<ul style="list-style-type: none"> bat blood used to treat asthma, malnutrition, cough/chest pains and anemia (bat blood is more nutritious due to the varied diet of bats obtained from diverse places as they fly) Sold to get money. 	<p>“Hunting makes business easier as most of the time bats are hunted within the very house, I sleep in.”</p>	<p>Crocodile oils can be used to treat muscle pains. Teeth of Guinea pigs are used for making ornaments. Eating bats prolongs life. Fats from millipedes can prevent diseases</p>
11	In which season is bat hunting mainly done	Done all year around though common in harvesting season when fruits are ready (from October to November).	Rain seasons and fruit seasons	Generally in the dry seasons. (between February and July) when there are less pastures in the national park which forces animals to move to communities in search of pastures. Bats are usually hunted in rainy and harvesting seasons
12	Number of bats captured per month or year	Approximately 200 bats in a year.	20 bats are caught per week	Approximately 100 bats per month by a hunter.
13	What happens to the captured bats	<p>Bats are sold alive and if it's to be eaten.</p> <ul style="list-style-type: none"> decapitation burnt in hot water to remove hairs Slit to remove internal organs Cooked by boiling. 	<p>Those in houses, doors and windows are closed, then a broom or long stick is used to hit the bat thus 10 bats can be caught in a day and 2-3 can be sold per day to traditional healers.</p> <p>Those in trees are caught and sold to consumers or eaten by the hunter himself.</p>	Sold, eaten or used for medical purposes
14	Any preparation of bats prior to trading	<ul style="list-style-type: none"> Hunted alive using a catapult, packed in sack to allow breathing transported in a black bag to avoid people from seeing what is being transported. Customers contact the buyer directly as there is no specified market for the product. 	<p>Using a catapult a bat is hit and put into a 20 bin polythene bag for transportation to the end users.</p> <p>Care is taken for those bats sold to traditional healers as they need them alive, after capture, bats are put in polythene and put in a laptop bag.</p> <p>A bat sold to consumers costs ugx 5000 and for a traditional healer goes for ugx 50,000.</p>	After hunting using a catapult, the bats are transported in black sacks with caution taken not to be bitten by the bats.

Uganda Participatory Surveillance | May 2023

15	Is contact with bat blood present or saliva during hunting and any precautions taken	At decapitation, blood gushes, thus if one cuts themselves in the process, they smear the bat blood on the wound as it is believed to have healing component.	Blood is just washed away if it gushes on the hands.	Blood spills on the hunters which they clean using any materials like leaves.
16	Who trades in the bats (buys or supply chain), exchange for other meats?	Customers (consumers and traditional healers) contact hunters. 1 bat=20,000shs.	Consumers, traditional healers and hunters who acts as middlemen. Exchange of bats for chicken with traditional healers.	Sold to consumers and traditional healers at shs1500 for and average bat and shs2000 for a big bat. Bats are bated traded in exchange for salt and cooking oil
17	Any alternatives that can be provided in exchange for hunting.	Hunter said, “chicken, goats and cattle can be provided but ,bats are better as they are both food and medicine”.	No alternatives because for bats he has a ready market.	Provision of financial capital to boosts the crafts business and engage in trading other products. Provision of other sources meat like chicken and goats.
18	What are the observed spillover risks already in the process	Hunters are bitten sometimes in the process Blood gushes during decapitation Raw blood given to children in treatment of anemia, cough and asthma.	Contact with bat blood, carrying of bats in bags that carry other foods daily staff used.	Injuries due to bat bites Contact with bat blood
19	Key informants (Name and Tel no.)	Katungu Moses of Kihoko II LC(senior hunter). 0785119418.	Asiimwe Francis.	Babunji Patrick of katwakale village.

ANNEX FOUR: KEY INFORMANT INTERVIEWS FOR BAT CONSUMERS

No.	Parameter	Subcounty or Town Council		
		Harugale	Ntandi	Burondo
1	Ethnic group	MUkonjo	Bamba	Batwa
2	Major source of livelihood	Farming (beans, cocoa, bananas, maize and cassava, cocoa, coffee) Hunting, trading in agricultural produce.	Farming (beans, cocoa, bananas, maize and cassava, cocoa, coffee) Hunting, trading in agricultural produce.	Farming (beans, sweet potatoes, cassava), hunting (wild birds, bats, snakes, squirrels trading in crafts, fishing down the valleys, entertaining tourists.
3	Common wild animals consumed (rank)	Monkeys, baboons, wild rats, bats and wild pigs.	baboons, wild rats, bats, and wild pigs.	Wild birds ,bats, toads, squirrels and snakes.
4	Why is bat consumption preferred or done	Bats are freely available as source of food Used as medicine	Done for food, medicinal for cases of back pains, anemia and manpower issues.	Bats are freely available, only source of meat, nutritious.
5	What bat species are preferred for consumption and why.	Big bats are consumed because they are big and sweet	Big bats as they have reasonable meat and sweet like chicken.	Big bats: tastier than chicken, big enough to make a meal for the family compared to small bats.
6	What is the source of consumed bats	Caves, trees, banana plantations and bushes.	Banana plantations, caves, trees	Trees, caves, houses
7	What is the price of a bat	A bat costs 1000shs, Sometimes exchanged by 1 chicken for 10 bats, freely hunted for consumption.	Price ranges from ugx 1000-5000 and the price is determined by availability and size of the bat.	Freely available, if outside customers, 1 bat =1500.
8	In which season is bat consumption mainly done and why	Bats are consumed all year around. However frequent in harvesting seasons as bats come in abundance to pick ready fruits.	Harvesting seasons as bats search for ready fruits.	Consumption is done throughout the year, however large sums targeted in rainy and harvesting seasons.
9	Number of bats consumed per month or year	1 approximately 20 bats per month.	Consumed bats ranges between 10-15 if purchased per month, 25-30 per month when children are in holidays.	10 bats are eaten per week thus are consumed 40 per month.
10	How are the bats prepared prior to cooking	Head and wings are removed, put in hot water to remove off hairs,	He just roasts the bats on fire to remove the hairs, then remove	<ul style="list-style-type: none"> Head and wings are decapitated

		split to remove internal organs, blood collected and used in case of anemic children, meat is roasted and fried with spices to make sauce.	intestines, then cut carcass into two pieces.	<ul style="list-style-type: none"> • Carcass is put in hot water to remove the hairs • It is then split to remove internal parts. • Later it is roasted or boiled and eaten as sauce for the day.
11	Who prepares or cooks the bats for consumption	Prepared by mostly women.	Consumed by self or sold off as women are not allowed to eat or cook bats, young boys are equally not allowed to eat bats before circumcision as per culture of Bamba.	Mostly women in case of sauce and men in cases of boiling for sauce.
12	Who consumes the bats in the family	Everyone in the family is entitled to the meal.	Men only are allowed to eat bats, because bats give birth like humans, women are not allowed to eat bats. Boys allowed to eat bats after circumcision.	The all family except for cases of scarcity where only the man in the family will enjoy the meat.
13	Is blood consumed separately and by who	Blood is only given to malnourished children or cases of anemia.	Blood is just washed away.	In case of malnourished child, blood can be provided to suppress the condition.
14	What are the observed spillover risks already the process	Risks arise during consumption of raw blood.		Feed blood to children. Cases where live bats beat during decapitation.
15	Any alternatives that can be provided in exchange for hunting.	Chicken and goats although it is expensive to rear than bats which are freely available.	Rabbits and guinea pigs. Although he sees no problem of eating bats as they are medicinal.	Chicken. Goats can be provided but it cannot replace the sweetness of a bat.
16	Key informants (Name and Tel no.)	Bwambale Edson.0785735878	Kosai Embassa	Balungi Sylvia

ANNEX FIVE: KEY INFORMANT INTERVIEWS FOR TRADITIONAL HEALERS

No.	Parameter	Subcounty or Town Council		
		Harugale	Ntandi	Burondo
1	Ethnic group	MUkonjo	Bwanba	Batwa
2	Major source of livelihood	Farming (beans, cocoa, maize and cassava) traditional healing of people as assigned by ancestors. Bananas,		Farming (beans, sweet potatoes, bananas, cassava), hunting, trading in crafts, fishing down the valleys, entertaining tourists.
3	Common wild animals consumed (rank)	Monkeys, baboons, wild rats, bats are not consumed but used in healing process.		Majorly wild rats, toads, bats, birds, squirrels and cobs
8	Why is bat consumption preferred and done	Bats are important in all aspects of healing and driving spirits to destinations as they move long distances and can fly. Culturally bats have special characteristics that suits the role of healing as per tradition.		Used for curing mental illness. It is believed that a mad person moves like a bat thus it is a bat that can save him. Used for strengthening marital ties
9	What bat species are preferred for and why	Small bats are preferred by night dancers and are used to carry their spirits. The analogous use them to take spells to people or pick hairs, academic		Both the small and big bats are used. Wings are extracted from the small bats and the heart from the big bats which are mixed with herbs and patients steam themselves for 25 minutes.
10	What is the source of consumed bats	Hunters get them form caves, trees, and houses		From trees, caves ,big stones with holes, houses.
	What is the price of a bat	He buys a bat at 20,000shs from a hunter then sales it to a client at 100,000shs.		Shs1 500 per bat
11	In which season is bat consumption mainly done and why	Bats are used all year around because clients never stop coming for help with their marriages and wealth issues. Although during harvesting of fruits the price for bats lowers because they are in abundance.		Throughout the year
12	Number of bats used per month or year	1 approximately 20 bats per month.		Approximately 240 bats per month since each patient requires two bats to be treated with an average of about eight patients received per day

13	How are the bats prepared prior to cooking	Traditionally a bat to be used should be alive, head removed, hairs used to make powder to heal fractures ,split to remove internal organs thus the meat is dried, pounded to make powder which is used as love portion.		Bats are slaughtered and intestines removed. The wings of the small bats are cut off and separated since They are used to treat mad people and the heart is removed since it helps to strengthen lone ties. The remaining meat is cooked and eaten.
14	Who prepares or cooks the bats for consumption	Prepared by the traditional healer himself		Women in case sauce is to be fed to men to tighten marriage.
15	Who consumes the bats in the family	Men consumes the bat meat pounded to tighten them in marriage.		All family consumes unless there is scarcity, meat is entitled for head.
16	Is blood consumed separately and by who	Blood is washed away.		Blood is given to children with anemia.
17	What are the observed spillover risks already the process	No spillovers.		Risk in handling of bats, bitten during handling, spillovers when children are made to consume raw blood.
18	Any alternatives that can be provided in exchange for hunting.	No alternative as bats are the only recommended source of animals used when mixed with the herbs.		Goats and chicken although they are not multipurpose in terms of food medicine.
19sss	Key informants (Name and Tel no.)			Luhangi Andrew.

ANNEX SIX: BAT-HUMAN INTERACTION DATA CAPTURE TOOL FOR MONITORING

AGENTS

1. **Name of Data collector:**.....
2. **Date & Time of data collection:**.....
3. **Subcounty**
 - Harugale Subcounty
 - Burondo Subcounty
 - Ntandi Town Council
4. **Parish:**.....
5. **Village:**.....
6. **GPS Location:**.....
7. **Type of roost**
 - Tree
 - Cave
 - House
 - School
 - Church/mosque
 - Hospital
 - Crevice
8. **For bats in house structures, is there a ceiling?**
 - Yes
 - No
 - Not applicable
9. **For bats in house structures, what bat excreta do you commonly encounter? (Multiple answers)**
 - Fecal matter
 - Urine
 - Both
 - Not applicable
10. **What is the average number of people accessing the roost per month?**
 - < 5 individuals
 - 6-15 individuals

>15 individuals

I 1. Type of bat seen (local name) (Multiple answers)

Emilima (Big bats)

Keribo/Kakolokombe (small bats)

Both types

I 2. Number of bats seen

<u>Emilima</u>	<u>Keribo/Kakolokombe</u>
<input type="checkbox"/> < 5 individuals	<input type="checkbox"/> < 5 individuals
<input type="checkbox"/> >5<15 individuals	<input type="checkbox"/> >5<15 individuals
<input type="checkbox"/> >15<100 individuals	<input type="checkbox"/> >15<100 individuals
<input type="checkbox"/> >100<500 individuals	<input type="checkbox"/> >100<500 individuals

I 3. Colour of the bat (Multiple answers)

Black

Brown

Grey

Unknown

I 4. Bat Activity (i.e., what are the bats doing?) (multiple answers)

Resting

Sleeping

Grooming/socializing

Flying

I 5. Proximity to human settlement (i.e. location of the roost in relation to human settlement)

Inside building

Garden

Compound

Cave/tourist site

ANNEX SEVEN: LIST OF BAT MONITORING AGENTS

Sub county	Name:	Contact	Parish	villages
Harugale Sub County	Masika Justin	0786427942	Bumate	Bimara Village; Bimara Full Gospel Church
	Mbusa Daniel	0789147319	Kihoko	Ngugho Village, Ngugho stone cave
	Mercy Orine	0777538177	Bupomboli	Kihoko II Village; S/C HQ & Kathengu's home
	Masereka Lugard	0778524652	kasulenge	Kasulenge II; Nyalulu stone cave
	Bwambale Josam	0787500507	Kitsolima	Kalhalhu Village; kalhalhu stone cave
Ntandi Town Council	Mbambu Yones	0782283017	Kahumbu	Isura II, kahumbu, Nyambowe, karongoti and Nkisyia villages
	Asimwe Gloria	0774985883	Mpulya	Mpulya I, II and III; Mpulya Central and Mpulya west cells
	Sekalombi Alex	0770863976	Bundimasoli	Bundimasoli central, Bundimasoli, Bundimasoli West, Kapepe, Kabale and Kabale central Cells
	Baluku Edson	0781375732	Ntandi	Ntandi west, Ntandi east, Bumaga I and Bumaga II cells
	Muhindo Sadam	0783974809	Nyabugesera	Bitahura I, Butahura II, Nyabugesera & Kapangu cells
Burondo Sub county	Muhindo Nyahoma Joram	0773086545	Burondo	Kinyambogo
	Thembo Edson	0785735878	Karambi	Karambi I and Kinyanjojo
	Bwambale David	0762599548	Karambi	Kinoni III
	Muzima Juliet	0776121712	Karambi	Burangapasi II
	Masika Ellen	0762599548	Burondo	Burondo Central