The Context of Rabies in Bombali District, Sierra Leone

Formative Research and Baseline Outcomes Monitoring Assessment Report

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Acronym List

AHW	Animal health worker
CCP	Johns Hopkins Center for Communication Programs
CHW	Community health worker
EVD	Ebola Virus Disease
FAO	Food and Agriculture Organization
FGD	Focus group discussion
FR	Formative research
GHSA	Global Health Security Agenda
KAP	Knowledge, attitudes, and practices
MOHS	Ministry of Health and Sanitation
OM	Outcomes monitoring
USAID	United States Agency for International Development

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Background and Rationale

Johns Hopkins Center for Communication Programs (CCP) is the lead organization for Breakthrough ACTION and is funded by the United States Agency for International Development (USAID). Breakthrough ACTION aims to use state-of-the-art evidence-based approaches to increase adoption of healthy behaviors and normative change worldwide. Breakthrough ACTION Sierra Leone works with the government of Sierra Leone and Global Health Security Agenda (GHSA) implementing partners to improve the risk communication capacity of government and partners, and to address specific behaviors in the population that are associated with selected high-priority diseases.

Zoonotic Diseases in Sierra Leone

The largest Ebola Virus disease (EVD) epidemic to date occurred between 2014 and 2016, resulting in over 28,600 cases and 11,300 deaths in Guinea, Liberia, and Sierra Leone (Ordaz-Neameth et al., 2017). Before the EVD outbreak, the health system in Sierra Leone was weak; specifically, it was poorly funded, understaffed, and ill-equipped. Both poverty and the weakness of the health infrastructure contributed to the scale of the EVD epidemic (Shoman, Karafillakis, & Rawaf, 2017). In the post-Ebola environment, studies demonstrated aftereffects of the EVD outbreak with significant decreases in the use of health care services and corresponding increases in non-Ebola morbidity and mortality (Brolin Ribacke, Saulnier, Eriksson, & von Schreeb, 2016). Sierra Leone cannot afford another large-scale outbreak. The 2014 EVD outbreak highlighted the need for a coordinated, harmonized, targeted, and effective global health response to public health emergencies. It is essential to strengthen and maintain Sierra Leone's capacity to prepare and respond to future health events through improved risk communication. Understanding the epidemiology and culture of zoonosis in Sierra Leone will provide a strong foundation for effectively responding to (and perhaps to some extent, preventing) another large-scale epidemic of zoonotic illness in the country.

Rabies in Sierra Leone

In 2017, Sierra Leone held a One Health zoonotic disease prioritization exercise and ranked rabies as the second highest priority zoonotic disease. Rabies is a zoonotic viral infection transmitted by contact with saliva of infected mammals, mainly through bites and scratches. The virus attacks the central nervous system, targeting the brain and spinal cord, and if untreated, is fatal. Rabies is endemic in Sierra Leone; however, poor reporting and surveillance have resulted in gross underestimations of cases and mortality. Children are especially vulnerable to rabies with four out of every ten rabies-related deaths in the African continent occurring in children under the age of 15 (World Health Organization, 2018). There is very little information about community-level perceptions and behaviors that influence transmission of rabies in Sierra Leone.

Program Approach

Breakthrough ACTION is collaborating with the Ministry of Health and Sanitation (MOHS) Health Education Division and other One Health and USAID GHSA partners, including the Ministry of Agriculture and Forestry (MAF); Environmental Protection Agency (EPA); PREDICT-2 project of the University of California, Davis; Food and Agriculture Organization (FAO) of the United Nations Emergency Center for Transboundary Animal Diseases project; World Health Organization; Development Action International's Preparedness and Response project; and the International Federation of Red Cross and Red Crescent Societies' Community Epidemic and Pandemic Preparedness Program. Breakthrough ACTION and partners will collaborate to design and implement a communication campaign to increase knowledge and awareness about the connection between animal and human health, and promote behaviors to protect and maintain the health of both humans and animals interacting in the same environment. The results of the formative research (FR), the outcomes monitoring (OM) baseline assessment, and other program activities and information will inform the design of a high-quality communication campaign strategy. Strategic interventions will relay information on rabies to community members and will be developed in English and/or the predominant local languages spoken in Breakthrough ACTION's focus district, Bombali district.

Breakthrough ACTION will train GHSA and One Health partners to use the project outputs to effect change at the community level. Groups to be trained may include community animal health workers (AHWs), community health workers (CHWs), Red Cross volunteers, religious and traditional leaders, village development committees, and facility management committees. We expect change in awareness and knowledge of rabies and its causes, symptoms, preventive actions, and reporting.

The OM activity aims to collect data on project indicators. We selected this approach to monitor and assess the project's endline achievements because the short duration of the program interventions will likely not support much change in long-term and impact outcomes that are assessed during a formal evaluation of the program. Breakthrough ACTION selected outcome indicators shown to occur early in the behavior change continuum (i.e., awareness and knowledge) and that also are based on simple concrete information such as expected response and reporting processes that community members will easily absorb and remember. Based on previous use of this method, Breakthrough ACTION is confident the project content, combined with the duration of activities, will support improvements in key outcome indicators.

Breakthrough ACTION research activities focused on Bombali District to align communication interventions with ongoing GHSA partner efforts there to strengthen laboratory, surveillance, and workforce capacity for priority zoonotic diseases. Breakthrough ACTION carried out FR to provide information on community members' knowledge, attitudes, and perceptions related to zoonosis and rabies, as well as the factors influencing risk of illness, prevention behaviors, reporting, and uptake of treatment and support services. The research aimed to provide high-quality data to inform evidence-based risk communication and behavioral communication programming for zoonoses, including rabies,

in Sierra Leone. In addition to the FR, we conducted OM in the program area as a benchmark to measure if Breakthrough ACTION is achieving its intended outcomes.

Aims of the Study

Breakthrough ACTION is working with the government of Sierra Leone and GHSA-implementing partners to improve the risk communication capacity to address high-risk behaviors among the population associated with zoonotic diseases. Breakthrough ACTION conducted FR and OM to inform project strategies and track project performance.

Formative Research

The overall aim of the formative study was to explore community members' perceptions, knowledge, and behaviors associated with zoonosis in general, and more specifically with rabies. Specific objectives included to:

1. Understand awareness and knowledge of risk to health from animal-human interactions;
2. Understand factors (individual, community, structural, economic, socio-cultural norms, etc.) that influence animal-human interactions;
3. Assess community members' knowledge of zoonosis and rabies regarding:
    - risk behaviors in animals and humans
    - symptoms of illness in animals and humans
    - zoonosis and rabies prevention strategies
    - reporting mechanisms for animal bites or suspected rabid animals;
4. Identify predisposing factors for risk and prevention of zoonotic illness such as:
    - protective behaviors and strategies that decrease personal risk and/or prevent rabies
    - risk behaviors and practices that increase personal risk for rabies;
5. Describe community member perceptions of AHWs and their work;
6. Describe personal experiences with animal-human interactions, zoonotic illness, and rabies; and,
7. Identify accepted sources of information on zoonotic diseases and rabies that community members use.

Outcomes Monitoring

A review of the available literature on zoonosis in Sierra Leone showed an evidence gap in information on individual and community-level behaviors related to rabies. The literature also did not contain appropriate estimates or strong proxies for the indicators in the project's monitoring and evaluation plan. The lack of baseline estimates against which to assess the project's performance emphasized the need to collect this type of information. To this end, this report shows results for the baseline data collection efforts to monitor project indicators. These indicators are related to individual and community-level behaviors, specifically knowledge and awareness of zoonosis with emphasis on rabies, experiences with human-animal interactions and zoonotic illness, perceptions of health providers and health services for rabies, and exposure to project-developed health communication interventions for rabies.

We collected OM data using a Rapid Assessment method specifically to track changes in the project's outcome indicators. Community members completed a short quantitative survey with questions that focused on the indicators. A similar survey will be repeated at the end of activity implementation. The outcome indicators for the project include:

1. Percentage of individuals with correct knowledge of transmission of rabies from human-animal interactions;
2. Percentage of individuals with correct knowledge of risk of rabies;
3. Percentage of individuals with correct knowledge of prevention of rabies
4. Percentage of individuals with correct knowledge of when to report suspected rabies;
5. Percentage of individuals with correct knowledge of reporting channels for rabies;
6. Percentage of individuals who were aware of suspected rabies and reported it in the past 12 months;
7. Percentage of individuals who had high-risk interactions with animals linked to rabies in the past 12 months;
8. Percentage change of individuals who had high-risk interaction with animals linked to rabies in the past 12 months and sought treatment;
9. Percentage of individuals who are aware of Breakthrough ACTION campaign on rabies; and,
10. Percentage of individuals who correctly recall project-related health messages on rabies.

Study Methods

Overview of Study Design and Methods

Formative Research

The team used qualitative methods to collect information on knowledge, perceptions, and behaviors related to zoonosis and rabies. We conducted focus group discussions (FGDs) with adult community members 18 years and older in groups stratified by gender and age, with children between the ages of 10-17 years, with community leaders, and with health workers. Moderators facilitated discussion groups that were matched by gender to the groups.

Outcomes Monitoring

The team conducted quantitative cross-sectional household surveys among adults 18 years and older to collect monitoring data to track changes in project outcome indicators. This baseline assessment was conducted with the FR in June 2018. An endline assessment will be conducted at the end of the project (approximately one year later).

Sample Size and Justification

Formative Research

The team conducted fifteen FGDs with 133 individuals. FGD groups for community members were stratified by gender and age, with three age categories for community members (children 10-17 years, young adults 18-29 years, and adults 30 years and older). Table 1 shows the distribution of FGDs by informant categories.

TABLE 1: DISTRIBUTION OF FOCUS GROUP DISCUSSIONS BY INFORMANT CATEGORIES

	TYPE OF FGD							TOTAL N
	CHILDREN 10-17	MALES 18-29	MALES ≥ 30	FEMALES 18-29	FEMALES ≥ 30	COMMUNITY LEADERS	PROGRAM & HEALTH STAFF	
# FGDs	3	2	2	2	2	2	2	15
# Informants	27	19	17	18	17	17	18	133

The sampling structure allowed for variation by eliciting the views of a diverse group of individuals to capture potential differences in experiences, beliefs, and opinions related to the thematic focus of the FR.

Outcomes Monitoring

The team collected survey data from 1,312 participants for the OM baseline assessment. At the time of the survey, there were no population estimates for zoonosis-related knowledge or behaviors, which are outcomes of interest for the OM. As we expect average behaviors to vary by constituency, urban/rural location, ethnicity, and some individual characteristics, we selected 0.50 as *p*, to provide for maximum variability in the calculation of the sample size. We used the Stata *sampsi* command to calculate the sample size. The formula for the sample size calculation implemented by Stata with continuity correction is:

$$N = \frac{[Z_{1-\frac{\alpha}{2}}\sqrt{2\overline{P}(1-\overline{P})} + Z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}]^2 * DEFF}{(P_2-P_1)^2}$$

Where:

$Z_{1-\alpha}$ = Z value associated with the level of significance of 95%;

$Z_{1-\beta}$ = Z value associated with the power of 80%;

P_1 = the indicator at baseline;

P_2 = the indicator at end-line;

$\overline{P}$= $(P_1+P_2)/2$

DEFF=2

In order to calculate the sample size required to determine a modest change of 15% in behavioral variables of interest, we estimated the initial value for the characteristic of interest ($p1$) at 0.50 and the change $p2$ at 0.65. At alpha levels of 0.05, power set at 80%, and including a design factor of 2.0 to correct for any sampling inefficiency related to the multi-stage cluster sampling design (as sampling does not occur from the universe of participants), we would require a sample of 294 individuals per constituency. We oversampled by 10% for non-response rate and to compensate for any unusable surveys, making the sample 327 individuals per constituency. We increased the sample to 328 individuals to provide equal distribution of the sample among four communities per constituency.

To compare at the level of the constituency, we multiply the target of 328 individuals by four program constituencies for a total of 1,312 rapid survey participants per wave of data collection.

TABLE 2: SAMPLING DISTRIBUTION FOR OUTCOMES MONITORING SURVEY					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	
# sampled	328	326	330	328	1312

Study Sites

Research and monitoring activities occurred in five purposefully-selected constituencies in Bombali District.

Selection of Constituencies

Stakeholders from MOHS and the Bombali District Health Management Team, MAF, EPA, and the Bombali District Council in Sierra Leone provided input for the selection of constituencies. We based selection of constituencies on the following guidelines:

1. Recent history of reported dog bites;
2. Urban locale with a high number of stray dogs;
3. Market, agrarian, or hunting locale that contributes to supply and demand for bushmeat, livestock, or dogs for hunting;
4. Community where activities increase the risk of bites and scratches from animals that may serve as potential sources of rabies;
5. Geographically well-defined and accessible locale;
6. Community large enough to allow random recruitment of the required number of participants for OM; and,
7. A location within the Breakthrough ACTION program area.

Selection of Communities

The team selected four communities within each of the following constituencies for FR and OM activities for a total of 16 communities. Table 3 shows the constituencies and communities selected for data collection activities.

TABLE 3: CONSTITUENCIES AND COMMUNITIES SELECTED FOR FR AND OM ACTIVITIES			
CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38
Gbendembu	Binkolo	Kanekay	Makama
Kalangba	Kagbo	Karena	Matinka
Kotohun	Kapethe	Kayanko	Ropolon
Masongbo-Loko	Masongbo-Limba	Manjoro	Stoko

Participants

Formative Research

The team completed the selection of FGD informants in collaboration with community leaders, program officers working on rabies, and district health team members who knew of individuals with specialized knowledge about rabies. We selected key informants purposefully based on their familiarity with local culture and community practices; personal and professional experiences with animals of interest including dogs, bush rodents, and bats; and on their ability to articulate in detail the challenges of operating at different levels of the community to prevent illness from animal-human interactions. This included community members, community leaders, hunters, traders, facility and community-based health workers (for humans), disease surveillance officers, program staff of community-based organizations working on zoonosis, and district health officers. No AHWs were available in selected communities during the data collection period.

Adults (18 years and older) and children (10-17 years) participated in the FGDs. We included children in the FR to provide a richer understanding of the perceptions and cultural practices that put community members at risk of rabies. For example, in Sierra Leone, young children are expected to hunt bushmeat to supplement household meat supply, and they also hunt bats found in small spaces inaccessible to larger adults, such as the rafters and thatch of homes (Bonwitt, et al., 2017).

Selection Criteria for FR Informants

Inclusion Criteria

1. Referred as a potential informant
2. Has lived in the study area for at least 1 year
3. Child between 10-17 years or an adult over the age of 18 years at the time of the survey
4. Understands and speaks English or Temne
5. An adult who has capacity to, and does, provide voluntary informed consent
6. For children between 10-17 years of age, a parent who has capacity to, and does, provide voluntary informed consent, and the child does provide informed assent

Exclusion Criteria

1. Not referred as a potential informant
2. Does not reside in or has not lived in the study area for at least 1 year
3. Child younger than 10 years at the time of the survey
4. Does not understand and speak either English or Temne
5. An adult who does not provide voluntary informed consent
6. For children between 10-17 years of age, a parent does not provide voluntary informed consent or the child does not provide voluntary informed assent

Outcomes Monitoring

Participants for OM were randomly selected residents 18 years and older living in one of the 16 participating communities.

Selection Criteria for OM Participants

Inclusion Criteria

1. Individual is 18 years or older at the time of the OM survey
2. Individual has lived in selected community for a least 1 year
3. Individual provides voluntary informed consent
4. Individual understands and speaks English or Temne

Exclusion Criteria

1. Individual is less than 18 years of age at the time of the OM survey
2. Individual has not lived in selected community for a least 1 year
3. Individual does not provide voluntary informed consent
4. Individual does not understand or speak English or Temne

Study Results: Formative Research

This section presents a summary of the results from FR and OM activities conducted in four constituencies (31, 34, 35, 37/38) in Bombali District, Sierra Leone.

The team conducted 15 FGDs among adult community members and leaders, children, and health workers providing services to people, purposefully selected from four constituencies in the district. A total of 133 individuals participated in the FGDs, including 27 children (10-17 years of age), 71 adults (36 males; 35 females), 18 health workers (facility and community-based health workers and surveillance officers, for human health), and 17 community leaders. A total of 1,312 adult participants (18 years of age and older) from the aforementioned four constituencies completed the rapid assessment OM survey. Fifty-one percent of participants were male and 49% were female, with an age range of 18-95 years, and an overall mean age of 37.9 years (SD: 13.4). The majority (72%) of participants were married or living with a partner, and their main occupations were crop farming (44%), trading (22%), vocational (9%), and professional (7%) jobs. Eleven percent were unemployed.

For the results, first we describe and discuss the context of animals in the study area, including information about common types of animals, how they are cared for, animal roles, and the perceived benefits and challenges related to care of animals. Then, we explore informants' general knowledge of zoonosis including what zoonosis is, animals with zoonotic potential, transmission, human-animal interactions and at-risk populations, and symptoms of sickness in animals and humans. Next, we discuss informants' knowledge and perceptions of rabies, including topics related to causes, risk and preventive behaviors, symptoms of rabies, and how to respond to animal-human incidents. Next, we describe results about community members' perceptions of AHWs, knowledge of reporting requirements, and community needs.

We present and discuss data from both the FR and OM where appropriate for each of the thematic sections of the results.

Context of Animals

Types of Animals

Informants described a wide variety of animals found in the study area. Within communities, animals that are either owned by community members or found in close proximity to homes and people include goats, cows, sheep, pigs, dogs, cats, ducks, other fowl, pigeons, rats, and bats. In the larger study area, especially in forested areas, informants reported there are "bush" or wild animals that include cutting grass (cane) rats, snails, deer, "freetambo," snakes, and monkeys. Animals commonly found around people and in communities may or may not be domesticated animals and include strays that fend for themselves and have no identifiable owner, and other animals that have owners but exhibit destructive, aggressive, or undesired behaviors because they are not controlled by their owners.

Informants believed that animals are "*anywhere and everywhere*" in their communities but mentioned that some animals are usually found in specific environments. For instance, informants described that *"ducks, pigs, and guinea fowls are raised by people in the community"* and are seen close to living spaces. Other informants said: *"Ducks you mostly see them in areas where garbage is deposited"* because that is where they can scavenge for food; "*rats, they are in the town and in the bush*;" and "*bats are all over the place, they are in our roof ceilings and in water wells that do not have covers.*" Some informants perceived that farming communities located near forest areas have bush animals moving closer to the towns because of burning practices that destroy natural habitats of forest animals, as illustrated below:

> *The reason why we find more animals in this other communities is because there are lots of forest there, they maintain their forest so that their wild animals will not run away as compared to us here, we always set fire on bushes. (Health worker, Kapethe)*

Informants noted that animals exist where there is an easy source of food. Cutting grass rodents commonly exist on farms and in cultivated swamp areas, and an informant explained "*when we see the area where they eat, we would know that they are around."* Informants from farming communities reported keeping their animals "*in our farms because there is enough food for them [there] than within the community."* They do this to prevent their animals from destroying property belonging to others in the towns. Informants reported that cows are usually reared by Fullahs (a cattle-rearing ethnic group) in open spaces of the "woreh" (cattle ranch) where they graze and consequently are not seen much in the larger towns.

Roles of Animals

Informants described several benefits of owning animals. The main reasons for keeping animals in the communities studied were for security, to facilitate work, for regular and supplemental income, as a food source, for companionship, and for spiritual and ceremonial purposes. We describe these themes in detail below.

Security

Informants perceived animals as a means of security for themselves and their property. This included providing security for personal property at home and for produce on the farm, and being also a source of financial security in times of hardship where the sale of animals can provide supplemental cash when needed.

Almost all the discussion groups mentioned dogs and cats in the context of animals providing physical security for their owners and owners' possessions. Informant groups in Kanekay and Stoko summarized the security work of dogs and cats as follows:

> *Animals like dogs are serving us our securities. They will be there lying by our doors during night hours to drive off thieves who may want to come and disturb and rob us*

during the night hours. Cats are also important to us here because they drive off rats from our houses that use to disturb us in our houses. (Community leader, Kanekay)

Cat also serve as a security for our food stuff and our harvest goods we have at home not to be destroyed by rat. (Health worker, Stoko)

Informants also acknowledged dogs as providing security outside the home, such as on the farm. Dogs frequently accompany their owners to the farm to help locate and also chase off other animal scavengers seeking to eat the farm produce.

Livestock farmers are using these animals to scare pest in the farm. (Child, Makama)

Animals are a source of supplemental income for those who face unexpected financial hardship and debts. Animals provide a sense of financial security during hardship by being easily converted into cash or used for food. Both children and adults reported that animal owners would sell some of their animals on an as-needed basis to supplement income and to pay debts.

The other role that they play is that, we use them as a means of getting money. Whenever we have financial difficulties, we'll sell them and have money and we'll use the money to buy ourselves things like rice as well as other things in order for us to survive. (Community leader, Kanekay)

Work Animals

Some informants perceived dogs to be multi-purpose animals. People train dogs to be work aides to hunters who use them *"for hunting to catch animals in the bushes around the community."* Informants described the dual role as follows:

Like our dogs here are trained or use to hunting during the day, and at night they serve as security for people who come to steal in our community. (Health worker, Kapethe)

The reason why many people are training dogs in this community is because they are using the dogs to hunt animals in the bush; this is the main purpose why some people are training dogs in this community. (Older adult female, Kagbo)

An informant from Makama rationalized the need for dogs and their use in hunting by stating that since the implementation of a ban on using guns to hunt, "*… we used the dogs to catch animals for us in the bush."*

In addition to dogs, people identified cows as other work animals that help with farm work. Cows perform manual labor on swampy terrain on the farm, especially during the rainy season. Farmers also rent cows out to other farmers who need help tilling swamp plantations, and in this sense are also a seasonal source of supplemental income or in-kind resources.

If you have a cow, it will help you to work in your swamp and other people will come to you and pay so that the cow will work in their farms to till the soil, some people will pay the money and others will give the rice in exchange. (Older adult female, Kagbo)

The other role which I can say is the role of animals here is, they can be used in farming. We have some people here in these our communities who have what we call "bollies" who will use animals like cows to do farming. (Community leader, Kanekay)

A few informants also noted that animals are beneficial to owners, and especially to farmers, because farmers use the animal waste products as fertilizer on the farms.

Income

The third benefit of animals to community members was regular and supplemental income generation. Informants reported that animals provide a continuous source of income for those who rear and trade animals for a living. Animals have value as a "*means of getting money*" for basic human needs such as food, education, health care, clothes, and other goods and services. Animals commonly reared and traded for household income include goats, sheep, pigs, ducks and other fowl.

Fowls, sheep, goats are sold to solve our domestic problems, like feeding, clothing, and paying of our children school fees. (Child, Makama)

They bring income to us when we sell them and this been a major source of income to most families in the community. (Child, Ropolon)

In addition to providing a steady source of income, having animals ensures a source of supplemental income during difficult times. Child informants described how an animal owner can "*easily sell their animal to settle their debts,"* including micro-credit debt, and a community leader from Matinka reported that he can sell his animals as needed to raise funds for "*immediate needs"* and to *"attend to medical requests from family members."*

Food

Informants related that animals are also a ready source of food for daily consumption or, for some families, reserved for special occasions.

The first thing is that they serve us as food. Whenever we want to cook some nice sauce, we will catch one of them and use them as meat for our cooking sauce. (Community leader, Kanekay)

Community members eat ducks frequently, however, some informants stated that other fowl, goats, and sheep are more beneficial as a source of income and are used for food only occasionally, such as when there are guests. A few informants said cats are eaten during funerals.

Companionship

Few informants described animals as being companions to humans. They noted that children often play with dogs because "*the dogs like children and children also like dogs."* Informants believed women without children keep animals so they can mother them, and only one informant described dogs and cats in the context of being "*friends to human beings.*"

Traditional Ceremonies

Many informants described the spiritual role of animals in the community and reported that fowl, sheep, goats, and cows often play a role "*in traditional celebrations like Bondo and Poro,"* as well as during special occasions when important visitors come to the community, and during traditional healing rituals.

> *The magicians, they are using animals to perform their ceremonies. They always need them to do their work. (Child, Makama)*
>
> *For the cow, most at times we use them for ceremonial purposes or for certain celebration when our people from outside visit us on important occasions. (Health worker, Kapethe)*
>
> *Most people are asked to use a sheep or goat as a sacrifice by some traditional healers either when they are sick or anticipation of getting fortune if they use an animal as a sacrifice. (Community leader, Matinka)*

One informant thought that dogs, in particular, were of little benefit to their owners because, unlike other animals, the dog cannot be eaten or sold for money.

Care of Animals

Informants had a lot to say about the care of animals in their community. They described animal-related issues regarding feeding, housing, animal health, and protecting the property of the general community from scavenging animals. While owners have primary responsibility for animals, it is usually children and younger household members who are tasked with ensuring that animals are secured, fed, and watered.

> *In talk about caring of our animals we the owners it is our responsibility to look after our animals when it comes to feeding, sleep place and make it to received check once in a while so that they might be in good condition of health. (Older adult female, Gbendembu)*
>
> *For us in this community, it is our children who keeps and take care of the animals, tie and untie them, feed them. (Health worker, Kapethe)*
>
> *My younger brother is tasked with the responsibility to ensure the animals are kept in the cage at all time. (Child, Ropolon)*

In spite of these expectations, many community members felt that animals are not treated humanely in their community and are often victims of neglect and unprovoked violent behavior, especially from youth and children.

> *Sometimes we contribute greatly for an animal to become stray dog because people treated animals as if they do not have life meaning. (Health worker, Stoko)*

> *This situation my brother is talking about is mostly common with the children and few young boys in the community who will try to harm these animals. Again this attitude of cruelty on the animals is more committed on dogs. You will see a dog passing by and without having done any bad to anyone, you will see these young boys begin to chase it and will try to harm it. (Community leader, Kanekay)*

A few informants believed that while dogs may have a useful role regarding protecting the property of their owners, dogs are not human beings and are not meant to be in houses and not meant to mingle closely with humans in ways such as sharing the same sleeping space or breathing into the air in the house.

> *They [dogs] always stay outside of the house to secure lives and properties of the owner. The reasons for their staying out are we do not have the same behavior and attitude to live with them inside the house, we classify them animals not human being. The way dogs breathe which is not healthy for we the human beings. (Older adult female, Gbedembu).*

Feeding Animals

Community members prioritized feeding animals reared for sale such as livestock and fowl higher than feeding household dogs and cats. Informants believed that neglect of animals by their owners contributes to the presence of small ruminants and stray dogs that roam freely in the community, and perceived also that cruelty to animals in turn makes dogs, in particular, aggressive towards humans.

> *Coming to the issue of dogs, failing to provide daily food it might become angry and even if someone comes closer it might bite you. (Older adult female, Gbendembu)*

> *People refused to feed them [dogs] and allow the animal to search for food, which is unfair to the animal. Due to this reason sometimes makes the dog to become more aggressive to people even if you the owner is not careful it will hurt you. (Health worker, Stoko)*

Informants expressed mixed perceptions about the responsibility to feed animals. While some informants perceived that community members take responsibility and make an effort to provide food for the animals they rear for sale or personal consumption, such as fowl, goats, sheep, and pigs, similar responsibility and effort was not usually shown for dogs and cats. Regarding the former, children usually ensure that animals belonging to a household have food to eat and are safe.

What happens is this. We have some people that have children and they will use their children to lead these animals to places they can go and feed on especially after you might have locked them for an entire day, then the children will lead them to a place where they can go and feed themselves and after some time they will bring them back. (Community leader, Kanekay)

Informants also described how the seasons can influence the amount of control exercised over an animal; animals are controlled more during the wet season and less during the dry season.

Like for now [wet season] we have the goats, we have put them under intensive care, in the morning we take them to their various places where they feed and in the evening or when it's raining we bring them back to their small house, we don't allow the rain to wet them. Like for the dry season we leave them roam around freely because this is the period that is very difficult for them to find food and water to drink, so during that period, roaming around for themselves will help them find food on their own. (Older adult male, Binkolo)

However, in households with no children to assist with the care of animals, owners often "*leave the animals unchecked*" and loose in the community "*without any control*" to look for food themselves. Informants described seasonal challenges related to feeding their animals and specifically described the dry season as a time when there can be shortages of both food and water. Informants also characterized the dry season as a time when some families often do not have enough food supplies for their household members, so the needs of animals become secondary.

In this past dry season animals are starving because no food for them and there is a water crisis in the community, so people find it difficult to get water for their personal use, not talk about animal. (Health worker, Stoko)

Another challenge we face is that we always face difficulty in providing them with food especially in the dry season, therefore we leave them to fetch for themselves within the community and nearby bushes. In a nutshell we faced challenges in providing food for these animals during the dry season. (Older adult male, Masongbo Limba).

Informants believed that when owners feed their animals regularly, they tend to stay close to home and the source of food. Informants also believed that animals roaming loose in communities is due in part to the inability of some animal owners to adequately feed their animals. Informants said that during these times, the animal owners make purposeful decisions to allow their animals to roam the community in search of food and water.

Getting food for them in the dry season is another challenge, which is why most times we leave them move freely around to feed on their own. (Health worker, Kapethe)

We cannot provide food for these animals and as a result they move freely to fetch for themselves in and around the community. (Young adult male, Kotohun)

Housing Animals

Some informants reported that providing appropriate housing for animals is the responsibility of the owner and they described a variety of different sleeping arrangements for animals at the end of the day. Discussions showed that in some communities, animals are appropriately housed in cages and other structures close to, or some distance behind, the owner's house, while in others, animals share the living quarters with their owners at nighttime or have no dedicated housing.

Majority of people that own these animals has built a pen for them, it is only lawless people that haven't built for their animals until now, but they are not many. (Health worker, Kapethe)

Well for me we have a cage wherein the goats, chickens and sheep are kept overnight until the next morning when we release them. (Child, Ropolon)

When it comes to sheep, goat and duck some people who have the opportunity to have bigger compound they built a small house for them as a place where they kept them. (Older adult female, Gbendembu)

Animals appear to be confined to their structures during the nighttime and let loose during the daytime. Several informants reported that in larger, more populated towns, it is a challenge to find the space for animal structures compared to the open rural areas, so animals stay freely outside. Several informants explained that animals, including those with housing structures, frequently are moved indoors at nighttime to be close to their owners. Preventing thefts of animals was a reason animals share the living spaces of their owners at nighttime rather than remain outside in a dedicated animal house. Poorer families with only one or two rooms also tend to share their sleeping space with their animals. Animal cages are brought into the rooms for the night, or smaller animals such as fowl are kept in baskets or closed bags and released during the day.

Before, we just leave the animals—they will come in the evening and enter into their place for the rest of the night. But for now, we cannot do that because we have people who are stealing them in the community. (Older adult female, Kagbo)

People who rear fowls built a special cage for them far from their houses—for fear of been stolen by thieves, some prefer to put their cages in the house. Others keep them right inside the rooms, the reason because others do not have a house on their own and others have a single room, so if you have your animal there is no place to keep except inside your bedroom to avoid thieves not to steal them at night. (Child, Makama)

Confining and Controlling Animals

Informants responded to questions about how they feel about confining animals versus letting them loose to roam the community. The opinions of informants differed regarding the benefits of allowing animals to roam in the community. Some informants perceived that animals benefit from being able to feed themselves and grow bigger, which increases their worth.

> *For me it is an advantage because it reduce the burden on the owner to be searching for food for them, they grow faster and healthier, which will add to their value in case the owner wants to sell any of them. (Health worker, Kapethe)*

On the other hand, some informants believed a stray or roaming dog is problematic and "*there is no good thing in leaving an animal uncared for or freely.*" A community leader from Kanekay explained that when left to roam, *"either the animal goes and get sick or they end up stealing it without you knowing at that moment. The other thing, it will get killed in the bush without you knowing."* Informants also had conflicting perceptions about the amount of control community members have over their animals. Some informants thought animals are appropriately controlled and confined in the community, while others thought they are not.

> *The animals in the community are easily controlled because if it is time to plant, they will be given a rope and tie them in a fix place so that they will not be able to move as they want. (Older adult female, Kagbo)*

Other informants disagreed and perceived that animals are roaming the community destroying farmland and produce, contaminating the environment with their feces, stealing food from kitchens, and acting aggressively towards the public, which in turn causes disputes between animal owners and neighbors.

> *The owners fail to give chains to their animals or tie rope within their necks to constrain them from moving freely. This has created a lot of misunderstanding between the owners and the farmers. The fowls and ducks are usually seen feeding on places where we nurse our seeds thereby destroying the viability of such seeds for planting. (Child, Ropolon)*

> *It is very, very bad, because whatever you put down by the time you think of it, they have thrown it on the ground or had put their mouth into it, even the cat we rear, whenever you lay down your fish or other food items, before you think of it they have eaten half or even all, so it is very bad leaving animals to just roam around like that. (Health –worker, Kapethe)*

> *If the animals are just going about their business without destroying our properties we will not have any bad feeling about them, but for the fact that they are all the time destroying our properties then I don't think we are going to be happy about them. (Young adult male, Manjoro)*

Informants linked confining animals to availability of food and the seasons, and confinement appears to be enforced more during the rainy season when farms are being planted, and less during the dry season, when food is scarce. This common theme is illustrated below through several examples.

> *If you have animals at home, during the dry season we release them because there is no sufficient food and water. But during the raining season we give them a rope so that we control them from eating people's plantations. (Older adult female, Kagbo)*

> *What happens here is that, during the dry season, they will leave the animals to go about their business freely and when the rainy season approaches, they build for their animals so that they will not go and destroy the crops of other member in the community. (Community leader, Kanekay)*

> *One of the owners told me one day that food for them is not enough, let alone they give to the animals, so that is one of the main reason why they leave them roam around freely. (Health worker, Kapethe)*

General Health

Informants expressed the common theme that in general, communities practice poor animal health behaviors such as bathing and vaccinating animals. Many dogs have untreated skin diseases, open wounds, and look emaciated.

> *It is in this community I have realized that people do not wash their dogs only few people that are doing such act. And if you walk around you can detect that dogs have rashes and body sore all over their bodies. (Health worker, Stoko)*

Some owners contact AHWs when they suspect their or other animals may be sick; however, this is rare in the case of dogs, and especially for stray roaming dogs. A frequently mentioned reason for low use of animal health services was that no easily accessible AHWs provide services in the community, and visits by AHWs from other areas occur infrequently. According to participating health workers (for human health) from Stoko, some owners refuse to seek treatment for dogs with scabies because of distance to an animal health care facility, and the costs associated with care, medicines, and transporting AHWs to the community. In some cases, sick animals are left to die.

> *One of the challenge is that there is nobody that comes into in the community to treat these animals when they are sick and this sometimes results to the death of many of them. (Older adult male, Masongbo Limba)*

> *We don't have anything to do because we don't have medicine to treat them and when they die we throw them away. (Older adult female, Gbendembu)*

Overall, the results showed that informants have mixed feelings about the general care provided to animals in the community. Animals have roles related to security, income, and food. The animals that

are a source of food or income, and that can be used for security or work at home and on the farm, receive more care than those that are perceived to not provide a benefit to their owners. Some owners provide housing for their animals, but increasingly more owners are choosing to share their sleeping spaces with their animals to protect them from thieves. Some owners do not have the resources to feed their animals and purposefully allow them to roam the community to look for food. This practice increases during the dry season when food is scarce; however, during the rains and planting season, some community members confine their animals to keep them from destroying farms. Few individuals routinely provide health care for animals, and many communities do not have visits from AHWs.

Knowledge of Zoonosis

Informants provided information about their knowledge of zoonosis and specifically knowledge of animal illnesses, causes of illness, signs of illness in animals and people, how illness in animals may be transferred to humans, and who in the community may be at risk of contracting illness from an animal. Overall, knowledge about zoonosis was variable. Some health workers, community leaders, and farmers demonstrated basic knowledge of zoonosis, while many community members and some health workers did not have knowledge or had inaccurate knowledge of zoonosis.

When asked about whether animals can pass on their sicknesses to humans, many community members responded with statements such as, "*I don't know*," "*unless the doctor tells me,*" "*I have not seen it before to know,*" "*I cannot tell,*" "*I don't have that awareness,*" and "*nobody has ever told me.*" An example of this knowledge gap follows:

> *Well I cannot tell whether the sickness I experience is coming from an animal or not because nobody has ever told me that animals can transfer sickness to people. (Older adult male, Masongbo Limba)*

The community perceives lack of awareness and knowledge of zoonosis to be a significant problem and many believe it contributes in part to the occurrence of zoonotic cases in the area. A community leader from Kanekay described getting sicknesses from animals as "*totally a new phenomenon"* for community members, and one that needs to be addressed. Another community leader from Matinka expressed, *"Most of us here are novices about the sicknesses we get from animals and perhaps this is the main reason why we get sickness from animals unknowingly."*

For some informants, including health workers at the health facilities, there was some confusion about the meaning of zoonosis. Some informants described zoonosis as any illness such as skin rash, gastroenteritis, possible allergic reactions, or diarrhea, that is perceived to originate from an interaction with an animal or animal product, rather than a shared disease that can be transmitted from an animal (with symptoms or not) to a person. While such animal-human interactions may contribute to some zoonotic infections, this was not the understanding among study informants.

> *For the fowls they place their mouth in our water after eating lots of dirt, which most times causes sickness in us. (Older adult male, Binkolo)*

Even the fowls we rear for domestic purposes they too can infect us because they feed on all kinds of foods. Some their food they eat are harmful to us. (Child, Makama)

The other bad thing is that they [pigs] toilet all over the community, and most of their toilets when dry, carry away by the wind causes sickness in people. (Health worker, Kapethe)

There are also other animals I have witness like goat, when someone eat it, his body began to scratch. (Older adult male, Binkolo).

On the other hand, some informants had basic knowledge about the possibility of transfer of illness from sick animals to humans. These informants knew that humans can get infected with a sickness from animals when they are "*touching a sick animal,*" when they "*kill and eat the sick animal quickly*" before it dies, and when they come in contact with animal fluids like saliva, urine, and blood. Following are quotes from community members, including children, that illustrate some awareness of zoonosis.

Yes of course we do have sickness through this animals we have at home. You can see animal has rashes in it body and we the human beings also get the same sickness, this is a manifestation that you get it your animal. We get infected when we come in contact, with the blood of the animal, if the animal is infected with diseases. It easily transfers to the person through contact. (Child, Makama)

Yes, people do get sickness from such animals because when one touches a sick animal there is every possibly that the sick can be transferred to that person. (Older adult male, Masongbo Limba)

While some informants clearly were aware that animals can transmit illness to humans, their understanding of the concept of zoonosis being a shared illness between the animal and the human was not very clear. Specifically, informants described zoonosis as an animal that is not necessarily sick or harboring a transmissible disease causing *any* illness in a person, rather than an infection or disease that is transmissible from animals to humans.

Few informants referred to the past Ebola epidemic as a source of knowledge about zoonosis.

I can remember last year there was sensitization in the community about the animals that we should not eat like bats, monkeys, as they have the tendency to transmit Ebola. (Young adult male, Kotohun)

I was told at one time that bats transferred Ebola and that I should not eat any food I suspect the bats has eaten or I should not even eat a bat regardless of any circumstance. I was told that rats have Lassa fever which is almost like Ebola if one gets the virus. (Community leader, Matinka)

Specific illnesses that informants said can be transferred from animals to humans included Ebola, coccidiosis (locally known as "*En wukah"*), Lassa fever, rabies, gonorrhea, typhoid, "*dry cough*", and a skin condition with loss of body hair called "*ebreth*;" however, very few informants (usually a health worker, community leader, or livestock farmer) had sufficient knowledge of most of these illnesses beyond the name. Informants mentioned dogs, monkeys, bats, and fowl frequently as the animals and birds that can transfer illnesses to people.

Transmission

In general, almost all the informants had little knowledge about the causes of zoonotic diseases, but some of them had information about how sickness in animals may pass from an animal to a person. Informants described behaviors around human-animal interactions that provide opportunities for illnesses to pass from animals to people.

Using Sick Animals for Food

A common practice that informants across constituencies believed contributes to people acquiring an animal's sickness is the consumption of sick animals.. Animal owners are quick to consume any of their animals that show signs of being unwell, including those that are sick and then die. Informants from Ropolon narrated an incident where many community members got sick after consuming fowl that died during a suspected outbreak of illness among fowl in the community. Other individuals consumed their dead animals regardless of whether they knew the cause of an animal's death or not.

> *We also get fever from these animals because most people eat sick animals even without knowing the type of sickness affecting the animal. Some people upon seeing an animal exhibiting abnormal signs, the next target is kill that animal and eat straightway which is perhaps the root cause of contracting sickness from animals. (Child, Ropolon)*

> *Well now if these animals and one of them happens to become sick and die with that illness, if you eat that animal, you might end up with a serious problem. If that animal had died of a particular illness you might also end up becoming affected with particular sickness. (Community leader, Kanekay)*

> *Some people are using them [sick animals] as food even if the animal dies with a particular disease they will eat it. (Child, Makama)*

> *In this community you will hardly see people throw away dead animals, some will eat or give it to others that want it and they will prepare it and eat it. Even fowl if it dies, they will call the children and give it to them and they will prepare it and eat it. (Older adult female, Gbendembu)*

Although not clearly expressed in the quotation below, some community members may believe that illness or the cause of illness in animals ceases to exist when the animal is killed or dies, and thus, the

meat of the sick animal may be safe to eat. Others, as stated earlier, simply may not know that sickness in animals can be transferred from a dead animal to a person.

> *We have people in these community that eats dead animals without knowing the cause of their deaths. But the problem we have now is that nobody has ever told us that dead animals have sickness in their systems. (Young adult male, Kotohun)*

However, a few informants acknowledged that animal-to-animal transmission of illness is possible when animals consume other animals that died from a sickness, as shown in the quotation below:

> *Some animals …they will go out to eat something harmful like an animal which has died with the virus, that animal went to eat it automatically the animal will be infected with the virus. (Child, Makama)*

Sharing Living Spaces with Animals

Informants across all communities identified shelter arrangements made for animals as a potential way to get an illness from an animal. They noted that animal owners frequently confine their animals in the same areas where they or their children sleep at night to protect the animals from thieves or because they have no space for an animal shelter. This behavior promotes close contact with animals in small spaces and informants considered it a potential way to acquire airborne illness from sick animals.

> *Sometimes the owner sleep with their animals in the same place so there is a chance for this animal to transfer airborne disease to its owner. (Health worker, Stoko)*

> *Another bad thing is that some of these roaming animals will tend to sleep in the same room with people, and some of these animals are quick to pass sickness on people, like the fowl has it sickness call coccidiosis, which is not good for human…some even allow the children to sleep together with the fowls. (Health worker, Kapethe)*

> *Others sleep with them in their houses thereby making it possible to become infected by their animals. (Child, Makama)*

Informants believed that risk of getting sick from an animal is higher from those animals that roam unchecked in the community during the day and then return to their owner's compound for the night.

Co-Mingling of Birds from Different Places

Informants described market and trading practices that promote illness among their bird populations. Sellers of fowl congregate in market places and birds from different locations frequently mix. Informants identified this mingling of birds as a potential way illness spreads among the birds, and then is brought back to other birds in different communities, and as illustrated above, potentially to humans.

> *Another problem is mingling the animal with other animals that have become infected with other animals, like for instance you take some of your animals to the*

market for sale and you mixed up with other animals if those animals you mixed them up with have sickness. So if your animals has come in contact with sick, this animals do not sell so in the evening you have to return them home to join the others you will realized this animals might transferred the sick to the others. (Health worker, Stoko)

Playing with Animals

Informants described play as a way that animals pass on their sickness to other animals and also to people, especially children. Informants described saliva from licks and playful bites and scratches as ways that infective agents pass from animal to animal and from animal to person.

It happens when a dog interacts with another animal by playing together or biting themselves during playing. (Child, Makama)

Meanwhile you the owner will not aware that your animal has become infected with the virus –you started playing with it and then 12 days the signs will start to manifest, so if you the owner is not careful there is a possibility for you to infected be with the virus easily. (Health worker, Stoko)

Dogs can easily transfer disease through their saliva. If they are allowed to stray in the street and return home at night pass a disease to the children by playing with them. (Health worker, Stoko)

Regarding the perception of increased risk of illness transfer to humans from animals that roam unchecked during the day, a few health workers discussed how ducks in the community that are rarely confined contribute to the spread of typhoid.

Typhoid is another sickness mostly pass to people by ducks, because when the ducks drink those dirty water, they will come and put their mouth in dishes, cooking water, spoons, etc. And at the end of the day as long as you contact any of these things, it will negatively result in typhoid. (Health worker, Kapethe)

A few informants mentioned other factors that facilitate the transmission of animal sickness to people, including a lack of bio-protective gear such as aprons, gloves, and boots for those who work with animals (dairy farmers, butchers, slaughter house workers),, and consuming fruits partially eaten by animals.

Myths and Misconceptions

In addition to a general lack of awareness and knowledge, informants (some of whom were community leaders or health providers serving people) had some misconceptions about the transmission of animal sicknesses to humans,. Most of these misconceptions concerned dogs and cats and how they could make one sick, rather than the experience of a shared illness between animals and humans. For instance, some informants spoke of the following: getting gonorrhea from stepping bare-footed on dog

urine; contracting malaria from stepping on the urine of other animals; getting skin rashes from contact with animal urine; and getting 'dry cough' (tuberculosis) from ingesting dog or cat hair.

Vulnerable Groups

Informants discussed the question about groups within the community who have frequent interactions with animals and consequently may be at risk of zoonosis. Some informants felt that just about everyone in the community has some interaction with an animal, so everyone is at risk.

> *Generally, everyone here has to do with animals so I cannot personally pinpoint a particular group that they are the ones that are more interacting with the animals. Young, middle, old, men, women…all of these do interact with the animals. (Community leader, Kanekay)*

Other informants identified specific vulnerable groups of people such as hunters who kill and handle bushmeat, cattle rearers including Fullahs, the Limba and Mandingo ethnic groups who have contact with their animals on a daily basis, farmers in contact with roaming animals on their farms, livestock traders, children who have responsibility for animals and frequently play with animals, butchers and workers at slaughter houses, and consumers of slaughtered meat.

> *The dogs also causes problem like biting people especially children, at one time a child has to be taken in Freetown for injection after a dog bite him and each injection cost one hundred and fifty thousand Leones. (Older adult female, Gbendembu)*

> *The children also they like playing with dogs. (Child, Masongbo Limba)*

Sick Behaviors in Animals and People

Informants responded to a discussion question about how a person might know that an animal is sick or that they may have contracted a sickness from an animal. Overall, informants across communities had difficulty providing detailed responses to this question.

Sickness in Animals

Regarding recognizing sickness in their animals, informants stated that goats in particular experience changes in appetite, weight, appearance of their feces, defecation habits, and energy level.

> *Like for the goat, they will mess up themselves with their toilets, if you give them food to eat, they won't, they will be lying down in one place whole of the day. (Health worker, Kapethe)*

Other symptoms of ill health in animals included weakness, coughing, skin rashes, wet and dripping nostrils, and salivation.

Sickness in People

Regarding people getting the same sicknesses that animals have, informants were not clear about factors or symptoms that would suggest their sickness was from a sick animal they had contact with.

Several informants stated, "*I can't tell,'* "*I don't know,*" and "*only the hospital can tell.*" Several informants stated people cannot know if their illness passed to them from an animal without testing at a hospital and a health worker confirming so.

> *Except if you go to the hospital and you will be tested but you will not be able to know if you do not go to the hospital. (Older adult female, Kagbo)*

The majority of informants provided little information about symptoms associated with zoonosis; however, some mentioned general symptoms of ill health including skin rashes, loss of body hair, and diarrhea. A few informants also stated that when a person acquires a sickness that is also in an animal, they have symptoms similar to those of the sick animal. Informants associated these perceptions specifically with rabies, and with past experiences they witnessed or heard about.

> *What we know here is that, whenever a human being receive any sickness from an animal that human being will end up behaving like that animal. Apart from that, that human being will also exhibit noticeable signs like loss of appetite, doing unusual things, and the rest. (Community leader, Kanekay)*

In the case of sicknesses communicated from dogs, several informants stated that the symptoms of rabies in humans would be "*the person will behave like the dog*" with barking, growling, foaming at the mouth, refusing water, and crawling on the ground.

Rabies

Knowledge

Informants discussed their knowledge of rabies disease in terms of what the sickness was called locally, what caused it, how it was transmitted, symptoms of rabies infection in dogs and people, and how to protect oneself and animals from getting rabies.

Awareness of Rabies

Overall, the OM survey showed a high awareness of rabies at 79%. In the FGD data, many informants demonstrated their awareness of rabies by referring to it by its common local names "*En tin en penk*" or "*craze dog*," confirmed a high rate of awareness, Fewer female informants than male had awareness of rabies and when asked about it, responded that "*We do not know anything about this sickness,*" "*We have never seen someone with that sickness with our eyes,*" and, "*For me today is the first day to hear this kind of sickness*." Per OM data, 28% of female participants were unaware of rabies compared to 15% of male participants. A few health worker informants referred to rabies as "*ebreth*," which is described as a skin disease with rashes and body hair loss.

Heath worker informants stated they are "aware about the fact that rabies is very bad and it kills." However, they expressed varied viewpoints regarding what rabies is, and a child informant aptly summed it up as:

This is the type of sickness we do not have better understanding but we have the idea that it is a killer diseases. (Child, Makama)

Informants linked madness and rabies in descriptions of rabies. A child informant from Makama believed that "*mad dogs are carriers of rabies,*" and a health worker from Kapethe believed that rabies is "*caused by a mad dog biting someone.*" Another health worker characterized rabies as "*this is when a dog bites someone and that person end up being crazy just like the dog,*" and a child informant from Ropolon described rabies as "*a sickness that we get from mentally retarded dogs.*" In most descriptions about rabies, informants made links between dogs, dog bites, and madness, as shown below.

We believe that mad dogs are carriers of rabies. If they bite somebody the person can easily be infected by rabies and he sometimes bark like a dog. (Child, Makama)

Only one informant, a community leader from Kanekay, directly characterized rabies as a sickness that affects the brains of dogs.

It is a type sickness that do affect dogs. I really do not know where dogs get it from but whenever a dog becomes infected with it, its brain ceases to be normal and if it bites any human being, the person will also become infected with rabies. (Community leader, Kanekay)

The above information shows that we can characterize rabies awareness as variable among the study population. The OM survey data shows that while overall there was high awareness of rabies, almost all participants from Constituency 31 (95%) were aware of rabies compared to 68% and 67% in Constituencies 35 and 37/38, respectively. While most descriptions of rabies were in the context of dogs, a few informants mentioned that rabies also exists in fowls, bats, sheep, goats, and monkeys. The findings from the OM survey data were similar in that 75% of participants cited dogs as the main animal that can transmit rabies, followed by bats (38%), monkeys (38%), cats (28%), bush rats (21%), rats (20%), goats (20%), cows (13%), and chickens (12%). Less than 10% of participants believed squirrels or pigs can transmit rabies.

Perceived Causes

Although some informants reported being aware of rabies in the community, many stated they do not know what specifically causes it, and they had varied thoughts about causation. A few informants believed that "*any dog who is mentally sick has rabies,*" making a connection between a key symptom of rabies and neurological functioning of the animal. However, informants frequently attributed causes of rabies to factors that predispose animals to becoming infected with rabies rather than a virus. These factors included poor care given to animals by their owners (in this case allowing animals to roam freely in the community), and a lack of preventive monitoring over time by veterinarians.

I believe that when a dog is not taken care properly it can develop rabies because it can interact with other animals in the community that may possibly have the sick. (Child, Ropolon)

Well I think a dog can develop rabies if the owner fail to call a veterinary worker to monitor the dog's behavior over time. (Child, Ropolon)

If you do not take care of your dog it will get rabies and the dog will bring the rabies in the house. (Older adult female, Kagbo)

Other ways informants perceived dogs got rabies was from eating dead or sick animals they find in the bush, or "*all sort of food*" when it is allowed to roam freely and has to scavenge for food.

OM survey data showed that 39% of participants reported they know that a virus causes rabies in humans. This was higher than expected from the responses in the FGDs; however, more than a third (34%) reported they do not know what causes rabies, 15% thought the cause is germs and rubbish, 7% thought rabies has spiritual origins, and a few others (<5%) believed it originates from feces and urine, or is inherited.

Transmission

Some informants had correct knowledge that rabies can be transmitted between dogs and people, and that a prime mechanism of transmission is through a bite from an infected animal or from coming in contact with the saliva of an infected dog.

I heard that dogs can transfer rabies to people. (Older adult female, Kagbo)

The only thing that I know about rabies is, we [humans] get it from dogs. (Older adult female, Kagbo)

If a rabies dog has bite someone, if that person is your relative you should not touch because that person will behave the same as the dog and if you the relative don't be careful, he or she bite you then automatically you will get infected. (Health worker, Stoko)

This was supported by the OM survey where participants reported that rabies is transmitted through the bite of a rabid animal (77%), scratch of a rabid animal (52%), contact with saliva (53%), eating or touching meat from a rabid animal (30%), and touching the brain of a rabid animal (15.2%). A few participants (13%) also believed that touching or petting a sick animal can cause rabies infection.

Informants did not always make a distinction between dogs that are sick and all dogs, and frequently implied that rabies is inherent in all dogs regardless of the state of their health. On the other hand, some informants had incorrect knowledge about rabies and believed that some animals, such as the cat, are born with rabies, while the dog has the rabies virus in its teeth. Consequently, cats always have rabies within them and a person is guaranteed to get infected when they are scratched or bitten by any cat or dog.

As for the cat, rabies was born with it and the sooner the cat scratch or bites you then you are confirming to have the virus. (Health worker, Stoko)

The rabies virus is already found in the teeth of a mad dog, when it bites a person then it pass the sickness to that individual. (Health worker, Kapethe)

Symptoms

Informants described many symptoms that they believe are indicative of rabies infection in animals and in people. These symptoms included changes to the usual appearance and usual behaviors of the sick animal or individual.

Rabies in Animals

Informants characterized animals with rabies as '*weak,*' '*surrounded by house flies,*' having a "*meaningless appetite*" with a preference to eat grass, suffering "*body weight drop,*" and having an "*always open mouth*" with its tongue hanging out. Rabid animals were also lazy, "*sleeping around too much,*" and had changes to their skin, hair, and eye color. The following illustrations describe more symptoms attributed to animals that have rabies.

Defecating or urinating frequently, losing its hair, losing weight or appetite. (Community leader, Matinka)

Seeing a dog with its condition has change like have rash and sore all over it body that is another sign of rabies. (Older adult female, Gbendembu)

Sometimes when you see saliva running from the mouth or nose of the dog it is a sign that the dog is sick or have traces of rabies. (Young adult male, Kotohun)

Informants described a commonly observed behavioral change in the temperament of animals with rabies, stating that they "*lacked fear,*" are "*angry*" and aggressive, and often attack strangers and people they are familiar with, including their owners, without provocation.

Animals that have been infected by the rabies virus will bite anyone who comes their way even the person hasn't done anything to them and the moment this animal bites you, then you have become infected with the rabies virus. (Young adult male, Manjoro)

When a dog has gone out of control like he is mentally sick, he will see someone and bite that person. (Health worker, Stoko)

If the dog has rabies, it will be passing everywhere looking for another dog to bite or a person to bite, if it is coming your direction, even if you take a stone, it will come straight to you and bite you. (Health worker, Kapethe)

While these behaviors are in contrast to a lazy, sleepy dog described earlier, they are similar to behaviors reported by participants in the OM survey. Specifically, the majority believed rabid dogs are aggressive (68%), however other nondescript behaviors mentioned include that a rabid dog does not act normal (62%) and behaves like it is sick (53%). Such dogs also foam at the mouth and salivate excessively

(36%), and do not eat (17%). Other reasons that people concluded a dog has rabies were if it were not vaccinated against rabies (16%), or it had been bitten by another animal (8%). Very few participants in the OM survey mentioned a fear of water or refusal to drink as a symptom of rabies. However, 15% did not know of any symptoms for rabies in dogs.

Rabies in People

Informants also described the symptoms of rabies in people. A common descriptor across all informant groups was that "*if someone has been bitten by a dog, the person will behave like the dog.*" Almost all informants mentioned that people with rabies bark like a dog, salivate, and develop skin rashes and sores just like dogs. The following quotations describe rabies in people:

> *The person's condition or looks will change, when the poison overcomes the person,* [they] *will bark like a dog and sometimes even began acting like dog, wanting to bite another people. (Health worker, Kapethe)*

> *Usually, when animals like dogs are infected with rabies…they will become very much aggressive, they will bite someone even though the person didn't go their way. Once this happens, then it a signal for rabies. Again the human being will behave the same way if this animal happens to bite him/her. (Young adult male, Manjoro)*

> *Like for the dog, when it bite you or the sign that shows you are bitten by a* [rabid] *dog is that, you will start behaving like a dog, you will be wild and want to bit somebody too, such signs shows you are bitten by a mad dog (Older adult male, Binkolo)*

> *When somebody is bitten by a dog that person ended up barking like a dog when in hospital or at home before dying. This to me is a sign that the person gets that sick from the dog. (Young adult male, Kotohun)*

Perception of Risk

In this section, we summarize the results related to perceived level of concern for rabies among community members. Perceptions of risk of rabies were mixed but largely appeared to be linked to knowledge of, and experiences with, rabies. Fifty-three percent of participants in the OM survey reported they are very concerned about rabies and another 29% are somewhat concerned. The FGDs also showed varied levels of concern; awareness and knowledge of rabies or experiences with dog bites and sick animals influenced the level of concern and perception of risk.

Some informants perceived rabies to be of little concern to members of their community because they "*do not eat dogs, cats, and bats*" and "*do not even have rabies in our community*." Lack of awareness of rabies influenced both low and high concern for rabies. Some informants linked a lack of awareness of rabies to low levels of concern. For instance, informants stated:

It is not that much heavy here….Well that is just something we don't naturally attached much importance to since the level of awareness is not that strong. (Older adult female, Kagbo)

Talking of people getting sick through animals is something our people don't have that type of awareness and concern. It will be good for them to be aware so that they will know how to keep themselves safe. (Community leader, Kanekay)

In addition, lack of awareness about rabies also generated high concern among informants who perceived that community members lack information about the issue that can help prevent them from getting rabies from their animals.

We are concerned because we understand that most of the sickness we get is from the animals we rear in the community, but most people do not know of it because there is no awareness in the community on how to care about the animals we rear. (Community leader, Matinka)

Talking of people getting sick through animals is something our people need but don't have that type of awareness and it will be good for them to be aware so that they will know how to keep themselves safe. (Community leader, Kanekay)

Some informants who did not believe there were cases of rabies in their communities at the time of the discussion still had some awareness and knowledge of rabies and knew it should be prevented from emerging in their community. An informant stated that although rabies is currently not an issue in their community, the community members are alert and have implemented actions to ensure rabies does not become a problem in their community.

Yes it is a problem, but it is not rampant in this community, because we are doing our best for this not to happen. The sooner we realized that there is a stray dog we kill them immediately. (Child, Makama)

Among a few informants with little or no knowledge of rabies, the fact that there is an interest in the topic raised their level of concern, as shown in the quotation below.

Before, we were told about HIV/AIDS, it happens. The next thing we were told about the Ebola, we saw it with our eyes. What else the white people will tell us that will not happen? (Older adult female, Kagbo)

Other informants also reported a high level of concern for rabies in their communities. Informants stated, "*the whole village have concern,*" "*everyone has concern and want to know,*" and "*yes, it is a big problem for us the people who live here.*" The high level of concern regarding transmission of rabies has influenced some acts of violence against dogs that are perceived to be carriers of, or at risk of, rabies and a threat to others in the community. As such, some people quickly dispose of dogs that are perceived to be strays, sick, or without owners in brutal ways.

When we see such [stray] animals, especially the dogs, alarm is raised by galvanizing the youth to kill that dog immediately to prevent it causing problem in the community. (Younger adult male, Kotohun)

Just to buttress to what my colleagues said, all dogs or animals that have no owners should be killed at once so that they will not possibly transmit the virus to other animals. (Child, Ropolon)

This last quotation shows that a belief that rabies may be present in all stray and roaming dogs amplifies the perception of risk. The OM survey provides some supports for this belief and shows that 31% of participants reported that all stray dogs had rabies. This belief implies that an animal, especially the dog, does not have to attack anyone to be considered a risk, and it can be killed. The motivation for killing dogs appears to stem from a desire to protect the larger community from sickness and the costs and problems associated with it. Decisions and actions to remove animals with suspected rabies are implemented swiftly, and informants used phrases like "*we kill them straightaway,*" "*there is no compromise,*" and "*we kill him [the dog] immediately*." An example of rationalization of these attitudes and behaviors from a community leader follows:

Without asking questions I will kill that animal at once because I do not want that animal to transfer the sickness to people in the community. The treatment for rabies is expensive and sometimes the treatment can only be done in Freetown. We have people here that cannot even afford transport to go to Freetown let alone pay for the drugs, therefore killing the animal will be the best solution for me. (Community leader, Matinka)

My brother, the only way to handle a dog with rabies is to kill the dog instance [instantly]… we have many vulnerable people in the community like children, pregnant women, and disabled that are prone to get sickness if they are bitten by a rabies dog. To me, killing the animal will be the best solution. (Older adult male, Masongbo Limba)

One informant from Manjoro did state that there is a '*harsh law*' that stops spontaneous killing of animals in their community, but this statement was in reference to other animals such as cows, fowl, sheep, and goats destroying property. The results show that community responses to stray dogs often are different from those given to other animals.

An important insight from informants pertained to risk-taking in spite of knowledge regarding potential consequences. Some informants related that some individuals are aware of what they should and should not do to prevent getting rabies and other illnesses from animals, but make conscious decisions not to implement that knowledge. The quotation below illustrates this point.

No matter the condition of the animal, people will always have the courage to eat that animal, even the animals emit signs or has what we call "reggeh" [skin rash], people will always have the courage to eat that animal no matter the consequence afterwards, but they will not throw it or bury it but rather we will eat that animal. (Community leader, Kanekay)

Informants also perceived that with time, individuals resume old behaviors and customs that they were taught are risky, including reverting to consuming bushmeat, as shown below:

During the Ebola, we were told that we should not eat bush animals, but after the Ebola many people have forgotten … some are saying that they have been eating bushmeat for a long time now, so why is it that only this time bushmeat becomes a problem. (Older adult female, Kagbo)

Reporting

Informants stated that community members usually report sick livestock animals to the AHW. They do so in order to get treatment for sick animals, to prevent the spread of illnesses to other animals in the flock, and to thus protect their source of livelihood. Reporting often means a need for animal health services that usually involve a fee, which some community members noted earlier is sometimes a barrier to consistent reporting behaviors.

Well, like for me, because I rear goats, so whenever we take notice of an outbreak, I call him [veterinary officer] to come and he will come and observe them and sometimes find the one having the sick and advice to remove it for that moment and keep it separate for observation. And now if you are able to pay him, he will treat that one animal so that the others will not get infected. We always adhere to his advices and all has been working well for our animals. (Older adult male, Binkolo)

When it comes to animals like goats, and other animals, we will have to call the veterinary officers to give them injection which we will have pay them five thousand Leones for each animal. (Younger adult female, Karena)

Mostly when such thing happened, the first place or person they will go to is the health worker or health center for advice or treatment. (Health worker, Kapethe)

On the other hand, an important information gap was evident among some informants who mentioned they do not know who to report to or where to report animal bites.

We don't know where to report and secondly there is no office for rabies in the area, which prevents us from reporting cases of dog bite. (Older adult male, Masongbo Limba)

The OM survey showed that knowledge of reporting channels is generally low and it is not clear among informants what information should be reported to whom. Fifty-six percent of participants in the OM believed that people should report an animal bite or scratch to a CHW (for humans), 50% thought they should report it to a facility-based health worker (for humans), and 33% believed they should report it to the AHW. The lower rate for AHW may reflect the fact they are not routinely present in the communities.

Reporting of suspected rabid or sick dogs that had not attacked anyone was not common in communities sampled. For these cases, people often encourage young boys within the community to chase and kill the sick dog. In the case of dog bites, informants stated the most common course of action is to immediately report these to the health care facility.

> *If there is any bite in this area, the first thing to do is to go to the hospital. It is not a matter of delay. We do not have anything that is preventing us, even if it is a snakebite we report it. We have a center here so if a dog or snake bites you and you just apply salt, then you should be ready to die. (Older adult female, Kagbo)*

> *We have by-laws in the community if you are sick and you fail to report to the center you will pay a fine to the chief. Except if the hospitals have tried their best then you can go to the traditional healers. (Child, Makama)*

Some informants stated that by-laws instituted in their community regarding sick animals motivate community members to report such animals. Nevertheless, the OM survey showed that there was very little reporting of sick animals to appropriate animal health authorities. A total of 28% of participants stated they would report a sick animal to its owner, 21% would inform the community leader, 18% would report to a CHW (for humans), and only 13% stated they would report a sick animal to an AHW.

Informants discussed barriers to reporting sick animals and animal bites, and they identified money and relationships as two main reasons why community members may decide not to report a case of animal sickness or bites. A community leader noted the important influence of money in stating that "*poverty is the underlining factor of not reporting animal bites.*"

> *There is this negative perception that if they report instances of animal bites, they will end up having problems from the animal workers. That, they, if they report, they will ask them to pay some money in order to provide treatment and because of this, they become afraid to report. (Community leader, Kanekay)*

> *Some think that you will have to pay the livestock offices when they come and treat your animal; they don't know you will just have to compensate them for coming from a far distance to treat the animal because most times they will have to moving around so may be the time someone here would need, they may have gone to another location. (Community leader, Kanekay)*

In addition to believing they will have to pay AHWs for the animal health care services rendered, community members do not report sick animals because of costs associated with paying for the transportation of the AHW to and from their community.

> *Transportation is an impediment restraining people from reporting for animal bites in the community. We have people here that cannot afford the transport to pay from the community to Makeni hospital, which is really a stumbling block for them. (Young adult male, Kotohun)*

In fact, some informants made it clear they perceived that eliminating transportation costs by providing communities with resident AHWs might increase the current level of reporting.

> *Well, if a community member is given training on animal health and the person returns to the community, we are confident of reporting any case of dog bites because it will not involve transportation cost. (Young adult male, Kotohun)*

Informants discussed other barriers that prevent informants from reporting risky encounters with animals to medical staff at the hospitals such as the cost of the drugs to treat animals and the person needing medical attention. In fact, informants cited these factors as possible reasons why community members opt first to use traditional medicine practitioners and home remedies before seeking care from health facility staff. In addition, because of the perceived costs of health facility care, informants stated that community members prefer to "*sit and wait to see what will happen"* before going to the health facility for care, and this often results in delayed medical services and poor outcomes.

> *The cost of the vaccines to treat dog bites is expensive in a way that people revert to the use of traditional herbs, which they perceived cheap and accessible within the community despite the health implications associated with these herbs. (Older adult male, Masongbo Limba).*

> *Some people, it is because of poverty, they don't have money to go to the hospital, thinking of they are going to ask you to pay enough money, you will then prefer use salt and endure the pain or whatever aftereffect. (Older adult male, Binkolo)*

> *Here, when a dog bite somebody we do not go to the hospital because the cost of the drugs or treatment is expensive and most people here cannot afford the money. Therefore, we revert to our traditional ways to cure the bite, which is cheap by using salt and lime to put in the affected area. (Community leader, Matinka)*

OM data show that most community members know when they should report a bite; 92% of participants responded that people should report bites immediately or within a one-day period. Nevertheless, the FGD showed that people do not always practice this because of expenses to get to, and receive care from, the AHW or the health facility.

A second barrier to reporting was community relationships. Matters relating to animals also are often reported to village chiefs. This usually happens when the owner of an animal is not forthcoming in assisting the bite victim to get medical assistance. Community members believe in the peaceful settlement of disputes and the village chiefs are often mediators of issues between the owner of a dog that bites a person and the victim of the dog bite. Reporting dog bites, which may inadvertently bring repercussions to the owner of the dog, was not in tune with this community practice.

> *Whenever there is a problem in the community that has to do with the animals, the chief is always there to step in and sees that it is resolved because there have been tensions in this community, and even with the neighboring communities, that have to do with animals which the different chiefs have come together and resolved. We are very much thankful for that, for having such authorities here with us that oversees such problems. (Young adult female, Karena)*

> *Most of the animals in the area are owned by neighbors and relatives, therefore in the event a dog bites somebody, the chief can intervene and settlement the issues in a peaceful manner. (Older adult male, Masongbo Limba)*

Maintaining neighborly relationships is important to community members, and informants cited this as a possible barrier to reporting dog bites within some communities.

> *In this community we have family ties such that when cases of dog bites occurs, we try hard to find resolutions. In most cases the chiefs are involved in ensuring that cases are amicably settled at community level for a peaceful coexistence. The community is small; therefore everybody is a neighbor and reporting becomes a problem. (Community leader, Matinka)*

A third barrier to reporting was location of communities. Informants mentioned that some communities are in remote areas that are difficult to locate, where it is difficult to access health facilities, or that have poor phone connectivity, all of which impede their ability to report a sick animal, a bite, or an illness to the health facility serving their community.

> *Some people are living in places where there is no network or where the network is difficult to access, so those people will find it difficult to report when their animals become sick. (Young adult female, Karena)*

> *Some people are living in far areas, especially those in the "worehs." There are some "worehs" you cannot find close to this place, so when something happens there, it will be very difficult for those people to report because of the distance, and even if they report, the veterinary officers will find it very difficult to trace those places. (Young adult female, Karena)*

Experiences

OM data shows that the majority of participants engage in behaviors that put them at risk of zoonosis. Specifically, 71% ate bushmeat in the last 12 months, 52% prepared bushmeat, 21% killed and ate a sick animal, 16% ate dog meat, 15% handled a sick animal, 12% hunted bushmeat, and 10% reported being scratched or bitten by their pet animal. Seventy-three percent of the participants who reported risk incidents also stated they sought care at the health facility, and 61% went to a CHW.

The case stories that informants described are consistent with their knowledge of rabies. In general, informants felt that all dog bites can lead to rabies. Some informants believed that a dog usually bites a person if it is a "mad" or rabid dog. Informants believed if they go to a health facility, they can be treated and cured of rabies. They relayed instances where people were taken to the hospital after an animal bite and died because they weren't given the correct treatment or because they did not receive, the required medical care quickly at the health facility.

> *My daughter was bitten by a dog and at the hospital there was no proper treatment given to the child and she ended up dying. (Young adult male, Kotohun)*

> *One of my relative was bitten by a mad dog; the man was affected because there were no drugs in the health centers. The man died so we are appealing to health authorities to provide drugs for us in these health centers. (Child, Makama)*

Generally, some informants seemed unaware that rabies requires prompt treatment and that there is no cure for rabies when it goes untreated and advances to a particular stage. Among OM participants who experienced an animal bite or scratch in the last 12 months, 73% went to the health facility, 67% reported that they self-treated their bite wounds with 'spirit' (alcohol, antiseptic) in lieu of going immediately to the health facility, 47% washed the wound only, and 45% reported it to the AHW. Of note, none of these participants from Constituencies 34 and 37/38 stated that they reported their injury or the animal to the AHW.

Some informant experiences included delays in seeking medical care following bites. These delays were due to having to transport victims of bites to neighboring towns for treatment, or opting to try traditional medicine approaches first because they could not afford the costs at the health facility. Informants stated that after a bite, individuals often would first try a traditional remedy and they would seek orthodox medical care only when traditional treatment failed. At this point it was usually too late and the victim would die from their injuries. The following quotations describe delays in seeking treatment.

> *The woman was a relative to me and she and son was bitten by a mad dog …. What they do, they used traditional herbs to cure them, but the situation becomes worse and the child was taken to the hospital so he could survive. Because during that period the treatment was not in Makeni so the child could not survive with the rabies.*

And the mother was rush up to Freetown to seek treatment, and she was able to survive. (Child, Makama)

The moment the dog bites him they should have taken him to the hospital, but what they first did was that, they first tried the local ways by providing him with local medicines until such a time when they saw that that will not really help him before ever they resolved taking him to the hospital. (Community leader, Kanekay)

Informants also felt that the health facilities serving their communities are not always equipped to manage animal bites. One informant relayed an experience in which a woman with a scratch from a cat had to be taken to several different health facilities seeking the appropriate care. She eventually died.

There was an old woman in the community that got a scratch from a cat and that old woman was taken to different hospitals for treatment but she died even when the family made efforts to provide all the medications to cure her. The problem we have is there, is that there is no hospital or clinic to treat such people in the community. (Community leader, Matinka)

One of my relative was beaten by a mad dog; the man was affected because there were no drugs in the health centers. The man died so we are appealing to health authorities to provide drugs for us in these health centers. (Child, Makama)

He was not the only person, the same thing happens to another woman, by the time they rush with her in Makeni she died. About six of them now has died of rabies in this town Kapethe, and all of them died at the hospital, because I always refer them as I don't have drugs or injections here for that. So because of these incident, I have to announce to the community that we should kill all dogs immediately or people will continue to die of rabies, so we kill all the dogs, even my dogs were all killed. (Health worker, Kapethe)

Informants also felt that when bite victims succumb to rabies, it is because the "*poison had overcome them."* This is consistent with poor knowledge of the cause of rabies discussed earlier.

Actually it happened in Kamakwie. There was a time when a craze dog bit one small boy and this actually happened in front of my eyes. When this happened we tried very hard and took him to the hospital but at that time, the poison had already overcome him so we tried very hard but we couldn't save the situation, he eventually died. Actually before he was behaving like a dog and we were advised automatically not to allow him bite another human being or else the poison will transfer from one person to another. It came to a point that whosoever wants to hold him, he will attempt to bite the person. This is something I saw with my own eyes. However, the person didn't survive, he died after the poison had overcome him. (Community leader, Kanekay)

When the incident happened, they took the old woman to the hospital and brought her back home, but I think the poison had already overcome her during that time so she couldn't survive. (Young adult female, Karena)

A driver was once bitten by a mad dog – because he was not treated on time he died of poison. (Child, Makama)

In general, informants had many stories to tell related to animal bites and rabies. Some of the stories were personal and involved their family, and many were from incidents that occurred in their own or neighboring communities. The stories that informants relayed are consistent with their knowledge, beliefs, attitudes, and perceptions about rabies.

Animal Health Workers

Animal health workers are referred to as community animal health officers, livestock officers, or more frequently, veterinary officers. Many informants knew about the AHWs within their communities, but others stated that there are no AHWs in their community. In such cases, they had to rely on AHWs from other towns like Makeni City for animal health services. Unfortunately, AHWs coming from Makeni took a significant amount of time to get to their town, and many times did not arrive quickly enough to administer necessary interventions to save the sick animals.

In this community, there are people here who use to advise us when it comes to the care of the animals. These are the people who have been trained recently and most times we use to call them when there is a problem with the animals. (Young adult female, Karena)

The veterinary workers are based in Makeni and by time the health workers come and treat these animals many gets die because it takes time for them to come, citing logistical reasons. (Young adult male, Kotohun)

Some informants mentioned that animal services in communities had changed. They said that, in years past, AHWs were located in or made regular visits to communities to assess animals and provide services. They did not have to be contacted or paid to come to the community when there was a need and they were given tokens of appreciation for their services by community members. Informants stated that, currently, many communities do not have resident AHWs and that AHWs do not make visits to communities unless they are called regarding a specific case that needs their services.

Before, we use to have the health workers for the animals who were coming here to treat the animals and offer pieces of advice on how to take care of the animals and we pay them small amount, but they are not coming again. (Older adult female, Kagbo)

Veterinary health workers used to visit this community to educate us on how to take care our animals, sometimes they even affect the sick ones, but that is a thing of the past, they no longer come here. (Child, Makama)

I called a veterinary worker to come in the community to treat my goat who was sick. But to be sincere, he only came here upon invitation, otherwise you hardly see them around. (Community leader, Matinka)

In general, informants had favorable and positive perceptions of AHWs. For many informants, rearing animals is their main source of livelihood, so they perceived that these individuals render an important service by taking care of their animals. Informants were lavish in their praise of, and appreciation for, AHWs.

They are trained personnel who have the knowledge of treating sick animals. They have demonstrated that in the community and we saw the animals they treated got cured and I am really impressed with their work. (Community leader, Matinka)

We use to praise them for the good work they are doing. We use to say ''this people know their work very well because they are providing treatment for our animals and they are getting well," so they know their work. We use to praise them. (Young adult female, Karena)

Informants described several responsibilities of AHWs. They considered AHWs important sources of credible information about caring for animals and about prevention and treatment of illness in animals. In addition to caring for sick animals, informants stated that AHWs provide advice to animal owners about how to care for both well and sick animals as well as castrated dogs, and how to put dogs down humanely, when necessary. They also encourage reporting of illness in animals, instruct on emergency actions that can prevent outbreaks, and provide animal owners information about the laws and legislation related to the care of animals. The quotations below summarize informant perceptions about the different services that AHWs provide.

They are responsible to look over the animals in the communities and ensure they are treated so that these animals cannot possibly transfer any sickness they have to other animals or human beings. They treat animals such as dogs, sheep, and goats in the community. When they suspect a particular animal is sick, they separate them from the rest of the other animals until proper treatment is given to the affected animals. They usually advise the community strictly that if an animal continue to show the same symptoms, he must be called upon, instead of the owner taking the advantage to kill that animal and use as food. [They] give injection vaccines to dogs that are perceived to have rabies to prevent them from transferring the sick virus to other animals or possibly to human beings through bites. They also treat animals like goats,

fowls, and sheep that are suspected of having sickness to ensure they get the appropriate treatment for their survival. (Child, Ropolon)

The other job that they do is that, they will walk from section to section and try to give laws on what has been the laid down laws on the side of government. They will emphasize on what to do and what not to do when it comes to the care of the animals, which they say if one violates the law, will take…will take its course. They use to go all over this area telling people what to do when it comes to the care of animals. (Young adult male, Manjoro)

Informants discussed challenges that AHWs and animal owners who need services from an AHW face. Informants noted that reaching remote villages such as 'worehs' is a challenge for AHWs and makes their work more difficult. Furthermore, informants were mindful of the fact that community members' non-compliance with directives or refusal to value the roles of AHWs can make the work of AHWs more difficult.

One thing I know that makes their work difficult is when people fail to adhere to what they tell them. The other thing again is reaching those people who are living far away in the 'worehs' who are very difficult to reach. (Young adult female, Karena)

They will also find it difficult to carry out their work if we refuse to receive them and values their role. (Young adult male, Manjoro)

Informants perceived that animal health services were expensive and beyond the means of many community members. They stated that one often has to pay the transportation costs (to and from) for an AHW to come to a community when they are needed to assess and attend to sick animals or ones that are bitten by other animals.

One of the difficulties they face is the mobility to move about in performing their functions. I spoke with one veterinary worker who told me categorically that his office doesn't provide vehicles or motorbikes for them so that when there is emergency they can move swiftly to respond. (Child, Ropolon)

Many people that could not afford will lose a lot of animals during outbreak, like an outbreak in a village called Makari, over hundred to hundred and fifty goats all died, we actually went and tell them to call a veterinary officer, but there was no one to afford money to do that. (Health worker, Kapethe)

The veterinary workers that are supposed to provide the services to us normally ask for money before administering treatment and this is a major concern in the community as most people cannot afford the amount requested to pay for such services. (Child, Ropolon)

Overall, informants value the services of AHWs, and consider them to be sources of both valuable information and animal health services. Informants knew a good deal about the role of AHWs even though they stated they rarely see AHWs unless there is an issue that needs their attention, and they provide the means for an AHW to come to their aid. Informants credited AHWs with curing their sick animals. The data characterizes them as a trusted and credible source of information on animal care and health.

Community Needs

Informants discussed what they believe communities need to protect themselves from zoonotic diseases, including rabies, and generally to improve animal care practices in their communities. The main needs that informants identified included medicines and vaccines, trained and accessible AHWs, community education and information, community-based services, and regulations for animal care.

Medicines and Vaccines

All communities and informant discussion groups frequently cited the need for medicines and vaccines to prevent, as well as treat, sickness in animals. Informants perceived that medicines are vital to protect their livelihood and prevent loss of income from animals, and also to prevent the spread of diseases among, and from, animals. Informants noted that when there are no medical supplies such as drugs for treatment, AHWs cannot effectively do what people expect of them.

> *As far as we are concern, these animals are sources of income for us and we do not want to see a situation wherein they die because of lack of drugs or for not getting a qualify person in the community to treat them. This is how our cows, sheep, and goats in the community die, because there is no qualify person to treat them in the event they are sick. (Young adult male, Kotohun)*

> *Even the goat and the sheep we need medication for them, like they have select one guy in the community that should be treating the animals but if does not have the medication, how can he do it? (Older adult female, Gbendembu)*

The above quotations illustrate the need for medicines not only for dogs and dog bite victims, but also to maintain the health of, and treat, other animals raised in the communities to generate income.

Trained and Accessible AHWs

Informants also perceived a dire need for more AHWs in communities, more training for AHWs and cadres of support workers, and having such workers accessible in times of urgent need.

> *Now we know that the sickness is from animals, but if we have people who will be treating these animals so that they will not be able to transfer this sickness to the people, it will be fine. (Older adult female, Kagbo)*

Many informants suggested that community members could be trained to care for animals to ensure their availability in the community when they are needed, thus facilitating prompt care.

> *Two or three people should be taken for training so that at that end of the day they can come back in the community to render assistant to victims of animal bites. Once a community member is trained the issue of transportation is reduced and confident is built within the community to report cases as quick as possible. (Young adult male, Kotohun)*

> *I want government to take people within the community and train them so that they can come back to the community and serve us diligently. (Community leader, Matinka)*

> *We actually want to see a situation wherein community members are trained on how to treat animals so that they can come home and share their knowledge on how to handle our animals when they get sick. (Young adult male, Kotohun)*

Community-based Services

Some informants stated communities need regular visits from AHWs to perform animal assessments and checks, give advice, and provide education and information services. Informants described a previous program in which AHWs visited communities regularly to provide education and animal health services, and suggested that program should be reinstated. They perceived the program as a good opportunity to promote needed preventive health services for animals.

> *I will recommend that veterinary worker visit our communities frequently to inject their dogs. In the past years veterinary move from community to community to treat and castrate them but this has stopped. (Child, Makama)*

> *I think we need to invite professionals who really know how to care for animals who can help us in caring for the animals, it could be on a monthly basis, or by weekly. We should not wait for them to become sick, rather to prevent them from becoming sick. (Community leader, Kanekay).*

> *We have never had the opportunity to get animal health workers coming to our community to sensitize us on rabies. If government send them in the community we shall be very appreciative in the sense they can teach us the preventive measure or places to report if there is a dog bite (Older adult male, Masongbo Limba)*

One informant, however, pointed out the need for community services to extend beyond the main towns to people who live further away in the 'worehs.' A comprehensive program should include all vulnerable groups and that includes the cattle rearers who live in remote locations.

The other thing again is that, there should people who will be there to meet those people who are living in the far 'worehs' who are very difficult to meet here in the village so that they also can receive this message in full because if we only receive this message in the town and those in the 'worehs' do not receive it, then we will still be at risk. (Young adult female, Karena)

Education and Information

Informants described many education needs for community members. They perceived that animal owners and the community at large need information about basic, routine animal care, as well as how to prevent illness, what actions to take when there is a sick animal, and how to report cases of suspected zoonosis. They also had a strong preference for using professionals and AHWs to conduct education and training sessions on animal health.

We need veterinary people who are specialized in this area to come and sensitize us about the sicknesses these animals carries and how we should go about to prevent ourselves from been victims in the long and short term. (Child, Ropolon)

The health worker or the veterinary workers should go out like an outreach to these communities to treat and do sensitization on taking care of animals. If the animal needs to be castrated you do it. There should be a vehicle for that exercise especially on Saturday, that will be the best to do. (Health worker, Stoko)

Finally, some informants cited the need for education designed specifically to increase awareness and knowledge of zoonotic illnesses among community members and the ways to protect themselves and their animals.

I believe if we get proper sensitization in animal management, there is a tendency that we can prevent ourselves from contaminating sickness from these animals. (Young adult male, Kotohun)

We need to start calling meetings and begin to sensitize the community people about sicknesses that human beings can get from animals, especially [animals] *that we do interact with on a daily basis. (Community leader, Kanekay)*

Regulations for Animal Ownership

Informants had very stringent suggestions regarding animal care and roaming animals. These included animal registrations, vaccination cards for animals, dog tags, by-laws for controlling animals in the community, and fines for those who do not obey the by-laws. Informants stated vaccination records for animals are essential information when investigating dog bites, but also will be a source of assurance to the person with the dog bite.

All owners of animal should have a vaccination card for their dogs with this it will help the health officer who is in charge to address issue related to dog bite. In relation to a dog bite from a treated dog this will give the confident that I am safe because the dog has received rabies treatment together with the presentation of the vaccination card. (Health worker, Stoko)

Informants agreed that there was a strong need to teach individuals why and how to exercise better control over the behaviors of their animals. Informants perceived that when the owner of an animal, and especially one that causes trouble in the neighborhood, knows they can be easily identified, it might motivate them to take better care of their animals

I suggest that animals should be tag in order to identify their owners whenever they cause havoc or bite somebody in the community; with this act people will learn to take care of their animals. (Child, Makama)

Other informants suggested that regulations should include consequences for not following the rules and laws.

To prevent the roaming of dogs in the community there should be by-laws to cover the management and caring of these dogs. Owners should be fined if they refuse to care for their animals. (Child, Makama)

Health Messages

Some informants provided suggestions on how best to relay information to the community in a manner that would be salient, acceptable, and impactful. They felt that messages that are visual, based on personal experiences or what people hear from others, and that include explanations, are effective ways to convince the community about the risk of zoonosis.

If we can convince them by showing them diagrams illustrating how an animal behaves when it gets infected like dog, making these kind of stories clear to us with clear explanations and stories that have to do with rabies been passed on to human beings, then the health facilities must also be involved in this so that when people go to the health facilities, they will hear the same messages. I want to believe with all these intensive strategies they will be convinced that yes, there is rabies and it does exist. (Community leader, Kanekay)

There will be no proof to show that bat pass rabies to human being, but through sensitization people will believe us, in the case of dog, we have proven it, as it has happened physically and many people have seen it with their eyes. (Older adult male, Binkolo)

If they see someone with the sickness, they will believe. (Child, Masongbo Limba)

The quotations above reiterate that for some community members, including those without knowledge of rabies, visual images may be important for people to believe and take action. They also indicate that community members are receptive to rabies-related information.

Sources of Information

Informants discussed how they usually receive information about animal care and health in their communities. For almost all the informants, medical personnel are the primary sources of information about animal care, needs, and health, as well as about special care necessary for animal bites. Medical personnel included the community animal health worker, AHW, livestock officer (LO), CHW, and other trained health facility staff.

> *The medical people also should be involved as the people here highly believe in them once it has to do with health and sicknesses. (Young adult male, Manjoro)*

> *Animal health workers and the livestock officers, they use to come and provide treatment for our animals whenever they get sick. They also use to provide advice on what to do in the caring of animals as well as when animals become sick. They use to come around telling people to report whenever an animal becomes sick and not to keep the animal. (Young adult female, Karena)*

In addition, informants stated explicitly that these individuals are the sources that community members respect and consider credible and trustworthy, and that they are prone to believe.

> *The people will only believe if we, the health personnel, tell them and sensitize them just as you have tell us about them. (Health worker, Kapethe)*

> *If a dog bites me and I go to the hospital, if the doctor says because of the bite I have got a rabies then I will accept, or because of a bat, I have got rabies, then I will accept because he is a medical person. (Older adult female, Kagbo)*

Discussion

A total of 133 informants from four constituencies and 12 communities in Bombali participated in FGDs on zoonosis with emphasis on rabies, and 1,312 from the four constituencies completed a rapid assessment OM questionnaire. In this section we discuss the prevailing themes from the FGDs and the OM survey, as well as recommendations for programming.

Little information is available in the published literature about the underlying individual behaviors and community factors associated with risk and prevention of rabies in Sierra Leone. In addition, we have limited information about estimates for correct knowledge of rabies, and its prevention and treatment. Nevertheless, there is some consensus among animal health professionals regarding the perceived needs and priorities for rabies prevention programs. In the discussion, we present these perceptions in lieu of unavailable quantitative and qualitative data from Sierra Leone, to support the study results.

The study results reveal several crosscutting and overarching themes. They include value of animals, status of knowledge about rabies, risk perception and prevention behaviors, reporting practices, trusted sources of information, and relevant health messages. We discuss these in detail below.

Perceived Value of Animals

Informants' treatment of animals was grounded in part by the perceived value of the animals. Although informants mentioned that dogs are useful for ensuring the security of their property, hunting, and companionship, they were not a direct source of income. Animals that could be sold for cash when needed were more highly valued and were afforded more defined care practices than other animals. Many informants believed that dogs were lower on the value chain than fowl and other livestock animals that are routinely eaten or sold. This finding is similar to what previous research demonstrated. Suluku, Abu-Bakarr, Johnny, and Jonsyn-Ellis (2012) reported that a majority of dog owners sampled in Freetown spent next to nothing financially on their pets. Those researchers stated that for many dog owners, feeding their pet dogs was not a high priority. However, this Breakthrough ACTION study highlights subtle nuances in the perception of dogs, as some informants felt that dogs should not be treated as human beings. For some informants, whether a dog was alive or dead seemed to be inconsequential. Violence against dogs, sometimes unprovoked, may be associated in part with this low value given to dogs, or with the fear among people with knowledge of rabies. Informants repeatedly stated that the most likely action taken in response to a dog bite is killing the dog, as described in other studies from Africa (Kabeta, Deresa, Tigre, Ward, and Mor 2015; Mauti, et al., 2017).

Knowledge of Zoonosis and Rabies

Few community-focused studies exist that explore and explain the behavioral and other contextual factors that influence risk of rabies infection in Sierra Leone. Consequently, few estimates are available about the status of individual knowledge about rabies, including the cause, animal reservoirs, methods of transmission, risk, preventive behaviors, treatment, and reporting.

Awareness of rabies among the study population was high (79%) and there was general familiarity with the local terms for a rabid dog. While awareness of rabies was high, knowledge of the disease was substantially limited. This study characterized reported statements and knowledge about rabies as either correct, incomplete/not comprehensive, or inaccurate. The results showed limited correct knowledge of zoonosis, and of rabies in particular, among community members and health workers in Bombali district. Among the few with correct knowledge, the information was largely incomplete, and limited to rabies in dogs. Furthermore, knowledge of rabies was limited to some symptoms of infection with very little understanding about causes, animal reservoirs, and transmission pathways. Other areas with knowledge deficits include risk behaviors and the ways through which rabies can be transmitted beyond a scratch or a bite from a rabid animal, and correct response and treatment practices, including the need for prompt treatment. These findings are similar to results from knowledge, attitudes, and practice (KAP) studies on rabies conducted in sub-Saharan Africa. A KAP study in Ethiopia (Digafe, Kifelew, & Mechesso, 2015) showed high awareness of rabies among almost all participants (99%), however "knowledge and practices about prevention of rabies were limited" (page 1). Another KAP study in Tanzania (Sambo et al., 2014) showed that 95% of the study population had heard about rabies, and 80% knew it was transmitted in a dog bite, but only 5% knew there should be prompt wound cleansing after a bite from an animal. A recent thesis study in Kenya (Muriuki, 2016) drew similar conclusions where 90% of participants had awareness of rabies, but a significant proportion (53% in Kisimu area, and 32% in Siaya area) lacked knowledge about how to respond at home to a dog bite.

The study results showed also that myths and misconceptions about rabies were prevalent within communities, and more importantly, among health workers. Some of the inaccurate beliefs were that dogs and cats are born with rabies, dogs that are aggressive or bite an individual or another animal have rabies, and that rabies is curable. Health care workers are currently among the frontline workers responding to animal bites in communities, and it is imperative that they provide accurate information and education to community members. They are also the sources of information that community members described as credible and trustworthy. Sierra Leone FAO has been working closely with a local university to implement programs to educate health care providers for people and AHWs about rabies, behavioral risk, and the recommended first aid wound care, treatment, and reporting guidelines (FAO, 2012). Inaccurate beliefs, such as any aggressive dog is a 'craze dog,' and every dog bite will result in rabies infection, coupled with high concern for rabies, may be responsible in part for some of the fear-driven violent behaviors against dogs meted out by some community members.

Specific areas of knowledge that need improvement among community members and health workers include: responsible dog ownership (Eke, Omotowo, Ukoha, & Ibe, 2015); the prevailing by-laws and regulations around dog ownership, vaccinations, and reporting (Dzikwi, Ibrahim, & Umoh., 2012); child education about safe play with animals; appropriate care of animal bites for parents, teachers, and children; care-seeking of medical treatment for animal bites; and correct reporting of sick animals, biting animals, and animal bites (Dzikwi et al., 2012).

Recommendations

Community members may benefit from rabies awareness campaigns with targeted health messaging that addresses causes and transmission pathways, appropriate first aid responses, and the need for prompt treatment. Such campaigns may help facilitate a shift from awareness to knowledge building.

Interpersonal and community dialogue approaches may best address prevailing myths and misconceptions about rabies, and the conflict between risk perceptions and participation in risk behaviors. These approaches afford individuals opportunity to share experiences and discuss the issues that influence their current beliefs, perceptions, and behaviors.

Health workers for people and animals may benefit from continued education and refresher courses about rabies. Development of job aids and resources for health workers to use in the field and for on-the-job training may also contribute to standardizing the information that is relayed to community members.

Risk Perception and Prevention Behaviors

Overall, there was much concern among community members about risk and prevention of rabies. Children were perceived to be particularly vulnerable to rabies because they often play with animals. Studies have explained children's vulnerability to rabies in terms of them not being developmentally equipped to recognize or anticipate danger, and having small stature that puts them at a structural disadvantage when they play with animals (Briggs & Mahendra, 2007). The high burden of rabies in children is confirmed by global epidemiologic data from the World Health Organization (World Health Organization, 2018) and in peer-reviewed publications (Eke et al., 2015), showing that rabies in Africa transmits primarily by dog bites and many of the victims are children under the age of 15 years. Nevertheless, the general feeling was that everyone in the community was at risk of rabies because there were so many unconfined and uncontrolled dogs roaming public areas of communities. In addition, a recent study of hunting practices and zoonosis in Southern and Eastern Provinces of Sierra Leone (Bonwitt et al., 2017) confirmed this and particularly, the risk to women and children. The study concluded that the at-risk population for zoonosis might be more widely distributed across age, gender, and social groups, than previously believed.

An important finding with programmatic implications was that perception of risk of rabies was not always aligned with individual prevention behaviors. While there seemed to be high awareness that rabies was a serious disease, other factors, particularly the protection of personal property including

animals used for income and sustenance, most often took precedence over the risk to one's health from rabies. The results show several commonly practiced risk behaviors, the main ones being not confining animals, sleeping closely with animals, and selling and eating the meat of sick animals and animals that died from sickness. Lack of knowledge, poverty, and hunger appeared to influence to some degree the relationship between risk perception and risk behaviors. These factors help introduce how collaboration and inter-sectoral engagement may play a role in comprehensive rabies prevention and control programs.

While there was general agreement that the free roaming of animals in the community amplifies risk of dog bites and rabies, the practice of not confining animals continues to be an issue in communities. Some study informants considered it necessary to allow animals to roam during the dry season when food for animals, and in some cases, for people, was scarce. This was true also for families that did not have young children to shepherd animals to appropriate grazing fields. Furthermore, during the dry season, animal owners move small ruminants like goats and sheep, and occasionally cows, that usually find grass within the community, to swamp areas to graze. These swamp areas may be close to communities or quite far away. In some situations where there may not be accessible swamp areas during the dry season, some animals cannot be adequately fed, and they may be allowed to roam communities to find their own food. The USAID-funded SPRING project in Sierra Leone (SPRING, 2015) confirms this practice for small ruminants during the dry season, where community members prioritized dwindling resources for family members rather than for animals. However, very little information is available in the published literature regarding underlying reasons why dog owners may opt to let their dogs roam freely and fend for themselves, or abandon them at any time during the year. A case study investigation of rabies in Koinadugu in Northern Sierra Leone (R. Suluku et al., 2017) described a high number of stray dogs and reported that "*the entire Koinadugu districts often care less and hardly feed their dogs*" (page 310). The beliefs by community members that most, if not all, stray dogs are rabid dogs also is supported in part by some studies that conclude some stray dogs harbor rabies (Olugasa, Aiyedun & Emikpe, 2011; Oluwayelu, Adebiyi & Ohore O, 2015; Suluku et al., 2017).

The results also identified selling and eating sick animals, or meat from animals that died from sickness as other risk behaviors. Herders would quickly sell off animals they observed to be sick, or give the dead animal to poorer community members for food. Suluku et al. (2017) reported similar behaviors in an isolated case of dog-associated rabies among cattle in Koinadugu district in Sierra Leone, where there was secondary human exposure to rabies when the meat of the dead cattle was sold to, and eaten by, community members. Another study in Ethiopia (Digafe et al., 2015) showed that 67% of the study participants believed that consumption of cooked or boiled meat from rabid animals was safe, and about a fifth of them (19%) believed that raw meat was safe for human consumption. The results from our study reveal implications regarding beliefs that sickness, including rabies, could no longer exist in a dead being (or dog), or in meat that has been cooked. However, further research is needed to better understand factors influencing these beliefs.

A third key risk behavior commonly practiced was the need to protect one's personal property. Some community members placed higher value on their animal possessions than on maintaining their good health. As such, they brought animals such as fowl, goats, sheep, and ducks indoors to share the family sleeping areas overnight to protect the animals from thieves. The close proximity to animals, some of which may be sick, in small and confined spaces for a period of time, potentially increases the risk of zoonosis. In Sierra Leone, Animal Health Clubs are promoting good animal husbandry practices, including educating community members, some of them young children, about rabies disease risk and prevention, and how to care for and shelter animals appropriately (FAO, 2012).

Recommendations

The population of this study area has a dire need for community-level education about transmission pathways of rabies and behavioral risk that incorporates the daily activities and needs of the community and uses examples that are salient to community members. Community-based interventions that directly engage community members in dialogue, and behavior change activities that support the context of community life will likely support the acceptance and adoption of new behaviors.

The expansion of Animal Health Clubs could facilitate the interpersonal approach to engaging communities in rabies prevention programs. These clubs also could be a way to support and reinforce other large-scale communication approaches that provide information to the general public.

Additional research may also help to better understand the factors that predispose some animal owners to abandon their dogs or stop providing them care.

Community Needs and Health Messaging

Community needs span many different issues including medicines and vaccines, trained and accessible AHWs, education (about rabies, risk factors, symptoms, and reporting), and regulations for animal ownership. However, these needs are not unique to Sierra Leone in the context of rabies prevention and control. Similar needs have been described in studies done in other sub-Saharan countries (Bailey et al., 2018; Dodet et al., 2008).

Regarding a need for treatment resources, according to a review of rabies in Africa by Dodet et al., (2008), vaccines were not always available and may be unaffordable for many patients. Informants in the communities sampled for this study cited similar needs and constraints. Furthermore, a few community members mentioned that even when AHWs are available in the community, they often do not have the vaccines or medicines they need to treat the animals. A 2013 evaluation report of community-based AHWs in Kenya, South Sudan, and Ethiopia (Leyland, Lotira, Abebe, Bekele, & Catley, 2014) described similar issues.

At least two studies show that community-based AHWs have proven to be beneficial for disease surveillance, zoonosis control, and animal vaccination programs in other Sub-Saharan African countries (Allport, Mosha, Bahari, Swai, & Catley, 2005; Leyland et al., 2014). However, these study results also

show that most informants were unaware of AHWs in their communities. Among those informants with knowledge of AHWs and their role serving communities, many described it as a program of the past that did not appear to be in practice today. There were many suggestions to provide support for the few veterinarians and AHWs available in the country. A repeated suggestion was the creation of new cadres of trained support workers drawn from members of the community (and thus locally based in communities) to work alongside AHWs; these new support workers will provide basic frontline services and be recognized as the focal point to link communities with needed health and veterinary services. Efforts must increase to improve accessibility of community members, and especially livestock owners, to AHWs, and to ensure the sustainability of the AHW role within the community.

Informants also commonly cited the stray dog population as a problem community members face. Sierra Leone has one of the densest populations of stray dogs in the world, and in Freetown there are an estimated 100,000 stray dogs (World Animal Protection, 2018). In Sierra Leone, Animal Health Clubs have a role in conducting animal censuses and re-enforcing the by-laws and regulations for animal ownership and care (FAO, 2012). However, we found in this study that the swift killing of dogs that were aggressive, appeared to be sick, or had bitten a person or another animal, was still frequently used in some areas to counter the problem. Additional effort to create new regulations and enforce current ones for animal ownership in the communities studied could help prevent violence meted out against dogs and help protect people from dog attacks and rabies.

Informants agreed that their communities need widespread rabies education and information programs. In general, messages rooted in history and experiences, rather than solely based on knowledge content, seemed to be more valuable to informants. This is not surprising as the use of storytelling to share experiences and pass on codes of behavior is an integral part of traditional African culture. Animal Health Clubs use storytelling and dramas to convey rabies-related information to communities. During the 2014 EVD outbreak, grassroots arts initiatives that included music, murals, and radio drama were a critical component in the dissemination of health education (Sonke & Pesata, 2015). Similarly, the education campaign against rabies in South Africa included cartoon leaflets that told the visual story of the danger and prevention of rabies in a way that was contextually relevant to children (Kloeck, 1993). Sierra Leone lacks contextually relevant educative videos about rabies. Informants proposed that community members may better receive and understand visual images and stories that offer information about rabies.

Recommendations

Interventions that include a focus on methods to manage dog populations humanely by advocating responsible dog ownership, mass vaccinations, provision of sterilization services, and basic dog health care would be beneficial in the study area.

Collaboration between authorities and local experts who understand the local dog population, the dynamics around animal ownership, local demographics, and attitudes of community members towards

dogs, may provide contextual information as an important basis for a tailored package of interventions for long-term management of the dog population and rabies.

Trusted Sources of Information

It is noteworthy that community members trusted animal and human health care workers as credible sources of information on rabies. Trust in the source of health information plays a crucial role in peoples' response to the health messages (Clayman, Manganello, Viswanath, Hesse, & Arora, 2010). It is therefore important that behavior change communication strategies include these sources in the development and delivery of mass media campaigns and information materials. This finding also highlights the need for an increased presence of AHWs or support staff in communities, and development of processes that make them more accessible to communities. AHW should be more visible and accessible when the population needs them.

Recommendations

Training a new cadre of locally resident, community-based AHW may improve accessibility to AHWs and their services, and provide continuity in delivery of routine education and information activities regarding animal care. Involving medical personnel and AHWs in the delivery of information and behavior change messages may help increase belief and acceptance within this community.

Reporting

There was low reporting of pets or stray animals that are sick or involved in bite incidents in the study area. This is similar to findings from other studies in Africa (Ali, 2002; Fèvre et al., 2005). Informants were generally unaware of which specific health workers they needed to report these cases to, and tended to report to either community leaders or health workers for humans at the health facility. The fact that no AHWs were readily available in many of the sampled communities contributed to this lack of knowledge. Community members could benefit from information about when to report sick or suspected rabid animals and to whom. Effective behavior change messaging about reporting should communicate the 'why,' 'how,' when,' and 'to' of reporting. In addition, health messages should contain explicit information about the purpose and effect of reporting, and about what to expect after reporting so community members can see the value and be motivated to continue reporting incidents appropriately.

We might attribute the higher likelihood of informants reporting dog bites at health facilities as demonstrated in the results of the OM activity to its link with human illness. Informants frequently reported dog bites at health facilities, similar to what was documented in a previous study in South Africa (Hergert & Nel, 2013). In that study from South Africa, Hergert and Nel showed that 80% of individuals in five out of the six study sites visited a clinic in response to a dog bite. The FR, however, revealed several barriers to reporting, including low knowledge, some beliefs that treatment need not be urgent, not wanting to cause tensions with neighbors, and anticipated costs at health facilities. The

research also showed that community leaders have a pivotal role in the chain of reporting; they often are among the first to be informed of animal bites, they prevent or settle disputes, and some ensure that AHWs and health facility workers (for humans) are notified of sick animals and animal bites respectively. The literature reflects a focus on raising awareness about accurate and prompt reporting so that treatment can start early, epidemics can be averted, and the authorities can have an accurate estimate of the scale of dog bites, and rabies, as a public health problem. Many communities need public awareness campaigns around the danger of dog bites, appropriate first aid, and where to seek care. Community members were unclear regarding when and what they should report to AHWs and what they should report to health workers for people. What is clear from the study is the need for increased communication and collaboration between CHWs and AHWs so that communities can accomplish comprehensive follow-up action and documentation on both sides (animal and human) of all incidents.

Recommendations

A centralized mechanism of reporting may foster coordinated inter-sectoral collaboration and communication between human and animal health professionals to strengthen surveillance and disease monitoring. Furthermore, all participating stakeholders and community members should receive clear and accessible communication that explains the reporting structure.

Developing the capacity for reporting diseases at the community level using community leaders, community-based AHW, or respected members of the community as focal points may improve reporting at the community level.

Community members should be encouraged to participate more actively in epidemic control and surveillance by reporting suspected cases early and to the correct channels.

Awareness campaigns should incorporate the benefits of reporting into messages as a way to encourage community members to participate in reporting guidelines.

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Appendix A: Characteristics and Distribution of Participants for Outcomes Monitoring

PERCENT OF PARTICIPANTS FOR OUTCOMES MONITORING ASSESSMENT					
	CONSTITUENCY 31	**CONSTITUENCY 34**	**CONSTITUENCY 35**	**CONSTITUENCY 37/38**	**TOTAL**
N	**328**	**326**	**330**	**328**	**1,312**
Age					
18-24	21.0	8.6	16.0	17.1	15.7
25-34	31.4	29.1	27.3	29.0	29.2
35-44	25.3	23.3	29.4	26.2	26.1
46+	22.3	39	27.3	27.7	29
Gender					
Male	52.1	52.5	51.8	49.4	51.4
Female	47.9	47.5	48.2	50.6	48.6
Marital status					
Currently married	50.0	62.3	72.1	59.5	61.0
Living with a partner	22.0	12.3	7.3	4.6	11.5
Divorced / separated	4.6	3.4	2.7	8.5	4.7
Widow / widower	7.0	15.3	6.7	6.1	8.8
Single / never married	16.4	6.7	11.2	21.3	14.0
Occupation					
Unemployed	14.6	6.1	3.6	18.9	10.8
Crop farmer	37.2	68.1	57.9	11.6	43.7
Animal rearer	4.6	2.2	5.2	0.6	3.1
Laborer	0.6	0.3	1.8	4.0	1.7
Trader	26.8	8.9	13.6	37.8	21.8
Hunter	1.2	0.9	0.0	0.6	0.7
Vocational	10.4	6.8	8.2	10.4	8.9
Professional	3.1	4.9	7.9	11.9	7.0

PERCENT OF PARTICIPANTS FOR OUTCOMES MONITORING ASSESSMENT					
	CONSTITUENCY 31	**CONSTITUENCY 34**	**CONSTITUENCY 35**	**CONSTITUENCY 37/38**	**TOTAL**
N	**328**	**326**	**330**	**328**	**1,312**
Other	1.5	1.5	1.8	3.6	2.1
Refused to answer	0.0	0.3	0.0	0.6	0.2

Appendix B: Rabies-related Awareness and Knowledge

Awareness of rabies

HAVE YOU HEARD OF THE SICKNESS CALLED RABIES?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
No	5.2	14.7	32.1	33.2	21.3
Yes	94.8	85.3	67.9	66.8	78.7

WHAT DO YOU THINK CAUSES RABIES IN HUMANS?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
Spirits/Witchcraft/gods	0.6	15.0	7.6	4.3	6.9
Germs/Rubbish	33.5	12.9	12.7	1.5	15.2
A virus that makes animals sick	49.1	46.3	36.7	22.0	38.5
Comes through the family line	0.9	4.9	0.9	0.0	1.7
Feces/Urine	5.5	2.5	6.1	0.0	3.5
Other	0.6	0.0	0.0	0.0	0.2
Don't know	9.8	18.4	36.0	72.2	34.1

Knowledge about rabies transmission

HOW CAN RABIES BE TRANSMITTED?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
Bite of a rabid animal	89.6	79.4	64.2	75.0	77.1
Scratch of a rabid animal	79.3	57.1	34.5	36.3	51.8

HOW CAN RABIES BE TRANSMITTED?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
Contact with saliva of a rabid animal	72.9	60.1	45.1	35.7	53.5
Eating/touching the meat of a rabid animal	52.1	20.2	37.0	11.0	30.1
Eating/touching the brain of a rabid animal	38.4	0.6	20.6	1.2	15.2
Petting a sick animal	7.9	23.9	12.7	8.8	13.3
Don't know	4.0	13.8	33.6	23.5	18.8
Other	0.0	0.0	0.0	1.2	0.3

WHAT ANIMALS CAN TRANSMIT RABIES?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
Dog	92.4	66.3	66.4	76.5	75.4
Cat	44.5	17.2	28.2	20.7	27.7
Rat	32.9	12.0	27.0	9.1	20.3
Bush rat	26.8	35.9	18.5	3.7	21.2
Squirrel	11.3	13.2	9.1	0.6	8.5
Bat	52.7	46.6	31.5	19.2	37.5
Chicken	18.3	19.3	8.2	0.3	11.5
Cow	23.8	4.3	25.2	0.0	13.3
Goat	29.6	19.0	29.1	1.8	19.9
Pig	27.1	4.9	3.0	1.2	9.1
Monkey	66.2	44.5	33.0	7.3	37.7
Don't know	1.8	12.6	31.8	23.2	17.4

Knowledge about the signs and symptoms of rabies

HOW WILL A PERSON KNOW THAT AN ANIMAL MAY HAVE RABIES?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
Animal behaves like it is sick	76.8	66	41.8	28.4	53.2
Animal does not act normal	75.0	71.8	45.2	54.3	61.5
Animal is aggressive	87.8	63.2	59.7	62.2	68.2
It's a stray animal	31.4	38.3	31.8	22	30.9
Animal does not eat	14.3	22.7	16.7	12.2	16.5
Animal does not drink	0.9	15.3	4.5	0.3	5.3
Animal not vaccinated	46.6	2.1	13.3	0.3	15.6
Animal salivates excessively/foams in mouth	50.3	37.7	40.9	15.5	36.1
Animal was bitten by a sick animal	20.1	4.9	4.8	0.9	7.7
Cannot tell if animal has rabies	0.3	0.3	0.3	1.8	0.7
Animal afraid of water	1.5	2.5	0.3	1.2	1.4
Don't know	2.1	4.3	33.3	20.4	15.1
Other	0.0	0.0	0.0	1.5	0.4

Knowledge about rabies prevention

RABIES IN ANIMALS CAN BE PREVENTED.					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
False	4.9	2.5	1.5	1.8	2.7
True	78.4	69.3	62.4	75.3	71.3
Refused to answer	0.3	0.9	0.6	5.8	1.9

RABIES IN ANIMALS CAN BE PREVENTED.					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
Don't know	16.5	27.3	35.5	17.1	24.1

WHAT CAN BE DONE TO PREVENT RABIES IN DOGS AND CATS?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**257**	**226**	**206**	**247**	**936**
Vaccinate dog/cat	94.2	55.3	83.5	89.9	81.3
Keep pets within compound	79.8	54.9	65.0	60.7	65.5
Don't let pets mix with strays	65.4	57.1	50.0	34.0	51.7
Report sick animals to AHW/LO/Vet	68.1	23.5	51.5	13.4	39.2
Report animals bitten to AHW/LO/Vet	39.7	3.5	29.6	0.4	18.4
Report sick animals to community leader	43.2	28.8	23.8	11.3	27
Do nothing	0.4	0.0	0.0	0.0	0.1
Don't know	0.0	0.9	3.4	0.4	1.1
Other	0.0	1.3	0.5	0.8	0.6

RABIES IN HUMANS CAN BE PREVENTED.					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
False	2.7	1.2	0.0	1.5	1.4
True	79.6	68.7	69.7	76.5	73.6
Refused to answer	0.6	0.9	0.6	6.1	2.1
Don't know	17.1	29.1	29.7	15.9	22.9

WHAT CAN BE DONE TO PREVENT RABIES IN HUMANS?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**261**	**224**	**230**	**251**	**966**
Wash hands	61.3	23.7	50.9	20.3	39.4
Avoid stray animals	68.6	41.1	49.6	43.8	51.2
Avoid animals that are not behaving normally	92	67	83	76.5	80.0
Avoid half eaten fruits	71.6	63.8	35.7	34.3	51.6
Vaccine	60.2	48.2	57.8	24.3	47.5
Don't eat bushmeat	55.6	33	58.3	4.4	37.7
Can't do anything	5.4	0.4	0.0	0.0	1.6
Don't know	0.0	0.4	2.6	2.4	1.3
Other	0.0	0.4	0.4	0.4	0.3

Knowledge of correct action to take after potential rabies exposure

WHAT SHOULD A PERSON DO IF THEY ARE BITTEN OR SCRATCHED BY A SICK ANIMAL?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
Nothing	2.7	0.9	10.0	1.2	3.7
Wash wound	47.6	25.2	32.1	11	29
Spirit	63.1	21.2	32.1	31.7	37
Go to health facility	91.2	75.2	70.3	81.4	79.5
Go to community health worker	56.1	35.9	65.5	9.5	41.8
Go to pharmacy	18.9	0.6	1.5	3	6
Go to chemical seller	1.2	1.5	5.2	2.1	2.5
Go to traditional healer	3	4.9	9.7	1.5	4.8
Confine animal	5.5	2.8	0.6	1.2	2.5
Kill animal	22.6	42.6	20.0	40.5	31.4
Report to AHW/LO/Vet	21.6	2.8	7.9	4.0	9.1

WHAT SHOULD A PERSON DO IF THEY ARE BITTEN OR SCRATCHED BY A SICK ANIMAL?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
Don't know	1.2	0.6	2.1	1.5	1.4
Other	0.0	0.0	0.0	3.0	0.8

Knowledge of appropriate reporting timeline

WHEN SHOULD A PERSON REPORT A SICK ANIMAL THAT MIGHT HAVE RABIES?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
Immediately/ Less than one day	65.5	60.1	69.1	75.6	67.6
Within one week	25.9	13.2	8.5	7.9	13.9
If animal's sickness gets worse	6.4	19.6	3.9	1.8	7.9
If animal dies from sickness	0.9	2.8	0.0	0.9	1.1
Other	0.0	0.3	0.0	3.4	0.9
Don't know	1.2	4.0	18.5	10.4	8.5

WHEN SHOULD A PERSON REPORT A BITE/SCRATCH THEY GET FROM AN ANIMAL?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
Immediately/Less than one day	89	94.8	96.1	87.5	91.8
Within one week	8.2	2.8	3	2.1	4
If the wound gets worse	1.8	0.0	0.3	4.3	1.6
When the person feels sick	0.6	0.6	0.3	2.1	0.9
Other	0.0	0.0	0.0	2.1	0.5

WHEN SHOULD A PERSON REPORT A BITE/SCRATCH THEY GET FROM AN ANIMAL?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
Don't know	0.3	1.8	0.3	1.8	1.1

Knowledge of proper reporting channels

WHOM SHOULD YOU REPORT AN ANIMAL BITE OR SCRATCH TO?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
AHW/LO/Vet	73.5	4.0	29.1	24.1	32.7
CHW	57.6	50.9	66.7	49.1	56.1
Health facility worker	69.8	36.8	67.0	27.1	50.2
Traditional healer	8.2	2.5	13.3	1.5	6.4
Pharmacist	15.9	0.9	1.5	0.6	4.7
Chemical seller	1.2	0.6	5.8	1.5	2.3
Community leader	52.7	46.6	39.7	30.5	42.4
Owner of the animal	46.3	49.4	49.4	48.5	48.4
Hotline	0.6	0.0	0.3	0.3	0.3
No one	0.0	2.8	0.3	0.3	0.8
Don't know	0.0	0.3	1.2	0.6	0.5
Other	0.0	0.6	0.3	4.3	1.3

IF YOU SEE AN ANIMAL THAT LOOKS SICK, WHOM SHOULD YOU REPORT IT TO?					
	CONSTITUENCY 31	**CONSTITUENCY 34**	**CONSTITUENCY 35**	**CONSTITUENCY 37/38**	**TOTAL**
N	**328**	**326**	**330**	**328**	**1,312**
Community animal health officer/ Livestock officer/Vet	29.9	1.8	6.7	12.8	12.8
Community health worker	33.2	25.2	4.5	8.8	17.9
Health facility-based worker	12.5	20.9	8.2	3	11.1
Traditional healer	0	0.6	0.3	0	0.2
Pharmacist	0	0.3	0	0	0.1
Chemical / herb seller	0	0	0	0.3	0.1
Community leader	19.2	19.3	14.5	30.2	20.8
Owner of the animal	4	24.8	46.4	37.5	28.2
Do not report to anyone	0.9	3.7	7.3	1.8	3.4
Other	0	2.1	1.5	4.6	2.1
Don’t know	0.3	1.2	10.6	0.9	3.3

Appendix C: Rabies-related Perceptions, Attitudes, and High-risk Interactions

Perceived risk of rabies

HOW CONCERNED ARE YOU THAT YOU CAN GET RABIES FROM AN ANIMAL?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
Very concerned	60.7	79.4	26.4	44.5	52.7
Somewhat concerned	32.3	16.3	45.2	20.4	28.6
Not concerned at all	6.4	2.1	10.3	20.7	9.9
Not sure/Don't know	0.6	2.1	18.2	14.3	8.8

High-risk interactions

HAVE YOU BEEN INVOLVED IN THE FOLLOWING HIGH-RISK INTERACTIONS WITH ANIMALS?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**328**	**326**	**330**	**328**	**1,312**
Hunted bushmeat	12.8	20.9	13	2.1	12.2
Prepared bushmeat	68.3	67.8	45.5	25	51.6
Ate bushmeat	86.6	86.8	72.4	38.4	71
Ate dog meat	15.9	26.7	13.9	6.1	15.6
Killed and ate a sick animal	12.2	38.7	32.4	1.8	21.3
Scratched or bitten by a pet	11.6	7.1	17	2.7	9.6
Scratched or bitten by stray animal	6.1	1.5	10.9	0.9	4.9
Scratched or bitten by a sick animal	1.5	0	3.6	0.3	1.4
Scratched or bitten by an animal that eventually died	3.4	0	1.2	0.6	1.3

HAVE YOU BEEN INVOLVED IN THE FOLLOWING HIGH-RISK INTERACTIONS WITH ANIMALS?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
Handled a sick animal	4	28.5	23.9	1.8	14.6
Handled an animal that died	2.1	3.1	2.1	6.1	3.4
Don't know	0	0.3	0.6	1.2	0.5
None	13.1	5.8	15.8	57.3	23

Attitudes towards high-risk interactions

WHAT DID YOU DO AFTER YOU WERE SCRATCHED OR BITTEN?					
	CONSTITUENCY 31	CONSTITUENCY 34	CONSTITUENCY 35	CONSTITUENCY 37/38	TOTAL
N	**63**	**28**	**69**	**15**	**175**
Nothing	0	7.1	1.4	0	1.7
Washed the wound	22.2	14.3	91.3	6.7	46.9
Spirit	68.3	17.9	89.9	46.7	66.9
Went to a health facility	65.1	78.6	81.2	53.3	72.6
Went to a CHW	71.4	7.1	84.1	6.7	60.6
Went to the pharmacy	9.5	0	26.1	0	13.7
Went to a chemical seller	6.3	3.6	21.7	0	11.4
Went to a traditional healer	1.6	7.1	10.1	0	5.7
Confined the animal	4.8	0	1.4	0	2.3
Killed the animal	6.3	21.4	18.8	6.7	13.7
Reported to the AHW/LO/Vet	69.8	0	49.3	0	44.6
Other	0	0	0	13.3	1.1

Sources of information on rabies

THROUGH WHICH SOURCES HAVE YOU GOTTEN INFORMATION ON RABIES?					
	CONSTITUENCY 31	**CONSTITUENCY 34**	**CONSTITUENCY 35**	**CONSTITUENCY 37/38**	**TOTAL**
N	**328**	**326**	**330**	**328**	**1,312**
Television	0.9	0	1.5	6.4	2.2
Radio	67.4	81.6	56.1	65.9	67.7
Poster	5.5	0.9	3.6	1.2	2.8
Newspaper	0.6	0.6	2.1	0.6	1
Internet	0.3	0	1.2	0.9	0.6
AHW/LO/Vet	31.4	4.6	31.2	5.8	18.3
CHW	33.5	16.3	18.2	8.2	19.1
Health facility worker	32.3	23	13	7.6	19
Traditional healer	2.4	1.2	5.2	0	2.2
Pharmacist	13.1	0	0.3	0.9	3.6
Chemical seller	0	0	0.6	0.6	0.3
Community leader	32.6	22.4	19.1	5.8	20
Community meeting	32.3	19.6	25.5	1.2	19.7
Community member	38.4	20.9	28.2	13.1	25.2
Family member	34.1	7.1	15.5	11.3	17
Friend	32.6	3.7	16.7	7.6	15.2
Don’t know	0.9	2.5	27.6	12.2	10.8
Other	0	0	0.6	0.6	0.3