

# Factors influencing perceived risk of zoonotic diseases and effectiveness/feasibility of related prevention behaviors

A qualitative study in Guinea

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## Acronym List

EVD	Ebola virus disease
FGD	Focus group discussions
GHSA	Global Health Security Agenda
IDI	In-depth interviews
NGO	Non-governmental organization
PI	Principal investigator
PZD	Priority zoonotic disease
RVF	Rift Valley fever
SBC	Social and behavior change

# Background

The threat of zoonotic diseases came to the forefront in recent years in West and Central Africa, with several outbreaks of Ebola virus disease (EVD), including the 2014-2016 epidemic that led to 3,814 cases and 2,544 deaths in Guinea.<sup>1</sup> More recently, diseases such as rabies have also caused ongoing concern. While local, regional, national, and international actors play important roles, actors at the community level also play key roles in prevention and response. Moreover, individual behavior drives disease risk and transmission<sup>2</sup> for zoonotic diseases, particularly in settings where human-animal interactions are pervasive. As a result, the successful prevention and management of zoonotic diseases demands a thorough and nuanced understanding of the flow of health information, as well as the multiple levels of influence on human-animal interactions and outbreak response behaviors. In addition, social and behavior change (SBC) interventions informed by timely research can promote uptake of positive behaviors in order to prevent and break transmission and improve emergency preparedness.

The Global Health Security Agenda (GHSA) is a global cooperative working to improve preparedness and response to infectious diseases.<sup>3</sup> As part of the GHSA work in Guinea, government stakeholders and non-governmental organization (NGO) partners identified a set of priority zoonotic diseases/disease groups (PZDs) for the country: (1) yellow fever, (2) dengue, (3) human anthrax, (4) rabies, (5) brucellosis, (6) Lassa fever, (7) avian influenza, and (8) other viral hemorrhagic fevers, such as EVD and Rift Valley fever (RVF). While considerable research occurred during and after the 2014-2016 Ebola epidemic, Breakthrough ACTION Guinea's review of the literature for the other PZDs in Guinea suggested that little research exists on individual, sociocultural, and structural factors influencing human-animal interactions in Guinea. Likewise, few research studies have examined motivators and barriers to uptake of zoonotic disease prevention behaviors.

In Guinea, current priority zoonotic diseases of interest include human anthrax, rabies, brucellosis, Lassa fever, avian influenza, and RVF. The current study focused on the prevention behaviors related to these particular diseases of interest. Specifically, the study examined awareness, perceptions, cultural practices, and other behavioral determinants that would inform animal-human interactions, as well as community engagement and coordination strategies to prevent and combat future disease outbreaks. The study also explored trusted information sources and the roles of various actors in an epidemic response.

# Methods

The research team conducted the study in three sites in Guinea: Conakry, N'zérékoré, and Kankan. The team chose these sites based on their epidemiological profile for the PZDs, using data provided by the National Health Security Agenda (*Agence Nationale de Sécurité Sanitaire* in French) outlined in Table 1.

**Table 1. Risk profile of priority zoonotic diseases by study site, June 2019**

DISEASE	KANKAN	CONAKRY	N'ZÉRÉKORÉ
Rabies	Medium	High	High
Anthrax	Medium	High	High
Brucellosis	High	Medium	Medium
Avian influenza	Medium	Medium	Medium
Rift Valley fever	Low	Low	Low
Lassa fever	Medium	Medium	Medium

The team used purposive sampling, selecting participants based on the relevance to the study objectives, rather than random or probability-based sampling. The team recruited individuals who influence, directly or indirectly, the prevention and response to one or more of the PZDs. Data collectors were male and female Guinean researchers with prior qualitative research experience. Each data collector also was fluent in at least one of the four local languages prevalent in the study sites (Malinke, Soussou, Poular, or Kpele). The study's principal investigator (PI) led a five-day training for the data collectors, orienting them to the research objectives, study procedures, data collection instruments, and ethical considerations. Local study managers, comprised of a doctoral-level training local research consultant and the Breakthrough ACTION Guinea monitoring and evaluation specialist, provided on-the-ground supervision of the data collection process. The Johns Hopkins School of Public Health Institutional Review Board and the Comité National d'Ethique pour la Recherche en Santé approved the research protocol, guides, and consent forms.

The study included three qualitative methods: in-depth interviews (IDIs), focus group discussions (FGDs), and participant observations. These methods allowed the study team to engage different types of individuals directly linked to the prevention of and response to zoonotic diseases (see Table 2). Prior to FGDs and IDIs, participants completed a free listing exercise. In this activity, each participant individually listed all of the diseases they could think of that can come from animals. The purpose of this activity was to explore the ways in which participants conceptualized zoonotic diseases and to identify which diseases were most top of mind.

Local community leaders such as imams or neighborhood chiefs, media professionals, health providers (formal or community-based), and veterinarians participated in IDIs. The IDI guide explored individuals' daily interactions with animals and their awareness/risk perception of zoonotic diseases, as well as

questions around their perceived role in an epidemic response, and how health information flows within Guinea.

Members of the general population, both men and women, as well as professional animal handlers, such as farmers or butchers, participated in separate FGDs. Data collectors stratified FGDs with the general population by gender and by rural or urban setting. FGDs explored perceptions and norms around interactions with animals, hygiene, and trusted sources of health information. In order to engage participants in these discussions, FGDs included two participatory pile-sorting exercises. As a “warm-up” to the discussion, participants broke into groups of two or three and sorted picture cards of nine animals into groups and named the groups, in order to explore the ways in which people might classify different animal types.

The second pile-sorting activity consisted of a participant discussion around a series of various prevention behaviors. The Breakthrough ACTION team previously identified a set of 15 prevention behaviors to assess, including 13 related to one or more of the PZDs.<sup>4</sup> The team included two additional behaviors (avoiding consuming bushmeat, avoiding eating fruit partially consumed by an animal) due to the controversy during the 2014-2016 Ebola epidemic<sup>5</sup> and the possibility to produce new zoonotic disease outbreaks. (See Table 2 for the complete set of behaviors.)

**Table 2. Prevention behaviors relevant to PZDs included in the study, Guinea, 2019<sup>4</sup>**

Prevention behaviors of interest	Anthrax	Rabies	Brucellosis	Lassa fever	Avian influenza	Rift Valley fever	Ebola
Keep animals separate from living areas	✓	✓	✓	✓	✓	✓	
Disinfect animal pens	✓				✓	✓	
Avoid dog bites		✓					
Seek immediate care at health center for dog bites		✓					
Vaccinate animals	✓	✓	✓		✓	✓	
Boil milk for 30 minutes before drinking			✓				
Sterilize knives and surfaces used to cut fresh meat	✓		✓		✓	✓	
Cook meat well, only eat meat that is well cooked	✓		✓				
Avoid eating meat from sick animals	✓		✓				
Avoid eating bushmeat							✓
Cover cuts or wounds on the skin when handling animals	✓		✓		✓	✓	✓
Wear protective clothing while touching carcasses	✓				✓	✓	✓
Bury sick animal carcasses and aborted fetuses	✓		✓			✓	
Avoid eating fruit already partly consumed by an animal							✓
Store food in covered containers to protect it from rodents				✓			

For the sake of time and participant energy, facilitators limited the discussion to a sub-set of approximately ten behaviors in each FGD (see Table 3). As part of this pile-sorting activity, participants discussed each behavior with respect to two dimensions: self-efficacy/feasibility (“Is this behavior easy for people in your community to do, more or less easy to do, or difficult to do?”) and response efficacy (“If one does this behavior, is it useful for preventing disease, more or less useful, or not useful at all?”). Facilitators promoted discussion and debate to encourage a variety of opinions. The activity culminated in participants voting where to classify each behavior along both dimensions.

**Table 3. Prevention behaviors of interest addressed during focus group discussions**

Prevention behaviors of interest	<i>General population</i>		<i>Animal handlers</i>		
	Men	Women	Butchers	Transporters	Farmers/sellers
Keep animals separate from living areas	✓	✓	✓	✓	✓
Disinfecting animal pens			✓	✓	✓
Avoid dog bites	✓	✓	✓	✓	✓
Seek immediate care at health center for dog bites	✓	✓			
Vaccinate animals	✓	✓			✓
Boil the milk for 30 minutes before drinking	✓	✓			✓
Sterilize knives and surfaces used to cut fresh meat	✓	✓	✓	✓	
Cook meat well, only eat meat that is well cooked	✓	✓			
Avoid eating meat from sick animals	✓	✓	✓	✓	✓
Avoid eating bushmeat	✓	✓	✓	✓	✓
Cover cuts or wounds on the skin when handling animals	✓	✓	✓	✓	✓
Wear protective clothing while touching carcasses			✓	✓	✓
Bury sick animal carcasses and aborted fetuses			✓	✓	✓
Avoid eating fruit already partly consumed by an animal				✓	✓
Store food in covered containers to protect it from rodents	✓	✓			

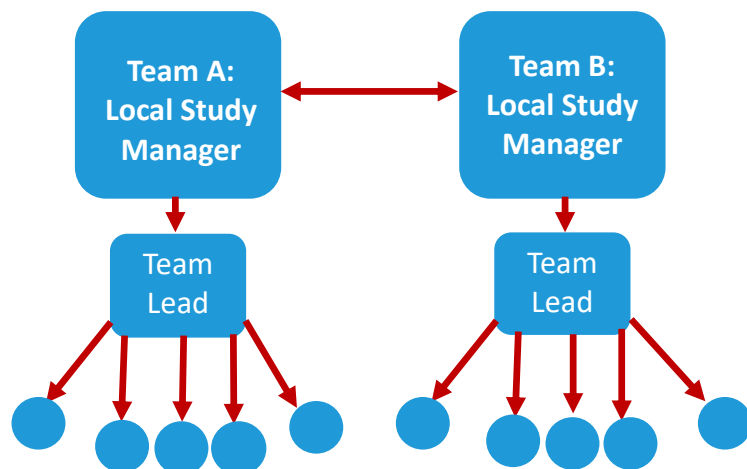
Direct observations took place with **animal handlers** or staff at veterinary offices. Data collectors spent between 4-8 hours with the participant, taking notes using a structured form and photo-documenting the participant’s interactions with animals.

The lead consultant and study manager recruited individuals to the study by hiring local mobilizers at each site. Mobilizers identified potential participants and read a recruitment script for either FGDs, IDIs, or the direct observation. The mobilizer described the study to potential participants as a research study that would help Breakthrough ACTION develop community programs and messages to prepare for outbreaks of diseases that come from animals. The mobilizers screened for eligibility (over the age of 18) at the time of recruitment. Interested individuals provided their contact information solely to schedule the research activity. Participants for the observation activity were also recruited from FGDs. The data



collection team with the help of the mobilizer then gathered the individual(s) for each research activity. Data collectors with the help of mobilizers organized each FGD or IDI at a location convenient for participants and in a place that would maximize the privacy of the activity. IDIs generally occurred in the office of the participant, while FGDs took place in community centers, churches or schools, or other community settings. Observations took place at work sites such as farms, veterinary offices, livestock markets, or slaughterhouses.

**Figure 1. Data collection team composition**



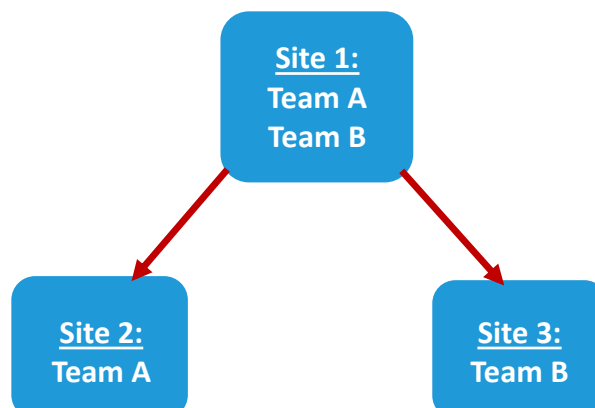
Data collectors administered the informed consent form to participants before commencing data collection. The consent discussion occurred in the preferred language of the participant, either in French, Malinke, Soussou, Poular, or Kpele. If a data collector conducted the consent process in a local language, he/she sight translated the French consent form accordingly. Researchers asked participants to sign the consent form. Those who were unable to sign their name could make

another identifying mark. Participants were given the “information note” to keep, while the data collectors retained the signature page for study records.

One data collector facilitated each IDI, while FGDs involved a small team of two to three data collectors, with one facilitating, one assisting (e.g., organizing the pile-sorting activities), and one taking notes. IDIs lasted an average of 45 minutes, with FGDs and observations lasting an average of 107 minutes and 6.2 hours, respectively.

The group of data collectors comprised two separate teams. Each team included one local study manager who would supervise data collection on the ground, one data collector to assist with logistics (Team Lead), and five additional data collectors (see Figure 1). The entire team collected data first in Conakry, to allow for constant oversight and feedback from the local study managers. After Conakry, the two teams separated, one working in Kankan and one in N'zérékoré (see Figure 2). Fieldwork occurred in September 2019 and lasted approximately two weeks. The local study manager facilitated a daily debriefing meeting to review field notes and identify any methodological or logistics issues that arose.

**Figure 2. Data collection chronology**



Local study managers held phone calls with the Baltimore-based research team approximately every three days during the active field phase to update on the progress of data collection and address any pressing issues.

Data collectors audio-recorded IDIs and FGDs and later transcribed the audio into French. At least one member of the research team verified the quality and accuracy of the transcription. This process included comparing the transcript to two minutes of audio for every 20 minutes of recording.

The Baltimore-based research team developed an initial coding framework, informed by the existing literature on zoonotic diseases and codes used for similar studies on zoonotic diseases conducted by Breakthrough ACTION in other Francophone West African countries. A team of six researchers—including the two local study managers and four data collectors—coded the transcripts using Atlas.ti. The coding team first coded one FGD and one IDI all together. At that point, each individual double-coded a transcript with one other individual coder, for a total of 14% (7 out of 48) double-coded transcripts. Coders met to agree upon their coding decisions—first in pairs and then the entire team. Once the team made final clarifications and adjustments to the guide, coding team members worked independently to code the remaining transcripts. This entire preliminary coding process took approximately two weeks.

After completion of the preliminary coding process, the PI led a five-day data analysis workshop using a participatory approach. The entire workshop involved a total of 12 people (including the PI). The methodological underpinning was both phenomenological and ethnographic. Fourteen stakeholders implicated in zoonotic disease research in Guinea—including representatives from relevant government ministries in Guinea, Breakthrough ACTION staff, the local research consultant, and two data collectors—participated in the workshop. Two participants each received one-half of the coded output for one region in advance of the workshop to review. Over the course of the five days, they followed a multi-step process to analyze the data. First, individuals would review a portion of their coded data for a particular set of codes and identify novel themes/ideas that appeared. Second, they would meet in pairs with the other person that had reviewed the same set of coded data to compare and agree upon

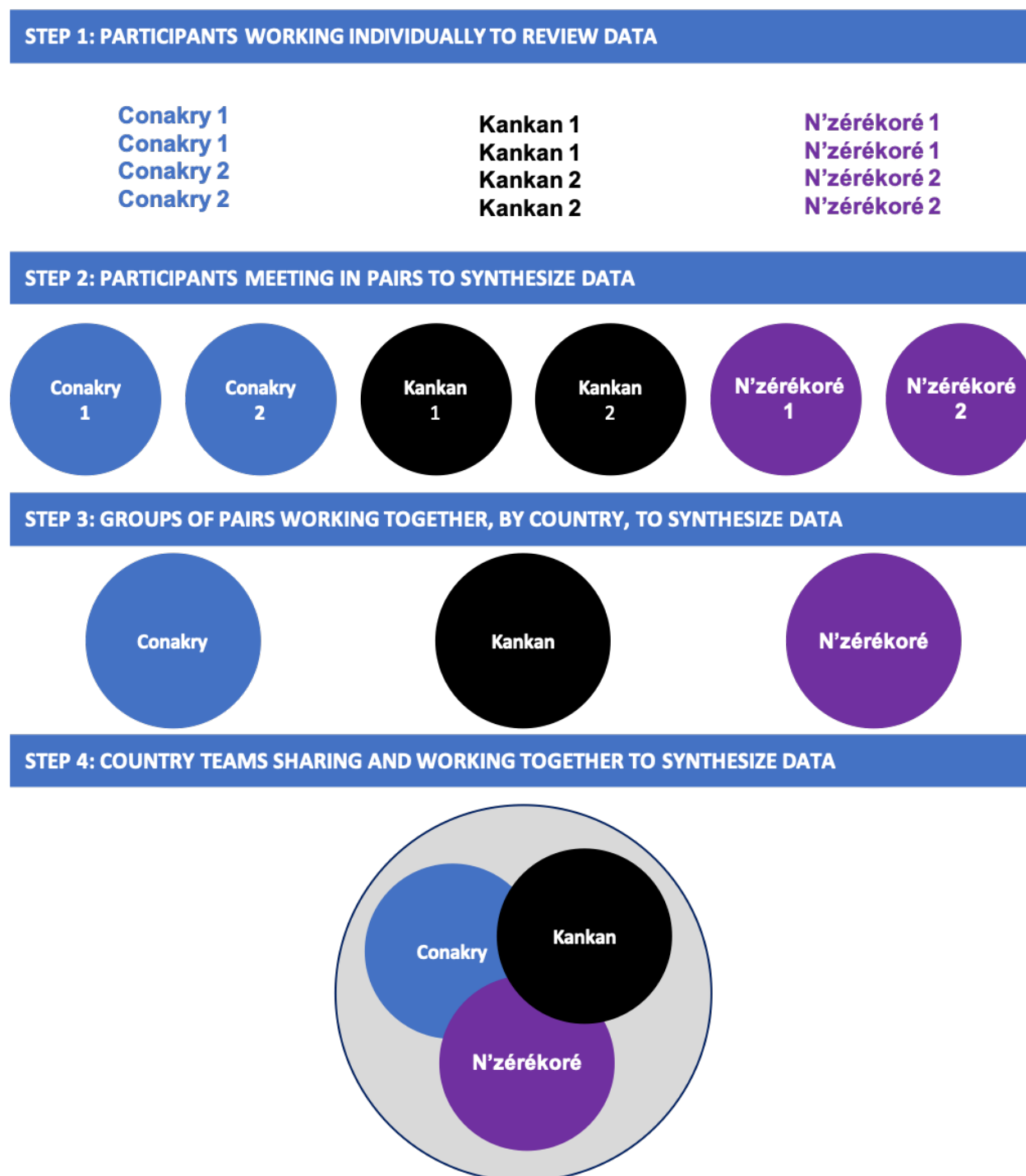


**Figure 3. Step 4 of Participatory Data Analysis Process**

themes. Third, each pair met with the other pair that reviewed the other half of the coded data for the same region. At this third step, the two pairs would agree upon the recurring themes for that region and would note them on VIPP cards, color-coded by category of participant (health provider, animal handler, community stakeholder, general population male, and general population female). Finally, each country team, which comprised four individuals, presented their themes to the other teams

(see Figure 3). In this step, the teams collaboratively synthesized themes by sub-population and site. (See Figure 4 for illustration of the four-step participatory data analysis process.) By the end of the workshop, participants produced a set of cross-cutting themes, insights with key quotations, and recommendations for zoonotic disease work in Guinea.

**Figure 4. Steps to participatory data analysis process**



# Results

The study collected data from a total of 244 individuals (FGDs=205; IDIs=24; Observations=15). The research team conducted eight FGDs, eight IDIs, and five observations per region. See Table 4 for breakdown of type of participant, per type of qualitative method. The vast majority of participants were male. A total of 58 participants were women, 53 of which participated in general population FGDs. In Kankan, three women participated in an FGD of animal handlers (vendors). In addition, in N'zérékoré, one woman participated in an FGD of animal handlers (butchers) and one of the IDIs with community leaders was with a woman.

**Table 4. Number of participants, by qualitative method**

POPULATION		IN-DEPTH INTERVIEW	FOCUS GROUP	OBSERVATION
Health Professional	Human health providers	6		
	Veterinarians	3		3
Community Stakeholder	Community leaders	12		
	Media professionals	3		
Animal Handlers	Butchers		30	4
	Farmers		19	5
	Vendors		32	3
	Hunter/transporters		14	
General Population	Women (urban)		34	
	Women (rural)		19	
	Men (urban)		37	
	Men (rural)		20	
	<b>Total</b>	<b>24</b>	<b>205</b>	<b>15</b>

## Free listing: What zoonotic diseases are “top of mind” for participants?

The first activity asked individual interview and focus group participants to list all of the diseases they could think of that can come from animals. The purpose of this activity was to explore how participants conceptualized or defined the domain of the study (zoonotic diseases), and which diseases were most salient or accessible (“top of mind”).

Overall, 223 individuals participated in the free listing exercise, with six refusals. There were 77 lists in N'zérékoré, 83 in Kankan, and 63 in Conakry; 165 were from men and 58 from women. Participants gave an average of 3.11 responses per list.

Among the 223 free listing participants, 84% were able to provide at least one recognizable disease name. Figure 5 depicts the most frequently mentioned disease names. Other types of responses included simply naming animals (e.g., individuals would say “there’s a disease that comes from sheep”), symptoms (e.g., “stomach ache” or “cough”), modes of transmission (e.g., “diseases caused by eating poorly cooked meat”), or affected body parts (e.g., “disease of the liver,” “gall bladder”). In some cases (14%), participants listed only symptoms observed in animals, such as “the disease that affects the hooves of a cow” or “affects sheep and gives them seizures.”

**Figure 5. Frequency of disease name mentions in free listing**

Among all responses, 11% had no direct translation from the local language into French. For example, “djöfö” is a word in one of the local languages (Malinké) that occurred on 22 lists and was described as a disease that causes inflammation of the lungs; the research team was unable to identify a clear translation in French.

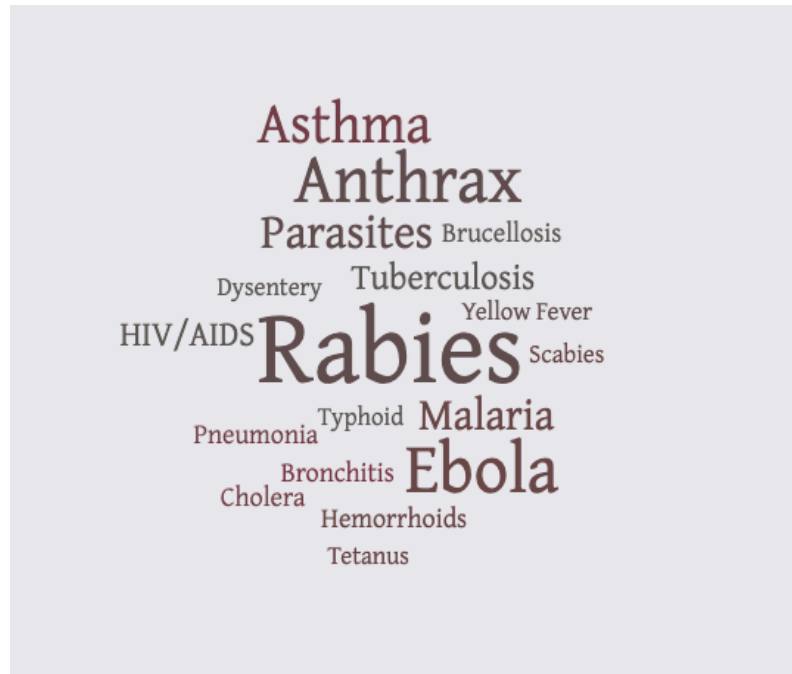


Table 5 summarizes (overall, by site, and by gender) the frequency of the top named

diseases (see Appendix 1 for additional frequency summaries). Rabies appeared most frequently—with mentions in half (45%) of lists—followed by Ebola, anthrax, and asthma. When broken down by sub-population, a few differences surfaced. Rabies received the most mentions across almost all sub-groups, with the exception of rural females and community leaders. Rural females mentioned Ebola more often (42.1%), followed by human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV/AIDS) (31.6%), parasites (15.8%), and then rabies (10.5%) and anthrax (10.5%). Community/opinion leaders, on the other hand, named asthma most often (57.1%), followed by rabies (42.9%), Ebola (35.7%), and then malaria (21.4%) and anthrax (21.4%).

Of the six priority diseases of interest for this study, four of them (rabies, anthrax, avian influenza, and brucellosis) were in the top 10 diseases mentioned. Non-priority diseases also in the top ten included Ebola, asthma, parasites, malaria, tuberculosis, and HIV/AIDS. RVF received two mentions (one from a health worker and one from a veterinarian) and Lassa fever received one mention (from a man in the general population in Conakry).

**Table 5. Free listing of diseases that come from animals: Frequency of diseases mentioned, by geography and gender (Guinea, September 2019)**

Disease	Overall n (%)	Site			Gender	
		<i>N'Zérékoré</i> n (%)	<i>Kankan</i> n (%)	<i>Conakry</i> n (%)	<i>Men</i> n (%)	<i>Women</i> n (%)
<b>Rabies</b>	100 (44.8%)	45 (58.4%)	19 (22.9%)	36 (57.1%)	80 (48%)	20 (34%)
<b>Ebola</b>	60 (26.9%)	25 (32.5%)	10 (12.0%)	25 (39.7%)	45 (27%)	15 (26%)
<b>Anthrax</b>	57 (25.6%)	16 (20.8%)	33 (39.8%)	8 (12.7%)	53 (32%)	4 (7%)
<b>Asthma</b>	41 (18.4%)	9 (11.7%)	1 (1.2%)	31 (49.2%)	28 (17%)	13 (22%)
<b>Parasites</b>	31 (13.9%)	12 (15.6%)	11 (13.3%)	8 (12.7%)	24 (15%)	7 (12%)
<b>Malaria</b>	27 (12.1%)	4 (5.2%)	4 (4.8%)	19 (30.2%)	21 (13%)	6 (10%)
<b>Influenza, avian</b>	26 (11.7%)	11 (14.3%)	10 (12.0%)	5 (7.9%)	20 (12%)	6 (10%)
<b>Tuberculosis</b>	16 (7.2%)	10 (13.0%)	3 (3.6%)	3 (4.8%)	12 (7%)	4 (7%)
<b>HIV/AIDS</b>	14 (6.3%)	8 (10.4%)	1 (1.2%)	5 (7.9%)	3 (2%)	11 (19%)
<b>Brucellosis</b>	6 (2.7%)	1 (1.3%)	3 (3.6%)	2 (3.2%)	6 (4%)	0 (0%)
<b>Bronchitis</b>	5 (2.2%)	1 (1.3%)	4 (4.8%)	0 (0.0%)	4 (2%)	1 (2%)
<b>Cholera</b>	5 (2.2%)	1 (1.3%)	1 (1.2%)	3 (4.8%)	2 (1%)	3 (5%)
<b>Hemorrhoids</b>	5 (2.2%)	2 (2.6%)	1 (1.2%)	2 (3.2%)	2 (1%)	3 (5%)
<b>Pneumonia</b>	5 (2.2%)	4 (5.2%)	1 (1.2%)	0 (0.0%)	4 (2%)	1 (2%)
<b>Influenza, swine</b>	4 (1.8%)	2 (2.6%)	1 (1.2%)	1 (1.6%)	4 (2%)	0 (0%)
<b>Typhoid</b>	4 (1.8%)	1 (1.3%)	1 (1.2%)	2 (3.2%)	3 (2%)	1 (2%)
<b>Dysentery</b>	3 (1.8%)	2 (2.6%)	0 (0.0%)	1 (1.6%)	3 (2%)	0 (0%)
<b>Influenza, non-specific</b>	3 (1.8%)	1 (1.3%)	1 (1.2%)	1 (1.6%)	2 (1%)	1 (2%)
<b>Scabies</b>	3 (1.3%)	3 (3.9%)	0 (0.0%)	0 (0.0%)	2 (1%)	1 (2%)
<b>Tetanus</b>	3 (1.3%)	0 (0.0%)	0 (0.0%)	3 (4.8%)	1 (1%)	2 (3%)
<b>Yellow fever</b>	3 (1.3%)	3 (3.9%)	0 (0.0%)	0 (0.0%)	3 (2%)	0 (0%)

Table 6 summarizes the top named diseases in order of salience, as defined by average position on the list. A salience score closer to one means that participants named that disease earlier on and is, therefore, more salient (top of mind) to participants. For salience, the order of the mention matters more than the total number of mentions. For example, although rabies received the greatest number of mentions overall, pneumonia and HIV/AIDS achieved slightly stronger salience. Nevertheless, rabies had an average position of just under two, meaning that for the 100 participants that named rabies, it tended to be around the second response given. In terms of the PZDs of interest for this study, rabies and anthrax were more salient (1.93 and 2.10, respectively) than avian influenza and brucellosis (3.12 and 3.5, respectively). Moreover, there were over 15 other diseases with higher salience scores than avian influenza and brucellosis, yet only a few other diseases more salient than rabies or anthrax.

**Table 6. Saliency\* for top named diseases, free listing (Guinea, September 2019)**

Disease	Total mentions	Saliency
Pneumonia	5	1.50
HIV/AIDS	14	1.86
Rabies	100	1.93
Anthrax	57	2.10
Cholera	5	2.20
Hemorrhoids	5	2.20
Tuberculosis	16	2.25
Tetanus	3	2.25
Influenza, non-specific	3	2.33
Asthma	41	2.35
Malaria	27	2.39
Influenza, swine	4	2.40
Ebola	60	2.60
Yellow fever	3	2.67
Dysentery	3	2.67
Parasites	31	2.72
Bronchitis	5	3.00
Scabies	3	3.00
Influenza, avian	26	3.12
Brucellosis	6	3.5
Typhoid	4	3.75

\*Saliency refers to the average position of a particular response within the order of items in lists including that particular response. Numbers closer to one mean that the response was mentioned earlier on in the free listing process.

## Animal pile sorting: How do people conceptualize animal types?

In Conakry, the main classification system was by usefulness (either useful or not useful, or type of use), and particularly consumption. Goats, cows, sheep, and chickens were grouped together as important and useful because they were “authorized” for consumption. Dogs and cats were grouped as domestic animals that served another purpose besides consumption, such as watching the house or catching rodents. Bats and rodents were considered not useful. Pigs were often grouped with bats and rodents because Muslims were not permitted to eat them, and Guinea is approximately 85% Muslim. Participants also grouped based on potential for causing disease.

There was more variability in classification systems in Kankan. Kankan participants grouped animals based on their appearance (e.g., size, horns, claws, wings), their proximity (close to humans or far from humans), or what the animals eat (carnivores vs. herbivores), as well as their usefulness and edibility. Groups in Kankan and N’zérékoré also tended to take into account the relationship of animals to one another, grouping together animals that could share a pen or would not harm or eat each other. Participants in N’zérékoré differentiated generally between domestic (e.g., chicken, goat, cow, sheep,

dog, cat) and wild animals (e.g., rodent, bat), also framing the same groups as city vs. bush animals. The pig tended to be difficult to classify, based on religious factors around consumption, as well as differing perceptions of its usefulness or harm and whether it was wild or domestic.

## Cross-cutting themes: What factors influence interactions with animals or zoonotic diseases?

The participatory analysis workshop produced seven cross-cutting themes that arose across multiple prevention behaviors and types of study participants. Understanding these themes provides a holistic view of the factors that may influence zoonotic disease prevention.

### Theme 1: Although people may have general basic knowledge and awareness of zoonotic diseases, they often fail to put knowledge into practice.

Participants expressed basic knowledge about zoonotic diseases, including the link between specific behaviors, exposure to disease, and risk of infection. For example, participants commented that many people are aware of the link between rabies and dog bites. A hunter from Kankan stated, *"We contract dogs' madness from their bites. And when a rabid dog bites a man, he too becomes furious and violent like that dog... any other animal bitten by a rabid dog becomes rabid too."*

At the same time, participants shared that people in their community often do not put the knowledge into practice, such as boiling milk for 30 minutes before drinking to prevent contracting tuberculosis. For example, a rural man from Kankan, when discussing boiling milk for 30 minutes, commented:

*This is not easy to achieve in our community, as some prefer fermented milk. People's ignorance about the danger of drinking unheated milk is another obstacle to achieving this behavior. Boiling milk is an unknown practice in our community. It is not in our habits; we think that unboiled milk is sweeter than boiled milk.*

### Theme 2: People's traditional and religious beliefs, existing habits, and norms in their families and community may influence their ability to engage in prevention behaviors.

Participants described multiple ways in which existing habits and beliefs could positively or negatively influence their behavior. For example, Islamic beliefs may protect people from contracting a zoonotic disease by forbidding the consumption of meat from an animal that dies on its own or has been touched by animals like mice that are known carriers of disease. One farmer in Kankan stated, *"When the animal dies of its own accord, in our house here, it's not difficult because our religion doesn't allow it. We're all Muslims. Any animal that dies of its own accord, we don't want that here. But if the animal's throat has been cut, we don't throw it away."* A woman FGD participant in Conakry similarly commented when describing eating mice, *"... But since I heard that it is written in the Koran, that anything the mouse puts its mouth on, not to eat that thing anymore - when the religious authorities said that, I didn't do that anymore, I believed them."*



At the same time, some participants provided cases when other positive perceived benefits outweigh traditional or religious beliefs. For example, one farmer in N'zérékoré argued, *"As he says these animals are rich in vitamins. Even if there is a devil or an angel who comes down to earth to tell us not to eat or consume this meat, we are going to do it anyway."*

Participants also provided competing beliefs around perceived hygienic practices for handling/cooking meat that could deter people from adopting proven healthy behaviors. For example, one butcher in Conakry described a behavior he perceived as preventive, commenting, *"When we slaughter a sheep, we bring water and we place the meat inside. After the work of butchering is completed, you can take the meat out of the water and eat it without any problem."* A female FGD participant from N'zérékoré provided another belief, commenting *"...when you kill a sick chicken the kids will prepare it with a lot of hot pepper and with this quantity of hot pepper the illness disappears from the meat."* A male FGD from the same region remarked *"some older people say that the poop from an agouti is a good medicine, even I've eaten it. So it is something important which will not permit people to abandon it."*

Participants further highlighted the importance of personal preference, such as preferring bushmeat not only for the perceived health benefits but also for the taste of it. A farmer from Kankan remarked, *"Bushmeat and city meat do not have the same sweetness. That's a first thing, they don't have the same sweetness."* He continued, in response to a question about the advantages of eating bushmeat, *"The first importance is the taste. Secondly, we have been told that it is good for health compared to city meat."*

The routinization of behavior to the point of being a habit surfaced as a key influence as to whether or not people engaged in behaviors that could help reduce the risk of zoonotic diseases. Some habits, such as washing up after slaughtering and butchering animals, positively influenced one's health. One butcher from Conakry stated, *"When we finish work in the slaughterhouse, we first clean all the work materials and then wash ourselves properly before leaving."* Behaviors that are not routine practice or a cultural norm, such as boiling milk, were more difficult to become habitual practice for people. An animal seller from Conakry commented, *"Up to now I drink fresh milk, freshly treated without filtering, I like this a lot. Me, I have never heated it, I just don't have the habit."*

### Theme 3: Veterinarians play a vital role in the control and prevention of zoonotic diseases, including in the diffusion of information.

The conversations with the lay public, animal handlers, community leaders, and health providers (both animal and human alike) underscored the central role veterinarians play in the prevention and control of zoonotic diseases. Their multifaceted responsibilities included the detection, diagnosis, and treatment of disease; the vaccination of animals (domestic and livestock); and the diffusion of information.

Participants described multiple ways in which veterinarians detected diseases, including visiting local markets to determine whether meat is fit to be sold. One urban association leader in Kankan said:

*As for rabies, it's [transmitted] from the bite of a rabid dog. As for anthrax, it's when you eat meat from an animal that got anthrax. And that's why no meat is sold without veterinary inspection. So, veterinarians come very early in the morning to the slaughterhouse. They are there for the slaughter. They take the animals' livers and other things to examine. They are the ones who authorize the sale of the meat to the public.*

The role of determining whether meat is fit to be sold served a dual purpose of detecting disease and protecting human health. One butcher in Conakry acknowledged:

*It is the veterinarians who can help us protect ourselves against these diseases. Because when an animal gets sick, the only one who can know whether the meat of that animal is edible or not is the veterinarian. For example, when animals get sick we call in the vets to treat them. Sometimes the animal also dies like that. We also call in the vets to see whether the meat is edible or not. He checks the liver, the spleen or the heart. If it's good, he tells us, that's why we work with them every day.*

Participants often described veterinarians as a first line of defense, e.g., when someone is bitten by a potentially rabid dog. In this circumstance, the veterinarian's role was to determine whether the animal is infected and to subsequently refer the person to a health facility for treatment. A farmer from Kankan stated, in reference to rabies:

*Well, a dog that is sick, when he is in the city, it's easier for him to pass it [rabies] on to the children. As soon as a child is infected, when you know the child is infected, you go to the vet. In the past, we used to be afraid. But nowadays there are bites. As soon as you know that a child has been bitten, you have to go see the veterinarian.*

All types of participants also described veterinarians as a trusted source of information for ways to care for animals. Veterinarians concurred with what other participants said. For example, a veterinarian in Conakry remarked:

*Well, the community often asks us questions. There are certain things, there are things that they ask us questions about. Doctor, if you do it like this, what is this? What is that? And we explain it to them. How to behave to prevent diseases. How to raise your animal or how to feed it. We explain all of these things.*

Participants also stressed the important role that veterinarians play in raising awareness of possible outbreaks in communities. In addition to informing the community at large, veterinarians also informed the appropriate authorities about potential outbreaks. For example, a veterinarian from Kankan noted, "...when we see a person bitten by a dog, immediately, we complete an assessment form which is signed by the Prefectural Director of animal husbandry and send the victim directly to the [Epidemic Treatment Center]."

#### Theme 4: Access constraints and structural barriers prevent people from engaging in healthy behaviors.

Study participants described a variety of different ways in which existing structural constraints and lack of access to necessary resources (e.g., time, space) hamper people's ability to engage in prevention behaviors.

Participants cited a lack of preparedness by authorities and a dearth of properly equipped health facilities as major structural barriers contributing to the spread of zoonotic diseases in Guinea. A community media professional from Conakry commented:

*I believe that the authorities must, because governing is anticipating, as we like to say, governing is anticipating, you have to anticipate everything. We must not say that we are waiting for the disease before dealing with it, they really owe it to each commune. For example, let us say, each commune talking about the situation in Guinea must have a hospital worthy of the name. This is a way of preventing it, because when we have health centers that are well equipped with qualified personnel, I believe that because the epidemic does not fall suddenly from the sky, it is accumulated, accumulated things that explode, all right.*

Participants mentioned the difficulty in accessing veterinarians, particularly those in more rural areas where there may not be a veterinarian in each village. In addition to physical access, the cost of paying for transportation might prohibit people from making the trip to a neighboring town. A male FGD participant in an urban part of Kankan remarked, when talking about people's ability to seek immediate care after a dog bite:

*It's easy if it's in Kankan city but it's difficult if it's in the villages. For example, if a dog bit someone in our village during the holidays. Before you got a motorbike to take the child and send him to Kankan, he suffered because even if you get the motorbike if you can't afford to put gasoline in it, it's difficult. Before solving the problem of how to afford it, the child suffered a lot. If the problem of money is solved it's easy. But a dog or snake bite will make people suffer if it's in the villages because of the cost of transport, so it's difficult. It's not difficult for those who are in the city.*

In addition to the cost of transportation to reach a veterinarian or a hospital, people may find it difficult to afford the cost of treatment. A male FGD participant from Conakry stressed, *"This is not a refusal for some people but simply a lack of means. Others are also afraid to go and test for a life-threatening disease. Because of the exorbitant cost that treatment can involve."*

Participants cited other financial constraints as often impacting people's ability to adopt health-promoting behaviors related to zoonotic diseases. In particular, one's financial status may influence their ability to afford healthy meat or whether they have to take a risk and eat meat that may make them sick. One farmer from Kankan described, when talking about the feasibility of avoiding eating meat of a sick animal, *"You can't afford the healthy meat. That's what makes it difficult. Otherwise it's not hard to throw away the meat of a sick animal. But since you can't afford the healthy meat, you find yourself in the situation of buying the unhealthy meat."*

People further acknowledged that behaviors related to prevention (e.g., vaccinating animals, wearing protective clothing when handling animals, and disinfecting animal enclosures) are important, but following through can be difficult because necessary supplies are too expensive or difficult to find. When talking about the feasibility of using protective clothing in his job, one farmer in N'zérékoré stated, *"Well it's quite normal, because you, who are breeders, you are talking about your future. But the lack of money makes us do not do the things we believe are good for everyone's health. It's easy, but the lack of financial means, we don't do it."*

In addition to financial means, the lack of time also seemed to negatively impact people's ability to perform certain behaviors like disinfecting animal pens and taking animals outside of the community to graze. For example, during an FGD of animal handlers in N'zérékoré, participants highlighted the ways in which lack of money and time make it difficult to regularly disinfect animal pens. One farmer commented:

*Disinfecting the pens is not easy for us breeders because the means are not there, because every morning to feed them first is a problem because it takes time, not to mention buying the disinfectant to sanitize the pens. So, we don't have the financial means to do that here. Not only do we not have the means but also the time to have them disinfected.*

Another responded:

*Well, in the morning it seems that you don't have time because you have to go and harvest, so you say to yourself: 'I'll come back afterwards to look after and feed the animals.' We can go a week without seeing them. The animal doesn't even know if you've disinfected or not. So, it's not easy to do it, but also the breeders don't have the time. It's not only that the means that are lacking, but the time to go and do it.*

The lack of space, due to physical and financial reasons, also recurred as a major constraint in people's ability to keep animals separate from living areas. Participants concluded that this lack of space resulted in many animals either roaming around town or living in close contact with people. A rural community councilor in Kankan described, *"When you raise an animal, you really want to benefit but with us here, when you do your breeding, you don't have where to keep them."* Participants further described that this lack of space not only facilitates the spread of disease but also contributes to accidents and other conflicts in communities where animals are left to roam freely. An urban association leader in Kankan stated:

*Before we used to put the animals in pens and look for a herdsman. Nowadays it's difficult to find herdsman. So, the animals are on the fence. Imagine when you have a certain number of animals; coming to put them on the fence every day and coming to put them on the fence at home is complicated. As for small ruminants, for example, it happens that they are released in the city. So sometimes they are the subject of accidents, killed by vehicles, etc. As for dogs, it's a bit complicated if you don't have a closed yard. It's complicated. It's difficult to control.*

## Theme 5: People rely on multiple sources and channels of information, which can be an asset for the dissemination of information during emergencies.

Participants often mentioned the importance of raising awareness across communities related to zoonotic diseases. For example, a health worker from N'zérékoré argued, *"If a disease arrives, or we only hear that the disease is in such and such a village, let's make haste and inform the other people so that they too are aware..."*. Through the many IDIs and FGDs, what surfaced was the importance of multiple channels and sources for reaching people. Participants shared that Guineans get their health information from a variety of channels and sources, ranging from interpersonal communication to social mobilization events to a variety of mass/social media platforms. For example, an animal handler from Kankan described:

*... one gets information comes from many sources. There are radios. Some information goes through community leaders. They send people to raise awareness among the population. Some information goes through the religious authorities to reach religious people; some information goes through the community patriarchs and leaders. There are many sources of information... In general, if it is said to our elders, to the imams, reliable radio broadcasts, if it also comes from the mouths of doctors to reach the population, we will respect this information.*

Likewise, participants in an FGD of rural women in Kankan had the following exchange about the sources people their community turn to:

*Participant 9: One of these sources is RFI radio. Because it's not easy for RFI to lie. But we have radio stations here that go straight to the information source. There are many such radio stations.*

*Participant 8: The source I believe is the religious leaders and what they say. Everyone says, 'It's at the mosque or the church where I learned about it.'*

*Participant 2: One of these sources is television. When something is on TV, people run to follow it. And a lot of people watch TV.*

In talking about the various channels, participants described television and radio as sometimes useful, especially in their ability to quickly reach large numbers of people. For example, when asked what communication method they prefer, an urban woman in N'zérékoré said, *"As for me, I would say that the radio is the best source of information because during the Ebola epidemic we were doing sensitization on the radio and these sensitizations allowed us to know how to prevent diseases transmitted from animals to humans."* An association leader from Conakry highlighted the importance of rural radio, in particular, in quickly reaching people in multiple languages, stating that *"it's effective because it is available in all languages. Not only in French, but in our different languages..."* An association leader from Kankan similarly emphasized the importance of rural radio in conjunction with interpersonal communication by trusted leaders, stating:

*... rural radio plays an extremely important role. We see that even during the periods of vaccination of children against polio. It is rural radio that circulates all day long throughout the city to sensitize the women to accept that their children are vaccinated. During Ebola, in the*

*mosques and during the sermons, in the churches, people also spoke about it, and therefore the precautions issued by the health authorities were communicated to the population.*

Participants described trusting mass media when linked to respected messengers who shared verified information. For example, a veterinarian from N'zérékoré said *"almost the entire population has the receivers and it allows them to have information on an equal footing."* Yet he cautioned that he trusted the media because *"...the health information it communicates comes from the health authorities. That is why I find it reliable."* It was not until explicitly asked about whether they got information from radio and television that the veterinarian confirmed they hear information from *"radio and TV, in short, the media in one word."* Similarly, an association leader in Kankan commented that during an epidemic they get their information from alerts from respected health sources, adding, *"It's the alert that they provide to the population about an epidemic that might happen. We are obliged to take precautions and the civil society also supports them."* He continued to say that community leaders support these efforts by telling their community via rural radio what the health authorities have advised.

Participants' viewpoints on social networks, specifically Facebook, was mixed, however. A hunter in Kankan summarized its primary strength that *"everyone's on it now."* At the same time, participants questioned Facebook's credibility, as exemplified by a media professional who cautioned:

*... right now, as soon as there's an event somewhere, people post on Facebook. So, if you're friends with the person or if one of your friends is friends with the person, everything follows that person can say 'ah it looks like there was such a thing.' We're going to try to check if it's true because not all the information on social networks is real, good information. So, we try to verify.*

Although mass media might be a source where people get information, participants consistently mentioned turning to some type of interpersonal communication source. For example, a health worker from Conakry explained that he prefers word-of-mouth communication because it's *"a means of direct contact. That is to say I come, I am on the ground, I see the person or the person tells me I have such and such a person, a sick person who is lying at home who has such and such. I come. I look."* Participants viewed community leaders, religious leaders, and health providers as respected sources of information before, during, and after a crisis. For example, a woman from urban N'zérékoré summarized:

*Health information is something that is not hidden. If there is a health crisis, we inform religious leaders so that they can pass on the information. It's the same for neighborhood leaders and health agents. [They] are responsible for passing on information because not everyone listens to the radio.*

Community and religious leaders also embraced this responsibility. For example, a rural community counselor in Kankan said, *"My role is to raise awareness. To inform, to make my population aware of the danger of the epidemic."* He continued to outline that people in parts of the country may not believe what they hear about an epidemic but that they will come to believe local leaders because they are trusted. He further commented that word of mouth was the preferred channel because *"not everyone*

*listens to the radio, not everyone watches social networks, not everyone watches television.”* Other participants concurred that interpersonal communication can play an especially vital role in linking those who have access to mass media, health authorities, and social networks to those who do not.

Community and religious leaders and health providers may receive information on outbreaks from government health authorities, which they then pass on to their communities in a variety of ways. A community leader from Conakry described:

*We receive health-related information from the health authorities who invite us to the commune to inform us that there is this or that disease currently in town or in the country and ask us, in turn, to go and inform people. Sometimes we get information from important people who have reliable sources who can inform you of a current disease.*

An association leader in Conakry commented, *“Yes, religious people too, there are messages that go through the mosques. In the churches we can give information about that. Because often when we want to raise awareness about important things, we go through the clergy in mosques and churches to get the message across.”*

This same community leader later described the responsibility of local leaders to verify information before passing it on to their communities. He remarked, *“First, we check the information, before passing it on to the population. You yourself have to check if it turns out to be true. You go out for to raise awareness of the population. But you can never go out to inform without knowing if what you have received as a message is real.”*

Community leaders also stressed that they want their communities to be healthy and see themselves as a trusted link between the community and health providers. They described taking pride in their role as disseminators of information during a crisis. A district leader in N’zérékoré stated, *“...the duties I assume as head of the neighborhood, is to put my neighborhood in order, is it not? To frequently increase awareness among my fellow residents, to educate them, to convene them to meetings every day. To bring them information from the municipality or the State.”*

A community leader in Conakry similarly remarked about his role and his community’s trust in him:

*I am the chief of the locality. When an epidemic occurs, I am concerned about the health of my community. I put myself in front of all the teams that come to assume this responsibility. I myself go out, I will show you this megaphone. I power up the megaphone. I put it in front of my mouth. I go from family to family, from sector to sector, to say to the population, be careful, there is an epidemic in our community. We have to make ourselves available to fight against this epidemic. So from morning to evening every day, if it's a week, if it's five days, if it's a month, I can't stay quiet because I have the conviction. I love my community. I have to do it. And during an epidemic, when I myself as the chief of the locality as soon as I go out and people listen to me and see me, they will say that this is serious.*

Participants shared that people are more likely to trust information coming from someone in their own community, whether it be a leader or a peer, during an epidemic. A mass media professional described this trust during an epidemic, commenting:

*... when there is a native of that village who is on the awareness team or the intervention team, people will be able to have more confidence in this team than if only strangers had come. They need to favor local resources (the people who are from there) in epidemic areas. They need to promote these people to participate on an equal footing with other actors. Even if they are not specialists, but when people (the community to which they belong) see them in front of these people, they can have more trust with the authorities.*

In addition to relying on some form of interpersonal communication, the exchange that occurred might be multi-directional, with the community turning to health providers and leaders for information as well as the health providers and leaders looking to the community for information. In the same light, participants stressed the importance of multiple levels (local, regional, and national) for coordinating and sharing information. For example, a health worker from N'zérékoré explained:

*... hunters can give me information. And the veterinary service also collects information. Since we are in the same platform, they can share information. They have tested this collaboration here through One Health. We are informed. Starting with the direct way in which we are informed, I also send the information to my management. That's how I do it.*

Likewise, when asked where they get information about animal health, the veterinarian from N'zérékoré that above mentioned trusting the media when the message comes from authorities, commented:

*We get information on animal health through the farmers and through community animal health workers, because in 90% of our villages or neighborhoods there are community animal health workers. When they notice a case or behavior, they call us by telephone. For example, if a farmer notices that his animal is not doing well, he is obliged to inform the veterinarian directly.*

When asked if there were other sources they turned to for information, he responded, “Apart from this, there are in the sub-prefectures in our villages there are representatives of the livestock service. We call them the heads of the livestock posts this can inform us about it.”

## Theme 6: People live in a world with a lot of uncertainty, which can make it difficult to adopt effective prevention behaviors.

Participants in all three regions described the challenges of living in a world with a lot of uncertainty when it comes to the health status of animals and zoonotic disease. Participants spoke about the lack of control they have over their neighbors' and community members' ability to properly keep their pets, particularly in the context of dogs and rabies. This uncertainty and lack of control participants described may manifest in multiple ways, including not knowing whether people vaccinate their pets for rabies, neighbors letting their pets/animals run astray, and the presence of stray animals. As one woman in urban N'zérékoré put it, “I will say that I am worried that people raise dogs just to do it. They don't take



*care of them. They don't vaccinate them, and these dogs are left to fend for themselves. They are not tied up and if they manage to bite you, it becomes complicated."* A male FGD from urban Conakry similarly remarked:

*As my colleagues have said, disseminating information among the population to prevent these diseases is useful. But what is more useful is for NGOs to join forces with the government. You can prevent disease, but it is difficult to avoid a dog left to its own devices. There is no way to avoid them. It is also not easy for individuals to take initiatives to vaccinate stray dogs.*

Much uncertainty also lies around the health status of animals, whether of one's neighbors' dogs or the meat they buy in the market. Participants expressed the ongoing uncertainty and lack of trust in the quality, status, and type of meat they purchase/consume. For example, a man from urban Conakry commented about avoiding eating meat from a sick animal:

*For me, it's not easy, because someone can kill a sick animal, and you who come to buy, you don't know. You buy. You send it home. You prepare it. And if it is badly cooked, if you eat it, you contract the disease. Or even if you prepare it well, but if the animal has been sick, you contract the disease too. So really, it's not easy at all, because we don't know where the animal was killed or if it was vaccinated or not with the veterinarians.*

Participants also described not knowing the health status of meat, the type of meat, or how well it was cooked when eating outside the home, such as while visiting a friend's house for dinner. Participants also highlighted the challenges to determining what type of meat is being sold—whether bushmeat or livestock. A man from urban Conakry assessed the complexity of avoiding eating bushmeat, saying, *"It is more or less difficult because there is no bush here. But if I buy meat from a travelling salesman, I can't find out the origin of the meat."* Another man added, *"If I visit someone and he hands me good meat I cannot verify its origin."*

Uncertainty around the hygienic practices of people slaughtering animals for meat consumption also surfaced. For example, when talking about the behavior of sterilizing cutting surfaces and utensils, a hunter from Kankan stated, *"People cut the animals' throats without cleaning the knife before putting it in the sheath just as many women can also take up to 3 days without washing their knives. These are the consequences of negligence and lack of control."*

In some situations, people may have to use or borrow materials from others who may or may not practice the same level of hygiene. One urban woman in Conakry lamented when assessing the feasibility of sterilizing knives and cooking surfaces, *"But typically it's not one person who actually uses it [a knife]...you're getting ready, you're in a hurry, but you don't see your knife. So, you have to go to your neighbor's house and borrow her knife real quick. See? So it's not easy."*

## Theme 7: People place great value on their animals for their livelihood, which influences their behaviors.

Participants shared that for many people in Guinea, their animals are their main source of income, investment, or savings. A man from urban Conakry offered examples of why people might not call the veterinarian when their animal is sick, stating:

*The reasons for raising animals are not the same. Some raise a sheep for example to make a sacrifice. When this animal falls ill, this farmer will try to treat it. Others raise animals for their own consumption, so when these animals get sick, they kill them and consume them immediately. Others raise animals for commercialization. So when they get sick, to avoid becoming a loss, he calls a veterinarian to take care of the animal. But if the animals are not for consumption, they kick it out of the house or try to kill it to dispose of it.*

These various values placed on livestock may, in turn, drive and impede prevention behaviors. Participants expressed interest in keeping their animals healthy in order to safeguard their investment. As a woman in rural Kankan explained, “If you vaccinate them over time, they’ll live a long time. They’ll reproduce. You’ll reap maximum benefit.” In addition, participants recognized the link between animal and human health, and the benefit of prevention behaviors, such as keeping animals and their enclosures clean. Several women in urban Kankan discussed:

*Participant 5: Disinfecting the cattle pen is not difficult. If you want to profit from your cattle, you have to take care of them. You have to keep the area clean. When you disinfect, you yourself will benefit from good health. Even someone else who finds the place clean will like the pen to be theirs. That's because of the cleanliness. So, you have to disinfect.*

*Participant 7: As she says, if you clean the cattle pen, next you wash the animal's body, since it is not enough to only clean the area, if you clean the body; since the animal pisses and shits there, if you clean that area and then clean the animal's body itself, not only will the animal be healthy. Because if you see that the animal contaminates the human being, the animal itself must first be healthy. First you clean where the animal sleeps, then you clean the animal. So, if these two are clean, and the animal is well cared for, you who eat it will be healthy. But if this place is not clean, you yourself as a human being will not have good health.*

At the same time, the challenges around poverty and demands on providing for their family may complicate people’s desire to keep their animals healthy. For example, because losing animals to illness could mean financial ruin, people may hide sick animals or sell infected meat so as not to incur a loss. An exchange between other urban male participants from the same Conakry FGD about when people decide to kill a sick animal noted:

*Participant 1: When there are no more resources, before the animal becomes so weak that it no longer serves any purpose to people. So people prefer to kill to eat it so that it will at least serve some purpose.*

*Participant 3: Uh..., killing the animal when you know it's really sick is hard, especially if it's a cow. If there's no more hope, it's true. But for money, there's more hope, for money. He knows that if the animal dies like that, he's not going to benefit at all, so he anticipates. He kills the animal and then he sells the meat, you know. That's also the impact of poverty.*

In a similar light, a media professional in Conakry summarized:

*... Even if you say the cattle there is affected by this, we have to slaughter it so that it doesn't contaminate the others. For them, it's a loss. So we have resistance because the majority of the population is illiterate. They don't directly see the danger of the disease. But, rather their economy, their trade, okay! That's what makes people a little reluctant.*

People might also decide to consume meat from a sick animal or from the bush in order to provide nourishment for their family. In an FGD among animal handlers in N'zérékoré, participants discussed the difficulty in convincing people to avoid eating meat from sick animals because people are hungry, and how people will resort to running away and eating the meat in hiding. For example, one participant claimed, *"It's not easy in the village because there are some families who can go one to two months without eating meat and the children are short of protein and if such an opportunity arises, they will not fail to indulge their hunger."*

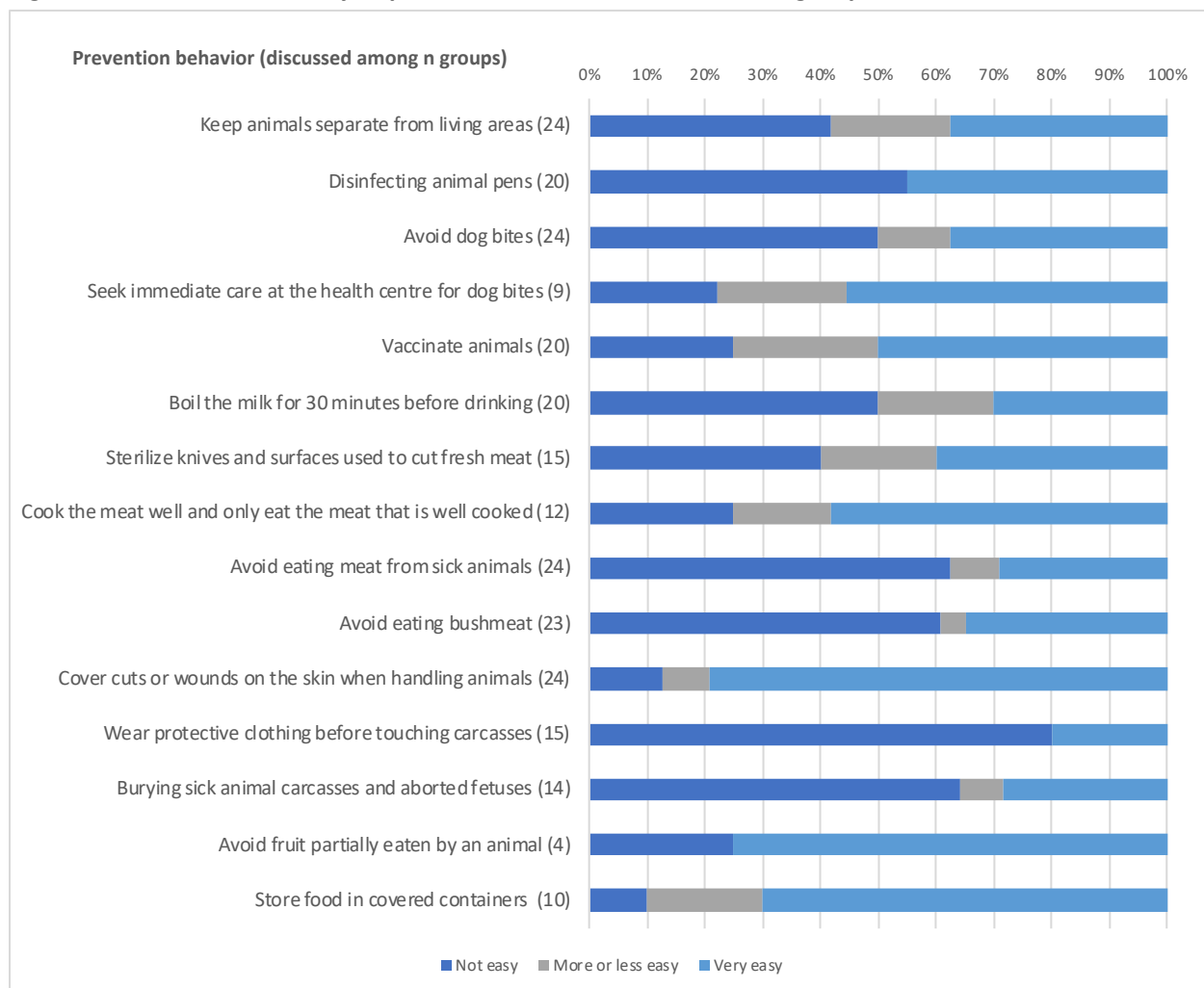
A fear of theft may also prevent people from keeping animals separate from human living areas, even though they know that the behavior is beneficial for both human and animal health. For example, a man from rural Kankan remarked, *"The fear we have, the risk of being robbed. Otherwise, this practice is inexpensive and is hygienic, since it protects us from the smell of animal urine and excrement. Because of the fear of being robbed it is not easy. Otherwise, it is easy."*

In direct response, another man in the same FGD concurred, *"What he said is the simple truth. Me, I am obliged to sleep with my calves out of fear of having them stolen. So, for me, this practice is not easy to observe."* Similarly, an animal handler in Conakry stated, *"If you distance yourself from the sheep or goat pen, they will steal from you at night. As it is raining now, if your goat pen is far away, even if you put sheet metal, they will take it away and you won't know anything. That is why it is difficult to keep the goat/sheep at a distance."*

## Assessment of specific prevention behaviors

When looking at overall trends of the perceived feasibility of specific prevention behaviors and their perceived effectiveness at preventing zoonotic disease, some interesting distinctions surfaced. There was a lot more variation across FGDs in terms of perceived feasibility compared to perceived effectiveness. Figures 6 and 7 summarize the perceived feasibility of unique behaviors and their effectiveness in preventing zoonotic diseases, respectively, across FGDs (among FGDs asked about the specific behavior). (See Appendices 2 and 3 for a more detailed breakdown of FGD assessments of zoonotic disease prevention behavior feasibility and effectiveness, respectively.)

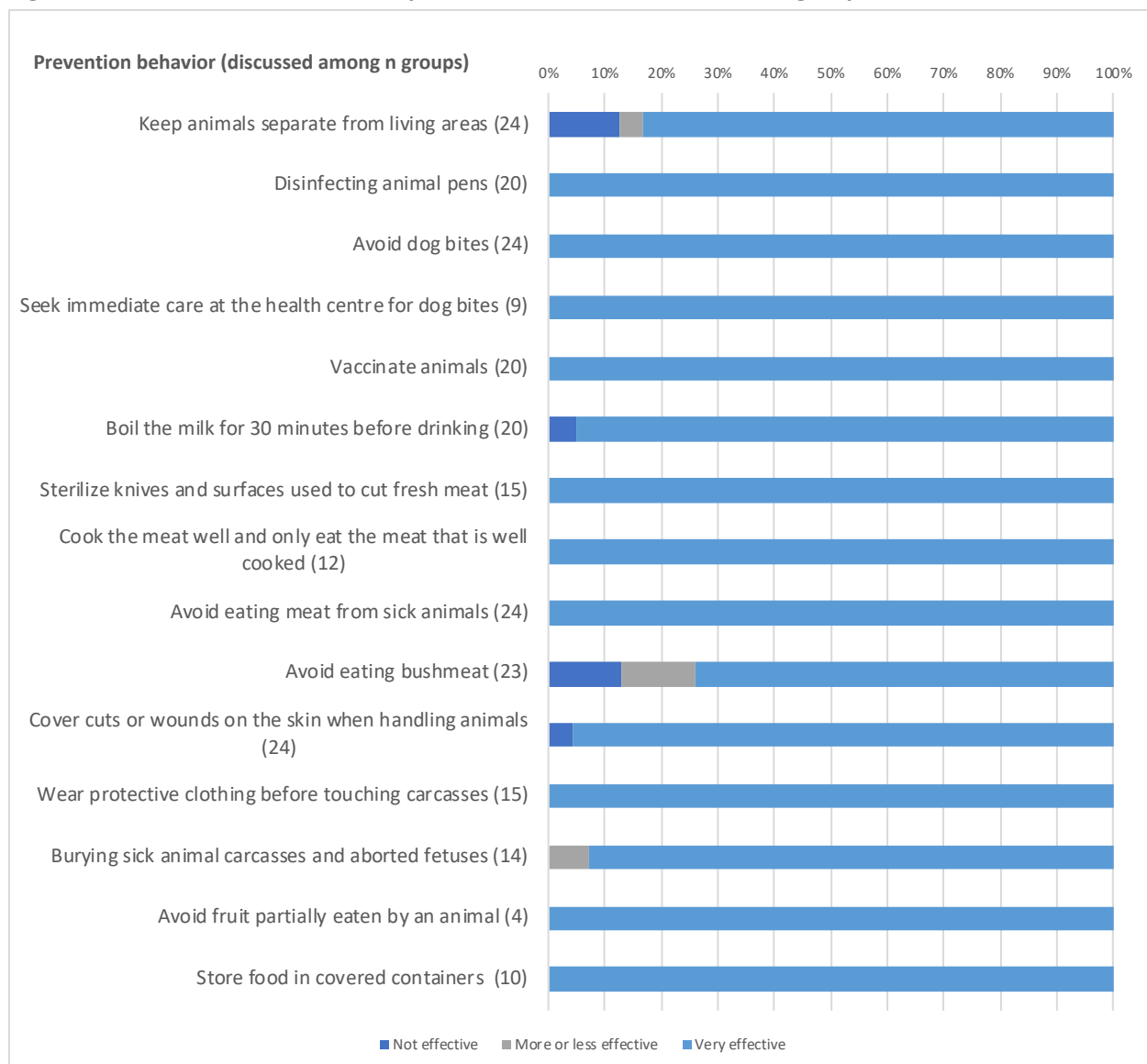
**Figure 6. Perceived feasibility of prevention behaviors across focus group discussions, Guinea 2019**



Results from the pile sorting demonstrated that a primary challenge for getting people to adopt zoonotic disease prevention behaviors may be the perceived feasibility of being able to carry out specific behaviors. Only five behaviors (seek immediate care at a health center after a dog bite, cook meat well/eat well-cooked meat, cover cuts or wounds on skin when handling animals, avoid partially eaten fruit, and store food in covered containers) were classified by a majority of FGDs as feasible to do.

On the other hand, there was little variability in perceptions around utility. The vast majority of FGDs assessed all behaviors as effective at preventing zoonotic diseases. Even the behavior that was viewed as the least effective, eating bushmeat, received an effective assessment in more than three of every four FGDs. Similarly, only three FGDs voted that keeping animals separate from the living space would not be very effective. These overall findings suggest the challenge, from an SBC perspective, is not raising awareness or increasing knowledge about behaviors' ability to prevent zoonotic diseases but rather making it easier for people to behave and convincing them that the specific behaviors are feasible.

**Figure 7. Perceived effectiveness of prevention behaviors across focus group discussions, Guinea 2019**



The rest of this section summarizes the feasibility and effectiveness assessments of each prevention behavior from the FGDs, indicates the related zoonotic diseases, highlights the relevant cross-cutting results, and offers several illustrative quotations.



## Behavior: Keep animals separate from living areas

Separating animals from domestic living spaces was a prevention behavior that appeared to be challenging for participants to accept. Among the 23 FGDs that discussed keeping animals separate from humans, almost equal percentages assessed it as very feasible (43%) compared to not feasible (39%). The value for animals as a financial investment amplified participants' fear of loss or theft. This fear, combined with the lack of available space for secure penning, reduced the perceived feasibility of the behavior. The vast majority (87%) of groups felt that the behavior would be very effective for preventing disease transmission from animals. Though high, it was one of the lower percentages for perceived effectiveness, suggesting clients were aware of some of the advantages but did not consider it a critical prevention behavior for zoonotic diseases. In fact, some of the advantages they cited related more to quality of life (e.g., odors, relationships with neighbors) than with avoiding disease. Notably, the views

### RELEVANT DISEASES

- ✓ Human anthrax
- ✓ Rabies
- ✓ Brucellosis
- ✓ Lassa fever
- ✓ Avian influenza
- ✓ Rift Valley fever



### SEE RELATED THEMES

Theme 1: Knowledge to practice gap

Theme 4: Access constraints and structural barriers

Theme 7: Livelihood represented by animals

on feasibility and utility of the behavior varied by type of animal. For example, dogs and cats were acceptable in the house, whereas other animals should be kept in pens.

### MOTIVATORS

- ✓ Belief that separating animals from the living space will help protect human health in general
- ✓ Belief that penning animals will help avoid problems with neighbors
- ✓ Belief that pens are more hygienic and fewer odors from animals near living area

*I am concerned that the animals are not in the enclosures and live in the village with the people, because being close to people there are mosquitoes that can bite them and transmit diseases such as malaria, cholera. So it is necessary that the breeders build enclosures away from the population and have veterinarians visit the animals.*

—Male, rural area, N'zérékoré

### BARRIERS

- ✓ Fear of theft of animals
- ✓ Perceived lack of consequences or follow-up on animal thieves
- ✓ Lack of financial resources to build a separate pen
- ✓ Lack of space for separate penning
- ✓ Inability to monitor the number and health of animals from a distance

*Nowadays, keeping the animals in the courtyard, better to keep the cattle in your house. They will come and take your cattle and take them away. So keeping the animal away from us right now is hard. It used to be done in the past, but today it's not possible. We are really afraid of theft.*

—Farmer, Kankan



## Behavior: Disinfect animal pens

All 20 FGDs that discussed disinfecting animal pens determined the behavior as very effective for preventing zoonotic diseases. Participants focused on the health benefits for the animals themselves (e.g., controlling diseases, reducing insect population). They also felt that clean pens were more appealing for customers. At the same time, FGDs were split on the feasibility of the behavior. More than half (55%) of FGDs concluded the behavior is very difficult to do. Disinfecting pens was thought to be time-consuming and the products expensive. Participants also appeared to have limited understanding of the health benefits of

### RELEVANT DISEASES

- ✓ Human anthrax
- ✓ Avian influenza
- ✓ Rift Valley fever



### SEE RELATED THEMES

Theme 1: Knowledge to practice gap  
Theme 4: Access constraints and structural barriers  
Theme 7: Livelihood represented by animals

this behavior or the proper way to implement it. Urban participants, in particular, expressed difficulty in finding time and resources to clean the pens.

### MOTIVATORS

- ✓ Awareness that this behavior may help prevent disease in general
- ✓ Belief that clean pens protect both animal and human health, and that a clean pen may help prevent one sick animal from infecting other animals in the herd
- ✓ Belief that clean animal pens protect from mosquito/insect bites
- ✓ Belief that a clean pen will bring more customers, leading to a financial benefit

### BARRIERS

- ✓ Lack of money to buy disinfectant
- ✓ Presence of other priorities that take precedence over regular cleaning of pens
- ✓ Perception that cleaning pens is prohibitively time-consuming
- ✓ Belief that disinfectant products are often unavailable

*If you clean their pens well, both you and the animals are protected from disease.*

—Female, urban area, Conakry

*If you clean the animal pen it will decrease your expenses and increase animal productivity, and often when the Tabaski festivities come, if you have a lot of sheep you can sell them.*

—Male, rural area, Kankan



## Behavior: Avoid dog bites

All 24 FGDs that discussed avoiding dog bites voted it as very useful for preventing disease, particularly rabies. Participants generally showed substantial awareness of dog bites as the cause of rabies. At the same time, a slight majority (52%) of FGDs voted the behavior as not feasible. Participants across FGDs cited the pervasiveness of stray dogs and close proximity of neighbors as reasons for the low feasibility. Participants characterized vaccination as a way to limit the consequences of a dog bite but expressed frustration when there is uncertainty about a dog's vaccination status. Participants also described that

### RELEVANT DISEASES

✓ Rabies



### SEE RELATED THEMES

Theme 1: Knowledge to practice gap

Theme 3: Importance of veterinary staff

Theme 4: Access constraints and structural barriers

Theme 6: People live in a world of uncertainty

the threat of being held responsible for treatment costs if their dog bites someone may lead individuals to be dishonest about dog ownership or vaccination status.

### MOTIVATORS

- ✓ High risk perception that dog bites are dangerous
- ✓ Expectation or norm that dog owners have a duty to control dogs and not let them wander

### BARRIERS

- ✓ Belief that a well-groomed dog can't be harmful
- ✓ Failure of people, despite the norm, to chain or pen their dogs
- ✓ Close proximity to neighbors, increasing the risk of bites
- ✓ Prevalence of abandoned animals
- ✓ Frequent cohabitation with dogs

*...for example, one day we were in the city center, when a girl went to get some water at the riverbank, a dog came from behind and bit her. Could she have avoided this accident? No, because the dog bit her by surprise. If you want to prevent that, you have to kill all the dogs in the area.*

—Male, urban area, Kankan





## Behavior: Seek immediate care at health center for dog bites

### RELEVANT DISEASES

✓ Rabies

Of the eight FGDs with the general population that discussed seeking immediate care for dog bites, all voted it very effective for preventing rabies (the behavior was omitted, by mistake, from FGDs in N'zérékoré). Groups



### SEE RELATED THEMES

Theme 1: Knowledge to practice gap

Theme 4: Access constraints and structural barriers

were more divided on the feasibility of immediate care-seeking for dog bites, although a substantial majority (62%) voted the behavior as very easy compared to not easy to do (25%). Participants demonstrated

substantial awareness of the problem of rabies and the mode of transmission. For example, if a family member experiences a dog bite, participants emphasized the importance of seeking care. The barriers to post-bite care at a health facility related to time and finances.

### MOTIVATORS

- ✓ Awareness that post-bite care is important for preventing disease

### BARRIERS

- ✓ Belief that post-exposure injections for rabies are expensive
- ✓ Perception that travel to a health facility equipped to treat dog bites is expensive and time-consuming

*It is not easy, because an injection against dog bites is very expensive. When the dog bites you and you can't afford the injection, the disease can become severe when you don't have the money.*

—Female, urban area, Conakry

*If we can go to the hospital every time a person is bitten by a dog, it's very useful. Once you're in the hospital they give you a vaccine right away. When you take the vaccine, you are directly saved from madness and your life is saved.*

—Male, rural area, Kankan



## Behavior: Vaccinate animals

Animal vaccination was widely appreciated, in theory, as an important part of animal health. All 20 FGDs that discussed this behavior assessed vaccinating animals as very effective for preventing zoonotic diseases. Participants felt that trusted influencers (e.g., local leaders, veterinarians) advocate for the utility of animal vaccination. Despite certain rumors circulating about the negative effect of vaccines on animal strength and health, participants disapproved of community members who refused to vaccinate; some participants even recommended slaughtering unvaccinated dogs to increase motivation. On the other hand, only half of groups voted the behavior as very feasible, with the rest split between more or less feasible and not feasible. Participants perceived vaccines as expensive and inaccessible. When financial resources were scarce, participants expressed that people tend to opt for the uncertain costs of treating

### RELEVANT DISEASES

- ✓ Human anthrax
- ✓ Rabies
- ✓ Brucellosis
- ✓ Avian influenza
- ✓ Rift Valley fever



### SEE RELATED THEMES

- Theme 1: Knowledge to practice gap
- Theme 3: Importance of veterinary staff
- Theme 4: Access constraints and structural barriers
- Theme 6: People live in a world of uncertainty
- Theme 7: Livelihood represented by animals

sick animals at a later date rather than committing to the certain costs of vaccination now. Given their financial realities, participants also advocated for intervention from the government to promote vaccination and make vaccines accessible (either free or affordable) and widely available.

### MOTIVATORS

- ✓ Awareness of vaccination as a method for preventing disease among animals and humans
- ✓ Expectation or norm that people who raise animals will vaccinate their animals
- ✓ Involvement of local leaders in informing their constituents about the importance of vaccinations
- ✓ Influence of veterinary staff in vaccination and treatment of animals

*We don't want to vaccinate animals, in order to avoid paying for the vaccine or the veterinarian's travel costs. Some people say that when we vaccinate the animal it will get sick and die and we should not eat its meat because the vaccine is strong and humans cannot tolerate it...*

—Female, urban area, N'zérékoré

### BARRIERS

- ✓ Belief or reality that vaccinating animals is expensive
- ✓ Difficulty in accessing vaccines (stock-outs) or veterinarians (human resources)
- ✓ Difficulty of transporting animals to veterinarians for vaccination
- ✓ Tendency to prioritize human health over animal health
- ✓ Preference for treating sick animals (uncertain costs) rather than vaccinating (certain costs)
- ✓ Belief that vaccination will reduce the strength of their animals, rumors that vaccinations kill chickens and ducks



## Behavior: Boil milk for 30 minutes before drinking

### RELEVANT DISEASES

✓ Brucellosis

Pasteurizing milk by boiling it before drinking it was one behavior where cultural and ethnic practices came into play. Certain ethnic groups do not habitually boil milk before drinking it. Taste preferences also varied. Some groups preferred the taste of raw milk, while others preferred boiled milk. Almost all (95% of the 20 groups who discussed this behavior) voted it as very effective for preventing disease. The one dissenting group was a men's discussion in an urban group in Conakry, who linked their skepticism about the utility of the behavior with the fact that it was not the custom. Most groups (56%) voted that this behavior is not feasible, with only one-third of groups saying that boiling milk for 30 minutes is easy to do. Objections to the practice tended to relate to local habits and the belief that boiling milk would



### SEE RELATED THEMES

Theme 1: Knowledge to practice gap

Theme 2: Traditional and religious beliefs and norms

Theme 6: People live in a world of uncertainty

negatively affect the taste or financial value, even though some participants acknowledged the advantages in terms of preventing illness.

### MOTIVATORS

- ✓ Awareness that boiling can kill harmful microbes
- ✓ Perception that boiling milk is faster than coagulation
- ✓ Taste preference for boiled milk
- ✓ Belief that the milk lasts longer if boiled

*Up to now I drink fresh milk, freshly treated without filtering, I like this a lot. Me, I have never heated it, I just don't have the habit.*

—Animal seller, Conakry

*It's not easy because I usually buy milk when I feel like drinking it, so I don't have time to boil it. So when I buy it, I just put sugar in it and I drink it.*

—Male, urban area, N'zérékoré

### BARRIERS

- ✓ Low awareness among some groups
- ✓ Belief that boiling milk destroys nutritional value, prevents fermentation, and reduces storage time
- ✓ Taste preference for raw milk
- ✓ Belief that boiling milk is too time-consuming, in light of other demands
- ✓ Perception that it is against local habits and customs, and lack of modeling for boiling milk
- ✓ Belief that simply warming the water will bring the microbes to the surface which can then be filtered off
- ✓ Downstream nature of milk consumption, making it difficult for consumers to know or verify if the milk was boiled at the point of collection



## Behavior: Sterilize knives and surfaces used to cut fresh meat

Fifteen groups discussed this behavior, and they were split evenly between not at all feasible (40%), and very feasible (40%). In particular, the Kankan groups (both men and women) felt it was very feasible, while in the other regions it was divided along gender lines, with women in Conakry groups and men in N'zérékoré groups voting it not at all feasible. The key barriers, as described by participants, were time and availability of water or sterilization products. Participants described a lack of awareness of the importance of cleaning knives and surfaces where raw meat is prepared, but even when people were aware, the force of habit interfered with them adopting the cleaning techniques on a regular basis. All groups voted that sterilizing knives and surfaces would be very useful for preventing disease. Participants debated different sterilization methods, including boiling

### RELEVANT DISEASES

- ✓ Human anthrax
- ✓ Brucellosis
- ✓ Avian influenza
- ✓ Rift Valley fever



### SEE RELATED THEMES

Theme 1: Knowledge to practice gap

Theme 4: Access constraints and structural barriers

Theme 6: People live in a world of uncertainty

knives, pouring hot water over surfaces, and soap or disinfectants. Groups expressed uncertainty about the best and most affordable techniques and requested more information.

### MOTIVATORS

- ✓ Awareness of the health benefits of using clean knives and surfaces in order to protect themselves and the people who consume the meat
- ✓ Risk perception around meat preparation, linked to the awareness that getting cut or injured while processing meat is common, so washing knives will prevent contamination during unavoidable injuries
- ✓ Belief that sterilizing knives would prevent other diseases (such as tetanus)

### BARRIERS

- ✓ Belief that habit and illiteracy prevent people from being informed of the advantages of regularly sterilizing their knives and surfaces
- ✓ Perception that it takes too long to sterilize knives while processing meat
- ✓ Lack of water availability, preventing butchers from boiling their utensils

*If we can do it it's useful. It can prevent us from getting sick. It can prevent a lot of things... If someone borrows the knife, he injures himself with it, if the blood touches the knife it will infect you with the illness.*

–Female, rural area, Kankan



## Behavior: Cook meat well, only eat meat that is well cooked

A slight majority of the 12 groups that discussed this behavior voted that it would be very easy to cook meat well and eat well-cooked meat. All 12 groups voted that it would be useful in preventing disease. However,

cultural

practices and taste preferences tended to interfere with the behavior, leading to the consumption of undercooked meat even when people were aware of the health risks.

### RELEVANT DISEASES

- ✓ Human anthrax
- ✓ Brucellosis
- ✓ Avian influenza
- ✓ Rift Valley fever



### SEE RELATED THEMES

Theme 1: Knowledge to practice gap

Theme 2: Traditional and religious beliefs and norms

Theme 4: Access constraints and structural barriers

### MOTIVATORS

- ✓ Awareness that undercooked meat can cause health problems
- ✓ Belief that undercooked meat causes both epilepsy and parasites as well as generalized stomach problems

*This is a way to avoid illness; poorly cooked meat can put you at risk of getting sick.*

—Male, urban area, N'zérékoré

### BARRIERS

- ✓ Taste preference for undercooked meat (allowing “a little water” to stay in the meat)
- ✓ Belief that cooking meat makes it lose nutritional value (“vitamins”)
- ✓ Lack of charcoal to fully cook meat
- ✓ Uncertainty about cooking process when consuming meat prepared by others (in the context of hospitality, vendors)



## Behavior: Avoid eating meat from sick animals

Most groups (63%) of the 24 who voted on this behavior agreed that it is not feasible to avoid eating meat from animals that were sick. While acknowledging the health concerns about eating meat from sick animals, financial interests tended to win out. Limited funds to feed their families led community members to kill and eat sick animals; constrained resources

prioritized immediate needs over the more distant threat of disease. Participants also emphasized that consumption was downstream from slaughter and emphasized the need for veterinarians and inspectors to certify meat as safe to consume. All groups voted that it would be very useful to avoid eating meat from sick animals. Participants clearly differentiated between “un animal mort de lui-même” (died itself) as opposed to an animal

starting to show signs of illness or age. If the animal died itself, people may avoid eating it and bury it, but if simply starting to get sick, they will quickly sell it or slaughter it and eat or sell the meat.

### RELEVANT DISEASES

- ✓ Human anthrax
- ✓ Brucellosis
- ✓ Ebola



### SEE RELATED THEMES

- Theme 1: Knowledge to practice gap
- Theme 2: Traditional and religious beliefs and norms
- Theme 3: Importance of veterinary staff
- Theme 4: Access constraints and structural barriers
- Theme 6: People live in a world of uncertainty

### MOTIVATORS

- ✓ Value for the role of a veterinarian in certifying that the animal is healthy before slaughter or that the meat is safe to eat
- ✓ Belief that if an animal died on its own, people consuming the meat risk getting the same disease.

*When you send the animals to be slaughtered, you're not there. You don't know the state in which these animals arrived. Were they sick or not before they came to the slaughterhouse? You don't know anything. You only see the meat. What would help the population in this situation is the assistance of veterinarians. They do their checks before and after they slaughter the cow, before the meat is delivered to the market. Otherwise, we'll eat it and... right now all diseases come from food.*

—Animal seller, Conakry

### BARRIERS

- ✓ Uncertainty about the health or sickness of animals prior to slaughter, as meat consumption is downstream from animal slaughter and preparation (particularly restaurants or markets, eating bushmeat, or imported meat)
- ✓ Habit of quickly slaughtering and eating sick animals so as not to lose the financial investment
- ✓ Affordability of meat from a sick animal relative to healthy animals
- ✓ Belief that certain plants can cure animals or purify meat
- ✓ Belief that cooking meat with a lot of spice will eliminate disease
- ✓ Immediate need to feed hungry family weighed against more distant threat of a possible illness



## Behavior: Avoid eating bushmeat

The majority (61%) of the 23 groups who discussed bushmeat consumption felt it was not at all feasible to change this behavior. Animal handlers tended to be more divided on the issue, while the general population groups tended to vote against the feasibility of avoiding eating bushmeat. In some cases participants described it as “impossible” to avoid eating bushmeat. Almost a quarter of groups voted that it is not at all effective or



### SEE RELATED THEMES

Theme 1: Knowledge to practice gap

Theme 2: Traditional and religious beliefs and norms

Theme 4: Access constraints and structural barriers

Theme 6: People live in a world of uncertainty

### RELEVANT DISEASES

✓ Ebola

more or less effective in preventing diseases, rather than very effective. Participants expressed that people may avoid eating bushmeat if an epidemic is already occurring, but cannot avoid eating bushmeat in order to prevent a zoonotic event.

### MOTIVATORS

- ✓ Awareness (particularly linked to the 2014-2016 Ebola epidemic) that eating bushmeat can cause illness
- ✓ Prohibition in Islam against eating certain types of bush animals

*It's not easy, it's not easy, because just now we go to the market, there are cured meats. The women sell any kind of meat. We don't know what kind of meat it is. Apart from the women, even the men, we see bushmeat, we don't know what kind of meat it is.*

—Male, urban area, N'zérékoré

*The meat of some bush animals enhances our health. When you get "sè", which is a disease that turns the urine yellow, it is cured by the meat of partridges. Just like red monkey meat.*

—Male, rural area, Kankan

### BARRIERS

- ✓ Belief that there is no difference between bushmeat and other types of meat that are safe to consume
- ✓ Uncertainty about the type of meat if prepared by others
- ✓ Taste preference for bushmeat, feeling that it is sweeter than domestic or commercially raised animals
- ✓ Perception that bushmeat is more accessible and less costly than other types of meat
- ✓ Belief that bushmeat (e.g., monkey meat) can cure certain human diseases, that it has more vitamins and gives strength to consumers
- ✓ Habit and custom supporting the behavior, with a long-standing tradition of eating bushmeat



## Behavior: Cover cuts or wounds on the skin when handling animals

Most groups who discussed this behavior (79%) voted that this is very easy to do; the only groups that voted it was not at all easy to do were professional animal handlers. All but one of the 24 groups who discussed covering wounds voted that the behavior is very useful for preventing disease, with a group of animal handlers in Kankan questioning the utility of the behavior in



### SEE RELATED THEMES

Theme 1: Knowledge to practice gap

Theme 2: Traditional and religious beliefs and norms

Theme 4: Access constraints and structural barriers

### MOTIVATORS

- ✓ Belief that covering wounds protects customers (receiving animals or animal meat) from illnesses that the animal handler may have, as well as protecting the animal handler from illness
- ✓ Awareness that open wounds can lead to exposure to disease in both directions

*When you wound yourself and put your hand on an animal—because the animal's hair that we see there is the source of many diseases—if you happen to be injured and you put your hand on the animal's hair, it will contaminate you.*

—Female, urban area, Kankan

### RELEVANT DISEASES

- ✓ Human anthrax
- ✓ Brucellosis
- ✓ Avian influenza
- ✓ Rift Valley fever
- ✓ Ebola

preventing zoonotic diseases. People weigh whether the wound is severe enough to warrant bandages, with minor injuries being overlooked even though they can lead to an exposure.

### BARRIERS

- ✓ Perception that it is too time-consuming to stop and deal with minor injuries, which are common in handling animals or processing meat
- ✓ Negative view of wearing bandages while handling animals or processing meat, as it draws attention to injuries and restricts movement
- ✓ Lack of habit and norms around covering wounds, even if people are aware of the benefits

*Our very custom says that when you have a wound, dipping it in blood helps the wound to heal quickly, so covering it up is of no importance.*

—Male, rural area, Kankan





## Behavior: Wear protective clothing while touching carcasses

Of the 15 groups that discussed protective clothing while handling dead animals, most (80%) voted that it was not at all feasible. Financial and other access constraints dominated the conversation, though participants described a general lack of knowledge or appreciation for the importance of

### RELEVANT DISEASES

- ✓ Human anthrax
- ✓ Avian influenza
- ✓ Rift Valley fever
- ✓ Ebola



### SEE RELATED THEMES

Theme 1: Knowledge to practice gap

Theme 2: Traditional and religious beliefs and norms

Theme 4: Access constraints and structural barriers

protective clothing. Nevertheless, all groups voted that wearing protecting clothing would be very useful in preventing zoonotic diseases.

### BARRIERS

### MOTIVATORS

- ✓ Awareness that protective gear can help protect against injury and disease
- ✓ Promotion from veterinarians on standard procedures around wearing protective gear in slaughterhouses or butcher shops
- ✓ Belief that humans are more vulnerable to disease than animals (animals stronger, more “resistant”), so one should use protective gear even in working with healthy animals
- ✓ Belief among hunters that protective gear also prevents insect and snake bites

- ✓ Lack of awareness of the benefits of protective gear, particularly for professional animal handlers (butchers)
- ✓ Lack of supportive norms for wearing protective clothing while handling animals or carcasses, including a perception that ancestors did not wear that type of gear
- ✓ Perception that there is a lack of time to obtain or put on protective gear if an animal’s death is immediate
- ✓ Unavailability of butcher gloves in Guinea
- ✓ Lack of money for protective gear
- ✓ Belief that protective gear is for professionals (at large slaughterhouses) and not for mid-level or small farms
- ✓ Preference by butchers to work with bare hands

*There are people there who are very rushed at the slaughterhouse. There is a lot of work to be done. The knife cuts him, but he doesn't feel the pain at the moment. The blood flows on the meat but he keeps on working. Normally, for health reasons he should cover it before working. But for him, he is obliged to do his job.*

—Male, urban area, N’zérékoré

*We're not careful when we handle meat. It happens that we neglect certain wounds. But you are not the only one who eats the meat that you might contaminate.*

—Hunter, Kankan



## Behavior: Bury sick animal carcasses and aborted fetuses

Sixty-four percent of the 14 groups who voted on this behavior characterized it as not at all feasible to bury animal carcasses and fetuses. The lack of space to bury animals and lack of time interfered with the practice, even when participants were aware of the benefits for human and animal health. Animal carcasses are valued as a potential source of income. Participants also discussed the problem of animals killed by vehicle traffic and expressed frustration that no one is tasked with burying those animals.



### SEE RELATED THEMES

Theme 1: Knowledge to practice gap

Theme 3: Importance of veterinary staff

Theme 4: Access constraints and structural barriers

Theme 7: Livelihood represented by animals

### RELEVANT DISEASES

- ✓ Human anthrax
- ✓ Brucellosis
- ✓ Rift Valley fever

Almost all groups did vote that burying animal carcasses, including fetuses, would be very effective in preventing zoonotic diseases. Participants requested education from veterinarians on the importance of burying animals.

### MOTIVATORS

- ✓ Prohibition in Islam against eating animals who died themselves (Muslims can slaughter a sick animal but must throw away a dead animal)
- ✓ Awareness that burying corpses protects human health and the health of other animals nearby
- ✓ Sense of duty and conscience to resist the temptation to sell a sick animal (pre- or post-death), but rather to bury it and avoid contaminating others without their knowledge

*There are two ways animals die here. First, when they get sick and die on their own like that, we usually throw them out—especially us Muslims, because that's what the religion recommends, that eating this meat (of the animal that died on its own) is not good at all.*

—Cattle seller, N'zérékoré

### BARRIERS

- ✓ Lack of space to bury animals
- ✓ Perception that carcasses (even of sick animals) are a potential source of income
- ✓ Practice of dumping dead animals on the road, linked to a cultural habit of throwing corpses somewhere rather than burying them
- ✓ Perception that it is painful to dig a hole and bury the corpse, as a reminder of the loss of the animal
- ✓ Perception that people steal buried corpses, which lowers motivation to bury them
- ✓ Perception of burying an animal as a “double loss”: the loss of the profits from a live animal, and the loss of the options for income from a dead animal (e.g., selling or consuming meat, using skin)



## Behavior: Avoid eating fruit already partly consumed by an animal

### RELEVANT DISEASES

✓ Ebola

The awareness that fruit partially consumed by animals could pose a health risk was well known to participants, yet they acknowledged reasons that people may still eat the fruit. The primary reason was simple hunger: prioritizing an immediate need over avoiding a distant or uncertain threat. The sense of uncertainty arose from the habitual practice of this behavior without negative effects. Participants shared examples of having eaten fruit consumed by monkeys or mice; nevertheless, 100% of groups voted that it would be very useful to avoid eating partially consumed fruit. Most groups (75%) felt it would be very easy to avoid the behavior. Participants described purchasing fruit from vendors where it was protected from animals, and not having access to fruit trees where it might be a temptation to pick up partially eaten fruit. On the other hand, participants in Kankan particularly acknowledged that most people would eat the fruit if they found it and were hungry.



### SEE RELATED THEMES

Theme 1: Knowledge to practice gap

Theme 4: Access constraints and structural barriers

There was a general belief that cutting off the section touched by the animal would be sufficient protection against zoonotic diseases.

### MOTIVATORS

- ✓ Awareness of partially eaten fruit as a risk behavior
- ✓ Preference for purchasing fruit at markets over picking fruit up from the ground

### BARRIERS

- ✓ Poverty or distance from fruit vendors, making it difficult to resist accessible food
- ✓ Belief that cutting off the part with animal bites is protective

*Some people with common sense will avoid eating such fruit. Only one in ten will be able to do without such fruit.*

—Hunter, Kankan

*You won't even think about the monkey. You'll pick and eat. The monkey eats part of it, you also eat part of it.*

—Male, urban area, Kankan



## Behavior: Store food in covered containers to protect it from rodents

Participants agreed that covering food to protect it from rodents would be effective in preventing disease, with 100% of the 10 groups that discussed this behavior voting it “very useful.” However, they described a general indifference toward the practice, both at the household and vendor levels. In retail, open containers allowed potential customers to view the food more easily. At home, participants described “not bothering” to cover food. Most of the health advantages cited by participants had to do with direct contamination of the food by rodents, salamanders, or domestic pets. There was little discussion of the

### RELEVANT DISEASES

✓ Lassa fever



### SEE RELATED THEMES

Theme 1: Knowledge to practice gap

Theme 4: Access constraints and structural barriers

indirect benefit of reducing the rodent population. Overall, 70% of the groups voted the behavior easy to do, with only 10% voting it very difficult to do.

### MOTIVATORS

- ✓ Awareness of the health and hygiene benefits of covering food storage containers
- ✓ Low risk perception for zoonotic diseases caused by rodents

### BARRIERS

- ✓ Perception that covering food in retail settings will interfere with profits (customers cannot see the products)

*We have to cover our food because in the houses there are mice walking around, and if they find uncovered food they will eat it. If we eat the rest of that food, we catch the disease. So we have to cover our food so that animals (like mice, sheep, goats) do not put their mouths in our food, so that we have health.*

—Male, rural area, N’zérékoré

*For example, awhile back here, they said that a disease has arrived, that it is transmitted to humans through mice [“lassa” whispered by another participant]. That’s it! It was said on the radio to take precautions. Because, as you said at the beginning of your talk, there are many things that we women easily worry about. We’re the ones who cook, we’re the ones who do the dishes, we’re the ones who do everything. Yet the mouse is something that’s all over the place.*

—Female, urban area, Kankan

## Gender considerations

During the data analysis workshop, a separate discussion occurred around study implications related to gender. Workshop facilitators grounded the discussion in the Gender Integration Continuum developed by the Interagency Gender Working Group, which is supported by USAID.<sup>7</sup> The continuum posits that programs can be either gender blind (ignoring the potential role of gender) or gender aware. Gender-aware programs also exist on a continuum, from exploitative to accommodating, and ultimately to transformative. The purpose of the discussion was to introduce these concepts and take a closer look at the findings with a gender lens in mind. The discussion introduced certain gender-related insights that were not necessarily grounded in the data (but informed by the local knowledge and expertise of workshop participants) as well as insights directly linked to the data.

**Table 7. Gender-related context linked to zoonotic disease prevention**

Contextual insight	Relevant gender		Related zoonotic disease prevention behavior
	Male	Female	
Boiling milk		✓	<ul style="list-style-type: none"> <li>• Boil milk for 30 minutes before drinking</li> </ul>
Purchasing meat		✓	<ul style="list-style-type: none"> <li>• Avoid eating meat from sick animals</li> <li>• Avoid eating bushmeat</li> </ul>
Cleaning and preparing meat		✓	<ul style="list-style-type: none"> <li>• Cook meat well, only eat meat that is well cooked</li> <li>• Sterilize knives and surfaces used to cut fresh meat</li> </ul>
Covering food		✓	<ul style="list-style-type: none"> <li>• Store food in covered containers to protect it from rodents</li> </ul>
Making important household decisions	✓		<ul style="list-style-type: none"> <li>• Keep animals separate from living areas</li> <li>• Vaccinate animals</li> </ul>
Providing money for expenses	✓		<ul style="list-style-type: none"> <li>• Keep animals separate from living areas</li> <li>• Disinfecting animal pens</li> <li>• Vaccinate animals</li> <li>• Avoid eating meat from sick animals</li> <li>• Avoid eating bushmeat</li> </ul>
Slaughtering animals	✓		<ul style="list-style-type: none"> <li>• Sterilize knives and surfaces used to cut fresh meat</li> <li>• Cover cuts or wounds on the skin when handling animals</li> <li>• Wear protective clothing while touching carcasses</li> </ul>
Stealing cattle	✓		<ul style="list-style-type: none"> <li>• Keep animals separate from living areas</li> </ul>
Being a veterinarian	✓		<ul style="list-style-type: none"> <li>• Avoid dog bites</li> <li>• Seek immediate care at health center for dog bites</li> <li>• Vaccinate animals</li> <li>• Cover cuts or wounds on the skin when handling animals</li> <li>• Wear protective clothing while touching carcasses</li> </ul>
Having the profession of butcher	✓		<ul style="list-style-type: none"> <li>• Sterilize knives and surfaces used to cut fresh meat</li> </ul>

In terms of important contextual insights, workshop participants shared some nuances regarding gender roles in Guinea that might affect zoonotic disease prevention behaviors. Table 7 identifies behaviors that workshop participants mentioned as having gender considerations in the Guinean context. For example, workshop participants shared that behaviors related to food hygiene (e.g., cooking meat, boiling milk, covering food) tend to fall on women's shoulders. Gender norms in Guinea also forbid women and permit men to slaughter animals. As a result, men serve in the professional role of butcher. In addition, only men typically function as veterinarians.

In terms of gender considerations directly supported by actual study findings, some similarities as well as some clear distinctions between men and women surfaced. The study found that some risks of exposure were similar, regardless of gender. Both men and women experienced risk of exposure to the consumption of meat from diseased animals and bushmeat. Although men typically served in the roles of farmers and animal vendors, the study did include several women in those roles. Both men and women across the regions expressed the challenge of having insufficient funds. Similarly, radio seemed to be a common source of information for both men and women.

Differences did, however, exist by type, location, and level of exposure. Because animal husbandry (including animal breeding, raising, and selling) is more often reserved for men, they may be more exposed to zoonoses than women. There were no female hunters or butchers in the study and the vast majority of farmers and animal vendors were men. As a result, men will have greater potential exposure to zoonotic diseases just by virtue of their choice of profession. Similarly, although risks around handling meat and other animal products existed for men and women, for men it was more often in the role of butcher/animal vendor and for women it was more around their roles in the home. In other words, the places where people might be at most risk may differ, with men at work and women at home.

Finally, the roles that men and women play in the household and the community differ. Study findings suggest that women cook, clean, cover food, provide first aid at home, boil milk, and are more likely to be the ones to take sick people to the hospital. Men handle food, sanitize outside the home, cover meat/food outside, and buy animals.

## Discussion

Current study results provide insight regarding motivators and barriers for zoonotic disease prevention behavior in Guinea. These results shed light on possible implications for current and future programs aimed at the prevention, control, and surveillance of zoonotic diseases. The cross-cutting themes are helpful not only for the current priority diseases of interest for Guinea but also for future zoonotic diseases.

In general, the data from IDIs and FGDs suggest that although people may perceive animals as possible sources of disease transmission, they may not take the appropriate preventive precautions. Reasons for not engaging in prevention behaviors range from tradition and norms to structural and other barriers, such as lack of space, time, or money. In addition, people may perceive specific prevention behaviors as effective in terms of preventing behavior but may, at the same time, perceive the behavior as not feasible to perform. This finding suggests that, although study participants commented on the importance of awareness-raising, promoting knowledge and raising awareness will likely not be enough to motivate people to adopt and repeat necessary prevention behaviors, especially because most of the relevant behaviors are not one-time behaviors. In fact, many of the behaviors are ones that require an ongoing commitment to behave and would benefit from habit formation.

Research on habit formation suggests that sustaining habits calls for repetition of the behavior, relevant cues to action for the particular audience, and rewards.<sup>6</sup> For example, in order to more successfully promote better animal husbandry habits, future programs may want to capitalize on the value that people place on their animals for their own livelihood. Existing habits may also serve as a barrier to introducing a new or modified behavior,<sup>6</sup> as was, likewise, found in the current study. As a result, future programs may want to proactively seek ways to reward ideal habits and disincentivize negative existing habits.

The current study further underscored the importance of collaboration and effective multi-directional communication between communities, authorities, and both animal and health providers for zoonotic disease prevention, control, and surveillance. This set of findings supports other research in Guinea stressing the importance of strong coordination among One Health stakeholders.<sup>8</sup>

The current study experienced three limitations. First, the study only included participants from three regions. Due to financial and time constraints, the study was unable to extend participation to additional regions. At the same time, the study does not claim to be representative of the entire country. Moreover, the selected regions represent areas of particular interest for zoonotic disease. Second, the study explored people's perceptions about what their community believes, not whether they themselves actually perform the behaviors. This study design component was intentional in order to get people to openly talk about their opinions and beliefs even if not directly disclosing their own personal behavior. Finally, there were some inconsistencies in the accurate application of the FGD guides, resulting in some intended audiences being asked about behaviors that similar audiences in other

regions were not. This resulted in extra data on certain behaviors but not for all regions, meaning that it was difficult to assess whether trends in the data would have been found across the three regions. The insight gained from this additional data was, nevertheless, relevant for those particular audiences and provided useful information. Regardless of these limitations, the current study contributes to the evidence regarding SBC around zoonotic disease prevention in Guinea.

## Recommendations

Part of the participatory data analysis workshop included a discussion regarding possible programmatic strategies informed by study findings. This discussion took place on the last day of the five-day data analysis workshop, after completion of the analysis of individual behaviors, generating cross-cutting themes, and identifying gender considerations. After an initial brainstorming of 22 evidence-based strategies, nine workshop participants, including various One Health stakeholders, classified the list along three domains: prevention, control, and surveillance. After this classification, the group prioritized the various ideas. Each individual voted for their top five strategies for both feasibility and potential impact. Table 8 provides a list of priority strategies, which were those that received at least three votes for either feasibility or potential impact and a minimum of one vote for both. (See Appendix 4 for a comprehensive list of strategies generated during the data analysis workshop, including the actual tally for both feasibility and potential impact votes).

**Table 8. Priority evidence-based strategies**

Programmatic strategy	Prevention	Control	Surveillance
Strengthen the use of veterinarians as major actors in the prevention and monitoring of zoonoses			
Improve the functionality of the One Health platform at the community level			
Establish an effective system for the circulation of information on zoonoses between the various actors			
Organize "porte ouvert" open house days at veterinary clinics			
Create a solidarity fund between farmers			
Combat beliefs, practices, and prejudices that are unfavorable to the prevention of zoonotic diseases			
Develop activities to raise awareness about zoonoses			
Adapt and develop posters on zoonosis knowledge at community level			
Develop and disseminate messages on transmission and protection against zoonoses			
Further strengthen the motivation of community health agents to report information			
Make meat certification more visible through a label			



Based on the above priority strategies and overall body of evidence, this study offers five general recommendations for current and future programs aimed at preventing and reducing the burden from zoonotic diseases in Guinea.

**Recommendation 1: Foster and reinforce an effective system for the circulation of information on zoonoses between the various key players**

As stated above, the current study emphasized not only the importance of multi-directional communication but also the fact that people at multiple levels value this system. Study findings support the continued support and strengthening of the effectiveness of communication links between the national, regional, and local levels, especially for disease surveillance. For example, programs may look to enhance the functionality of the One Health platform at the community level by creating a cadre of remunerated community health agents that can serve as key players in prevention, control, and surveillance. Such an approach could be especially effective given that people place greater trust on messengers from their own communities. It would also be important to further improve and expand the existing capacity of stakeholders in order to prepare for current and future diseases that might arise in communities. For example, programs may want to explore ways to further enable the ability of community health agents to report information to authorities at various levels.

**Recommendation 2: Combat beliefs and practices that are unfavorable to the prevention of zoonotic diseases**

Given that people hold multiple misconceptions and myths regarding animal hygiene, it would be important to directly address these issues. Programs could enhance posters and other materials regarding zoonosis, so they are tailored to the specific community level. Since people may not necessarily know zoonotic diseases by name, it may be worth focusing on behaviors that can apply to multiple zoonoses. Addressing these beliefs and practices will be instrumental for both disease prevention and control. Moreover, due to the repeated nature of multiple zoonotic disease prevention behaviors, programs will want to identify ways to promote habit formation. The current study presents an important first step in this process, by ascertaining the knowledge, needs, and current habits/practices of the intended audience.

Programs will want to provide simple, yet specific, descriptions of how to effectively perform behaviors, and try to avoid promoting too many behaviors at the same time, in order to avoid cognitive overload for people. In addition, programs should consider how to encourage repetition of individual behaviors, including cues to action and rewards. Moreover, programs should frame messages to reinforce the ease of performing the behaviors while simultaneously promoting their effectiveness. For example, it would be vital to promote disinfecting animal enclosures or separating animals from humans in a way that seems easy and manageable, given the specific urban/rural context.

### **Recommendation 3: Enhance the use of veterinarians as major actors in the prevention and monitoring of zoonoses**

A cross-cutting result across behaviors was the importance of veterinarians for the prevention, control, and surveillance of zoonotic disease. Participants across regions stressed veterinarians' role in activities such as certifying the safe consumption of meat, vaccinating animals, and certifying animal vaccine status (essential for being able to access prompt care after a dog bite). At the same time, participants also perceived the number of veterinarians as too low, and their services too expensive. One possible strategy to address these barriers could be to develop a veterinary assistant/technician program to increase the number of paraprofessionals capable of conducting more basic veterinary services, such as vaccinations or meat certification. During the data analysis workshop, participants mentioned the previous existence of such a program in-country. Therefore, if such a program already exists, efforts could instead be directed toward further strengthening the program's ability to increase access to basic animal health services via well-trained paraprofessionals. Another possible strategy would be to organize open house ("*porte ouvert*") days at veterinary clinics to increase communication and linkages between veterinarians and their respective communities. Although this would not increase the number of veterinarians in a community, it could foster more open communication and also help to address concerns such as difficulty in accessing the clinic.

### **Recommendation 4: Establish changes in the ecosystem that remove uncertainty and make it easier for people to safeguard their investment and livelihood found in animals**

Study participants stressed living in a world of uncertainty where animals serve multiple purposes. People place value on their animals for their livelihood, including representing an investment for their future. Two related programmatic strategies help to reduce the level of uncertainty and protect their livelihood. First, the creation of a solidarity fund between farmers could help reduce the financial burden of actions such as hiring someone to guard their animals from roaming too far or from theft, as well as help secure funds for vaccination and materials/supplies. Second, making meat certification more visible, such as via a seal of approval, could also increase people's confidence in the meat they consume. Study participants knew veterinarians certify meat for consumption, yet they raised concern about not knowing when they buy meat whether it is safe for consumption.

### **Recommendation 5: Account for the role of gender when developing and implementing SBC programs around zoonotic disease**

In terms of gender implications, the discussion among data analysis workshop participants highlighted the general gender considerations linked to various zoonotic disease prevention behaviors. Upon closer review of study findings through a gender lens, the importance of taking into account the social roles of men and women in all strategies to control zoonoses becomes clear. For example, programs will need to operate in the reality that men may have greater exposure to zoonotic disease in their work environment and in response may need to tailor unique messages for butchers. Similarly, programs will want to address how women may experience greatest exposure while dealing with food hygiene

behaviors in the home. This distinction highlights the need to tailor messages by gender, in their placement, design, and content. At the same time, it will be critical for programs to be mindful of not exploiting existing stereotypes while integrating gender considerations into program activities.<sup>7</sup>

Given that the list of PZDs continues to evolve, the need to discover ways to effectively promote multiple related prevention behaviors remains pertinent. The current study provides insights into perceptions in Guinea about zoonotic diseases and prevention behaviors related to specific priority diseases of interest. These insights can serve to inform existing SBC programs for the prevention, control, and surveillance of zoonotic disease in Guinea. In addition, study findings may be helpful to future programs, whether for the current PZDs or future priority diseases, both in Guinea and in other parts of West Africa.

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# Appendices

**Appendix 1. Free listing of diseases that come from animals: Number and proportion of lists each disease appeared on, by sub-population (Guinea, September 2019)**

	General population men		General population women		Community / opinion leader (n=14)	Animal handler (n=89)	Health worker or veterinarian (n=9)
	Urban (n=37)	Rural (n=20)	Urban (n=35)	Rural (n=19)			
Rabies	19 (51.4%)	15 (75.0%)	18 (51.4%)	2 (10.5%)	6 (42.9%)	33 (37.1%)	7 (77.8%)
Ebola	14 (37.8%)	7 (35.0%)	7 (20.0%)	8 (42.1%)	5 (35.7%)	15 (16.9%)	4 (44.4%)
Anthrax	6 (16.2%)	8 (40.0%)	2 (5.7%)	2 (10.5%)	3 (21.4%)	32 (36.0%)	4 (44.4%)
Asthma	10 (27.0%)	1 (5.0%)	12 (34.3%)	0 (0%)	8 (57.1%)	7 (7.9%)	3 (33.3%)
Parasites	4 (10.8%)	9 (45.0%)	4 (11.4%)	3 (15.8%)	1 (7.1%)	7 (7.9%)	3 (33.3%)
Malaria	8 (21.6%)	2 (10.0%)	6 (17.1%)	0 (0%)	3 (21.4%)	7 (7.9%)	1 (11.1%)
Influenza, avian	5 (13.5%)	7 (35.0%)	5 (14.3%)	1 (5.3%)	0 (0%)	4 (4.5%)	4 (44.4%)
Tuberculosis	1 (2.7%)	4 (20.0%)	4 (11.4%)	0 (0%)	0 (0%)	5 (5.6%)	2 (22.2%)
HIV/AIDS	0 (0%)	0 (0%)	5 (14.3%)	6 (31.6%)	2 (14.3%)	0 (0%)	1 (11.1%)
Brucellosis	2 (5.4%)	0 (0%)	0 (0%)	0 (0%)	1 (7.1%)	1 (1.1%)	2 (22.2%)
Bronchitis	0 (0%)	1 (5.0%)	0 (0%)	1 (5.3%)	1 (7.1%)	2 (2.2%)	0 (0%)
Cholera	1 (2.7%)	1 (5.0%)	3 (8.6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Hemorrhoids	0 (0%)	0 (0%)	3 (8.6%)	0 (0%)	0 (0%)	2 (2.2%)	0 (0%)
Pneumonia	1 (2.7%)	0 (0%)	1 (2.9%)	0 (0%)	0 (0%)	3 (3.4%)	0 (0%)
Influenza, swine	0 (0%)	1 (5.0%)	0 (0%)	0 (0%)	0 (0%)	1 (1.1%)	2 (22.2%)
Typhoid	1 (2.7%)	0 (0%)	1 (2.9%)	0 (0%)	0 (0%)	1 (1.1%)	1 (11.1%)
Dysentery	1 (2.7%)	1 (5.0%)	0 (0%)	0 (0%)	0 (0%)	1 (1.1%)	0 (0%)
Influenza	0 (0%)	1 (5.0%)	1 (2.9%)	0 (0%)	1 (7.1%)	0 (0%)	0 (0%)
Scabies	0 (0%)	0 (0%)	0 (0%)	1 (5.3%)	0 (0%)	2 (2.2%)	0 (0%)
Tetanus	1 (2.7%)	0 (0%)	2 (5.7%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Yellow fever	0 (0%)	1 (5.0%)	0 (0%)	0 (0%)	0 (0%)	2 (2.2%)	0 (0%)

## Appendix 2. Frequency of perceived feasibility of zoonotic disease prevention behaviors

<b>Prevention behaviors</b>	<b><i>Number of groups</i></b>	<b><i>Not easy</i></b>	<b><i>More or less easy</i></b>	<b><i>Very easy</i></b>
<b>Keep animals separate from living areas</b>	24	42%	21%	38%
<b>Disinfect animal pens</b>	20	55%	0%	45%
<b>Avoid dog bites</b>	24	50%	13%	38%
<b>Seek immediate care at health center for dog bites</b>	9	22%	22%	56%
<b>Vaccinate animals</b>	20	25%	25%	50%
<b>Boil the milk for 30 minutes before drinking</b>	20	50%	20%	30%
<b>Sterilize knives and surfaces used to cut fresh meat</b>	15	40%	20%	40%
<b>Cook meat well, only eat meat that is well cooked</b>	12	25%	17%	58%
<b>Avoid eating meat from sick animals</b>	24	63%	8%	29%
<b>Avoid eating bushmeat</b>	23	61%	4%	35%
<b>Cover cuts or wounds on the skin when handling animals</b>	24	13%	8%	79%
<b>Wear protective clothing while touching carcasses</b>	15	80%	0%	20%
<b>Bury sick animal carcasses and aborted fetuses</b>	14	64%	7%	29%
<b>Avoid eating fruit already partly consumed by an animal</b>	4	25%	0%	75%
<b>Store food in covered containers to protect it from rodents</b>	10	10%	20%	70%

Note: Frequency represents percentage of focus group discussions

### Appendix 3. Frequency of perceived effectiveness of zoonotic disease prevention behaviors

<b>Prevention behaviors</b>	<b><i>Number of groups</i></b>	<b><i>Not effective</i></b>	<b><i>More or less effective</i></b>	<b><i>Very effective</i></b>
<b>Keep animals separate from living areas</b>	24	13%	4%	83%
<b>Disinfect animal pens</b>	20	0%	0%	100%
<b>Avoid dog bites</b>	24	0%	0%	100%
<b>Seek immediate care at health center for dog bites</b>	9	0%	0%	100%
<b>Vaccinate animals</b>	20	0%	0%	100%
<b>Boil the milk for 30 minutes before drinking</b>	20	5%	0%	95%
<b>Sterilize knives and surfaces used to cut fresh meat</b>	15	0%	0%	100%
<b>Cook meat well, only eat meat that is well cooked</b>	12	0%	0%	100%
<b>Avoid eating meat from sick animals</b>	24	0%	0%	100%
<b>Avoid eating bushmeat</b>	23	13%	13%	74%
<b>Cover cuts or wounds on the skin when handling animals</b>	24	4%	0%	96%
<b>Wear protective clothing while touching carcasses</b>	15	0%	0%	100%
<b>Bury sick animal carcasses and aborted fetuses</b>	14	0%	7%	93%
<b>Avoid eating fruit already partly consumed by an animal</b>	4	0%	0%	100%
<b>Store food in covered containers to protect it from rodents</b>	10	0%	0%	100%

Note: Frequency represents percentage of focus group discussions

#### Appendix 4. List of possible program strategies and tally of votes

Strategy	Domain	Feasibility (# votes)	Potential impact (# votes)
Ensure the implementation of the national strategy for the control of zoonoses in Guinea	PCS	0	4
Strengthen the use of veterinarians as major actors in the prevention and monitoring of zoonoses	PCS	2	3
Elaborate/develop a guide to hygiene rules for handlers	P	2	0
Making vaccines available at a lower cost	P	0	4
Multiply local infrastructures	P	0	1
Adapt and develop posters on zoonosis knowledge at community level	S	5	1
Encourage the construction of enclosures outside villages	P	0	0
Create a solidarity fund between farmers	PC	3	2
Help to organize farmers into groups to facilitate exchange between farmers	CS	0	1
Make meat certification more visible through a label	P	4	1
Combat beliefs, practices and prejudices that are unfavorable to the prevention of zoonotic diseases	PC	2	3
Further strengthen the motivation of community health agents to report information	PS	4	1
Organize "porte ouvert" open house days at veterinary clinics	PCS	4	2
Develop/strengthen a program of veterinary assistants or technicians	PCS	0	3
Develop activities to raise awareness about zoonoses	PC	3	1
Facilitate access for populations in general and handlers in particular to products and services that enable them to apply their good knowledge on the prevention of zoonoses	PC	2	2
Call on/advocate decision makers for vaccine availability	PC	0	3
Develop and disseminate messages on transmission and protection against zoonoses	P	4	2
Improve the functionality of the One Health platform at the community level	PCS	2	4
Establish an effective system for the circulation of information on zoonoses between the various actors	PCS	7	2
Set up a toll-free number in the communities to inform in case of a situation	S	0	1
Reactivate the animal identification system	PCS	0	3

Notes: P = prevention ; C = control ; S = surveillance

Green shading represents 3 or more votes; Red shading represents 0 votes