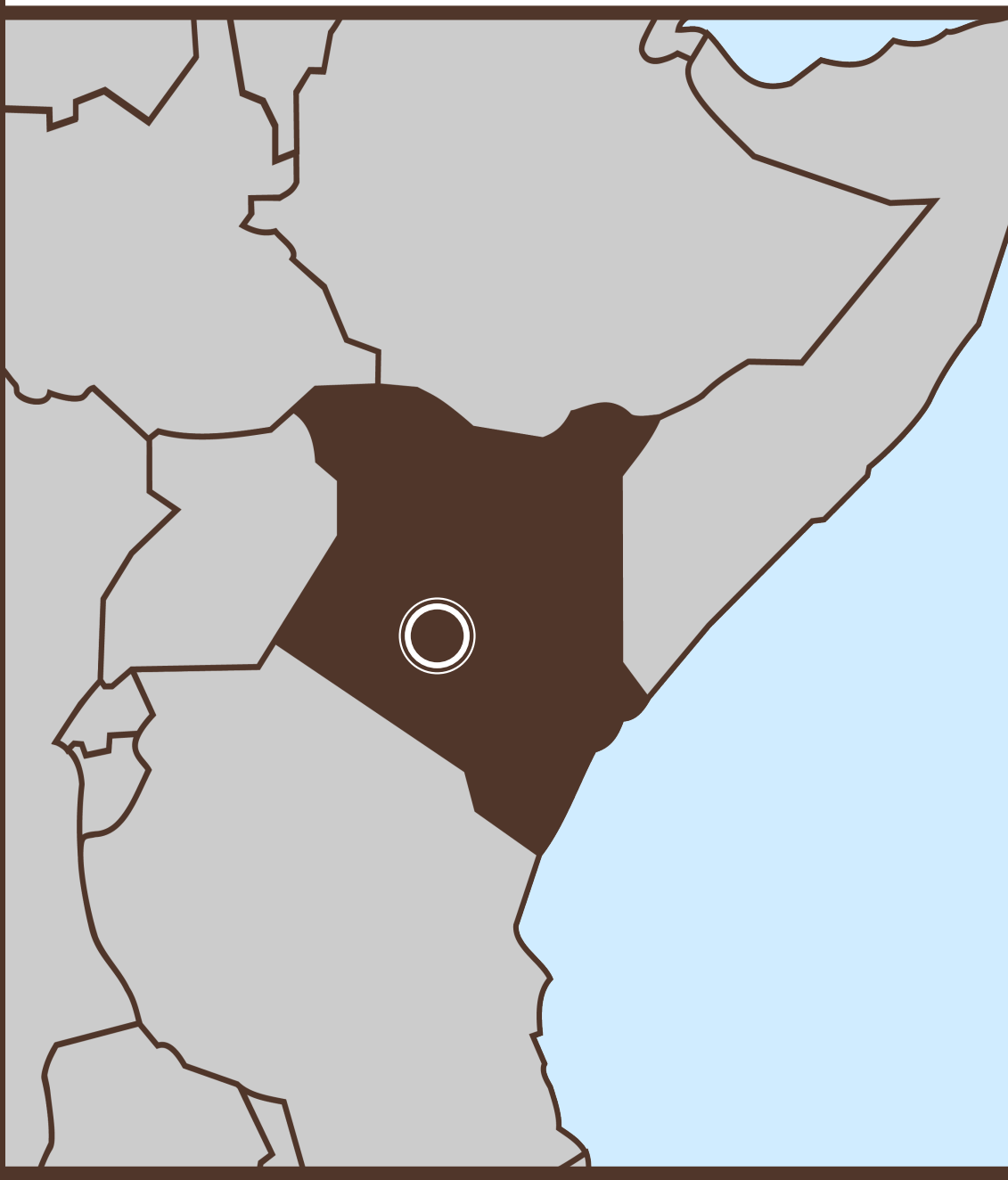
The Pan African Medical Journal

Investigation of Anthrax in an Endemic Region in Kenya: A Mixed Methods Approach

Participant Guide



African Case Studies in Public Health

Volume 2

March 2018
Special Issue

Investigation of Anthrax in an Endemic Region in Kenya: A Mixed Methods Approach

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Abstract

In Kenya, human anthrax cases most often occur linked to animal anthrax. In most cases, human behaviors, especially slaughter and consumption of meat from animal anthrax cases, has been implicated. This case study is based on an anthrax outbreak investigation conducted in an endemic region in Kenya in May 2016. The case study simulates how a mixed methods approach can be used in epidemiologic research. To fully benefit from this case study, participants should have had prior lectures or other instruction in quantitative and qualitative study designs and sampling approaches used in epidemiologic research. The case study is ideally suited for trainees at intermediate or advance level training in field epidemiology who should be able to complete the case study in approximately 3 hours.

How to Use the Case Study

General instructions: The case study is suited for a class of up to 20 trainees per session. Ideally, 1 to 2 instructors can facilitate the case study in a classroom or conference room. The instructor facilitating the session should direct participants to read a paragraph out aloud, going around the room to give each participant a chance to read. When a participant reads a question, the instructor may choose to engage the class in large group discussion of the answer, randomly identify a participant to respond to the question, or divide the class into smaller groups for exercises, depending on the type of question. The role of the instructor is largely to coordinate the session such that participants learn more from each other, and not just from the instructor.

Audience: Intermediate and advance level trainees in the Field Epidemiology and Laboratory Training Program (FELTP).

Prerequisites:

- For this case study, participants should have received lectures or other instructions in:
- Study designs in epidemiologic research
- Survey and sampling in epidemiologic research
- Ethics in Research: Writing an Informed Consent Form

Materials needed: Flipcharts or white board with markers

Level of training: Intermediate and advanced level training in epidemiology

Time required: Approximately 3 hours

Language: English

Participant Guide

Goal of the case study: To reinforce application of knowledge and skills on use of mixed methods in epidemiologic research

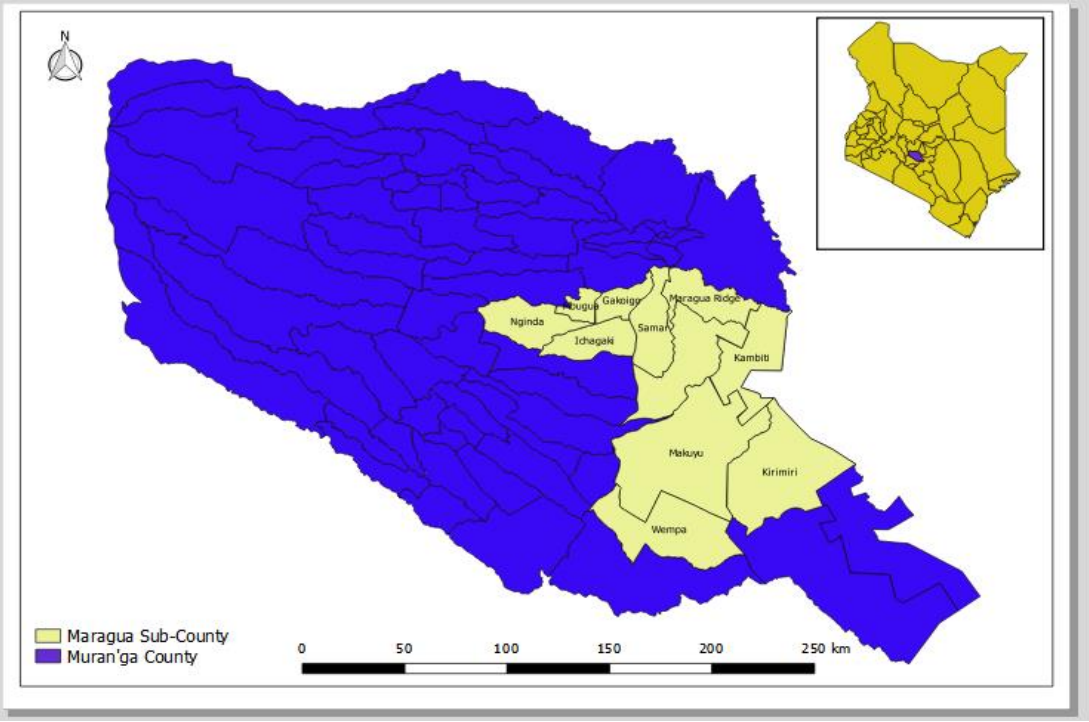
Objectives: After completion of this case study, the participants should be able to:

1. Identify quantitative and qualitative study designs used in epidemiologic research and identify appropriate study design(s) for the various scenarios provided
2. Describe differences in quantitative and qualitative study designs
3. Identify various sampling methods used in epidemiologic research and identify appropriate sampling design(s) for the scenarios provided
4. Calculate sample size for epidemiologic research and identify usefulness of design effect in calculation of sample size
5. Describe the questionnaire development process for community-based surveys and research
6. Describe approaches used in conducting FGD as a qualitative research method
7. Describe the content of a consent form and the process of obtaining consent in research

Introduction

In Kenya, human anthrax cases often occur following cases of animal anthrax and human behavior has been implicated in most situations. Infectious diseases including anthrax are not only biologically determined but are also socially constructed and maintained. [1, 2] However, most of the interventions employed for the control of anthrax are largely derived from technical solutions with limited consideration of the social conditions existing in the affected communities. [3] Interventions need to consider both technical and social factors in order to be appropriate and more acceptable to local communities. [2]

Figure 1: Map developed by the first author showing outbreak site in context of Kenya



Part 1

Quantitative Methods

Recurrence of anthrax in both livestock and humans has been reported in County A over the years. In 2001 five cows died and 10 people got hospitalized following suspected anthrax outbreak in Village A. In the year 2006, an outbreak of anthrax occurred in the sub county B witnessing the current outbreak, during which 70 human cases with one death were reported. Other outbreaks involving animals and humans were reported in sub county B in 2010 and 2013. All human cases were linked to butchering and/or consumption of meat from a suspected anthrax animal case. Despite extensive community education geared towards preventing human anthrax cases, cases of human anthrax continued to be reported in sub county B. The investigation team decided that a better understanding of the community knowledge, attitude, and practices (KAP) was of interest in understanding the reasons for continued human anthrax cases.

Question 1. List types of quantitative study designs used for epidemiologic research and indicate the appropriate design for this scenario.

Question 2. List the steps used for conducting epidemiologic research.

In planning the community KAP study, the investigation team had to select an appropriate sampling method and a sample size for their study.

Question 3. List types of sampling approaches used in quantitative studies.

Question 4. Suggest the type of sampling approach that would be appropriate for the community KAP study and provide at least two advantages and disadvantages of that sampling approach.

The investigation team planned to select households to be included in the community KAP study. The sub-county has 6 wards consisting of 26 villages. From each ward, a random selection of 3 villages was done using Microsoft Excel (Microsoft Office, Seattle, USA) giving a total of 18 villages. In determining the number of households per village, sampling proportionate to the approximate number of households in each village was done. The number of households per village was obtained from the Kenya national bureau of statistics (KNBS). To determine the households to be visited in each village, the investigation team identified a central reference point (example: landmark, church, school, chief's house, and playground) in each village. From the central reference point, the investigation team planned to spin a bottle to determine the direction to walk in order to identify the first household and subsequently select other households that consent for the study. The investigation team would then return to the central reference point and move in the opposite direction to repeat the same process until the total number of households to be interviewed in that village was achieved.

In the planning phase, the investigation team also calculated the sample size needed for their study. Households were considered as the primary sampling unit. Based on a similar study done in Zimbabwe, the proportion of people interviewed who were aware of anthrax was 72%. [7] Due to the sampling approach that was adopted by the investigation team, they decided that they needed to factor in design effect in calculation of the sample size and therefore assumed a design effect of 2 in calculating the sample size.

Question 5. Using the information provided, calculate the minimum sample size that will be required for the community KAP study using the Cochran formula provided below.

$n= Z_{1-\alpha}^2\ p\ (1-p)/d^2$

Where:

n= minimum sample size

$Z_{1-\alpha}^2$= Is standard normal variate (at 5% type 1 error ($p<0.05$ it is 1.96 and at 1 % type 1 error ($p<0.01$) it is 2.58). As in a majority of studies p – values are considered significant below 0.05 hence 1.96 is used in formula.

p = Expected proportion in population based previous studies or pilot studies

d= Absolute error of precision (has to be decided by researcher) but for this survey assumed to be 5%

Question 6. What is a design effect?

The investigation team developed a questionnaire to collect information from the study participants. Before starting data collection for the KAP survey, the investigation team pilot tested the questionnaire.

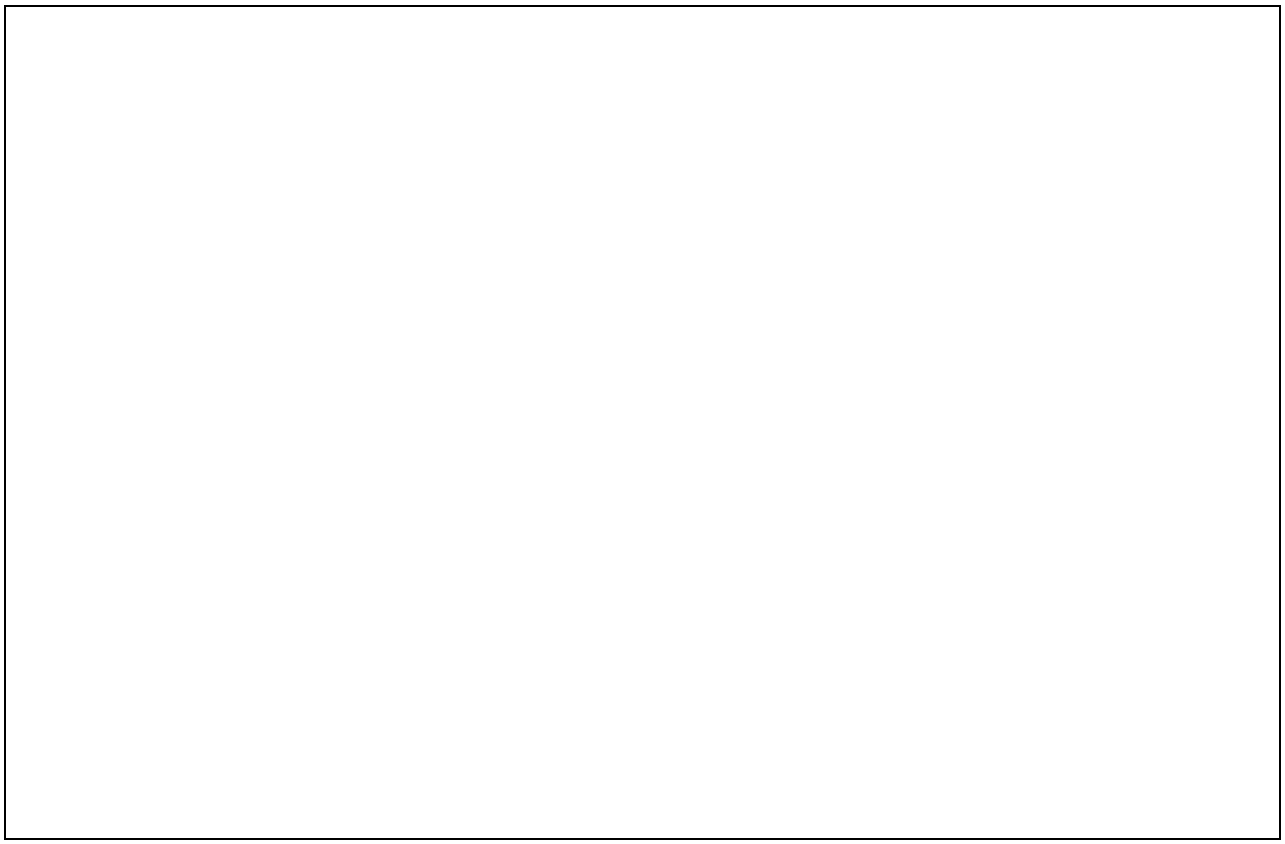
Question 7. List the general steps involved in designing a questionnaire for epidemiologic research.

Question 8. Broadly provide categories of questions that would be included in the community KAP study questionnaire and provide relevant examples.

Question 9. What was the rationale for pilot-testing the questionnaire for the community KAP study before beginning the actual survey?

After pilot testing the questionnaire and training interviewers, data collection commenced. In each selected household, the team interviewed persons who were 18 years and above. Both livestock-owning and non-livestock-owning households were included in the study. All eligible study participants were consented before being included in the study.

Question 10. What information could be included in the consent form for the community KAP study?



In the community KAP survey, a total of 738 participants were interviewed. Tables 1 and 2 below show summary of results of the community KAP survey.

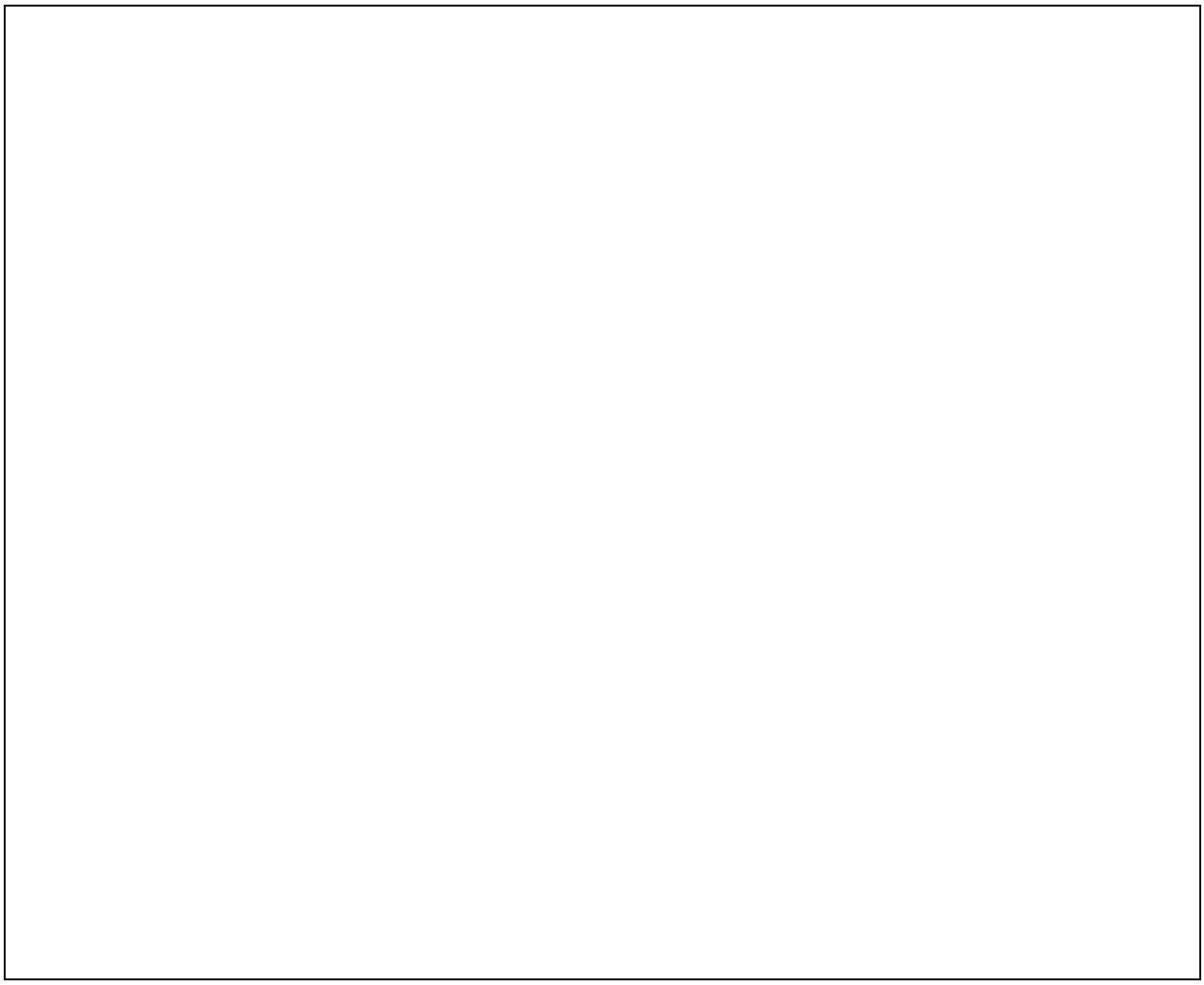
Table 1: Community responses on knowledge about anthrax

Variable	Frequency	Percentage
Heard of Anthrax	611	82.8%
n=611		
Aware of cause of anthrax	208	34.0%
Germs	97	46.6%
Can tell when an animal died of anthrax	161	26.3%
Bleeding from Mouth, Nose, Ears and Anus	107	66.5%
Bloating of Carcass	52	32.3%
Lack of rigor mortis	36	22.4%
Rapid decomposition	32	19.9%
Knowledge on what to do if an animal died of anthrax		
Call a Public Health Officer	236	38.6%
Report to Administration	111	18.2%
Skin the Animal	103	16.9%
Burn the Carcass	41	6.7%
Bury the Carcass	12	2.0%
Knew Anthrax affects humans	336	55.0%
Contact with sick or dead animals	283	84.2%
Through consumption of meat from dead animals	79	23.5%
Through inhalation	30	8.9%
Knew Anthrax is preventable in animals	337	55.2%
Through vaccination	318	94.4%
Through environmental decontamination	18	5.3%

Table 2: Community response on attitude and practices towards anthrax (n=611)

Variable	Frequency	Percentage
Attitude and Practices in event an animal died suddenly		
Slaughter it and sell or give meat to neighbors	91	14.9%
Sell dead animal to butchers	14	2.3%
Slaughter, remove skin and bury carcass	40	6.6%
Perception on slaughter and sale/consumption of meat from animals that suddenly died from unknown causes		
Because it's cheap	235	38.5%
Because it's free	168	27.5%
Cut cost on loss of animal	217	35.5%
Don't know the risk	207	33.9%
Practices on home slaughter		
Have slaughtered an animal in the past year	191	31.3%
Meat was inspected at home by veterinary or public health officials	105	55.0%
Practices on vaccination of animals		
How often do you vaccinate your animals	280	45.8%
Twice a year	166	59.3%
Once a year	94	33.6%
Every two years	20	7.1%
Reasons for non-regular vaccination of animals (n=331)		
Vaccines not available at veterinary offices	17	5.1%
Don't know were supposed to vaccinate	14	4.2%
Vaccination is expensive	14	4.2%
Vaccination sites are far from home	7	2.1%
Time consuming	2	0.6%

Question 11. Using table 1 and 2 above, summarize the community knowledge, attitude and practices towards anthrax.



Part 2

Qualitative Methods

In addition to the KAP survey, the investigation team conducted six focused group discussions (FGD) with 60 participants. Each FGD was conducted with 7 to 15 participants drawn from each of the 6 wards in the sub-county. The selection of participants was done in liaison with the local administration officers, public health officers and veterinary officers. Participants had to be a resident of a ward for the last five years and could contribute effectively to the discussions. The investigation team used a semi-structured questionnaire to assess the participants' understanding of the various underlying factors that influenced the community knowledge, attitudes and practices towards anthrax.

Question 12. Why do you think qualitative approaches are important component in research?

Question 13. Compare and contrast use of quantitative and qualitative methods in research.

Question 14. What is focus group discussion, and when should focus group discussions be used?

Question 15. Apart from the focus group discussions, list other approaches that can be used in qualitative research.

Question 16. Describe the various sampling approaches used in qualitative research and which method(s) you would recommend for this focus group discussion.

Question 17. Provide at least one advantage and disadvantage of non-probability sampling approaches.

Question 18: Provide examples of the type of questions that the investigators should have asked during the FGD.

Question 19. How would the investigation team analyze data from the FGDs?

During the FGD, cattle were identified as the main animals kept by the community and from which the community derived most of their livelihood and economic benefits. Anthrax was identified as one of the priority livestock diseases in the community. Most discussants identified some traditional ways of telling if an animal had died of anthrax as illustrated in the following excerpt:

"There was a cow which died in our village and the owner called some young men to slaughter it just after it had died. The owner distributed the meat to the community members. Some people took the meat but did not eat it immediately. They waited for other people to eat first and they became affected and the rest of the people did not eat it". Female discussant in FGD #3

Some ant species were also used by some of the community members to test for the safety of the meat for consumption. They placed a piece of meat from the slaughtered animal near the ants. People would then observe if the ants attempted to eat the meat. If they eat it, then the meat is safe for human consumption as illustrated in the following excerpt

"Red ants are used for testing the safety of meat from dead animals. If they eat a piece of meat from the animal and they die, then the meat is not safe for human consumption. However, if they eat the meat and they survive then the meat is safe and can be consumed by human beings". Male discussant, FGD #2.

Almost all the farmers kept dairy breeds of cattle and practiced zero grazing. The FGD discussants identified the zero-grazing type of husbandry system as a major constraint to livestock vaccinations as illustrated in the following excerpts:

"*Most vaccinations were organized in centralized places like vaccination crashes and cattle dip for control of ectoparasites. These animals we keep them [rear and feed] at our homes all the times and they are heavy [have a lot of kilograms] and can therefore not walk long distances to access vaccination sites*." Female discussant FGD #1

The high cost of vaccinations and unavailability of anthrax vaccine were also identified as major constraints to livestock vaccination by the discussants. Individual home visit during vaccination was considered as costly especially when done by private animal health service providers since they charged more than double the price charged by the government. The discussants also noted that the veterinary personnel from government were overwhelmed due to large areas they cover, with some discussants saying they could not remember when they last saw a government animal health service provider in their area.

The discussants intimated that the community was aware of the dangers of consuming meat from suspected animals that died from anthrax. But reasons such as greed, ignorance and need to salvage something from the dead animal made the community to continue eating meat from dead animals as illustrated in the excerpt below:

"Mostly it is due to ignorance and fear that if one calls the meat inspector, the meat will not pass [read: condemned]. Some of these animals are very expensive and very fat [healthy]. You can milk the animal in the evening and it is ok [not showing any sign/symptoms] but you hear it bellow once during the night and it start kicking. You therefore call the neighbors to assist you to slaughter it at least to save the hide. Sometimes even if you call the veterinary people and they recommend burning or burying of the animal, some young men will sneak at night where the animal is buried and take away the meat. All in all, I would say it is just ignorance and greed". Male discussant FGD #1

Question 20. Based on the result of the findings from community KAP survey and FGD, what recommendations would you suggest for prevention and control of anthrax in this area?

Conclusion

This case study illustrates how results from a quantitative research can be reinforced by findings from qualitative research in the context of a mixed method approach. The case study demonstrates how results from the FGDs were able to explain some of the reasons behind the community poor knowledge, perceptions and practices towards anthrax.

Background Reading

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Competing Interests

The authors declare that they have no competing interests in the design and development of the case study.

Author's Contributions

MO, EH and WR conceived, designed and drafted the case study. All authors read and critically reviewed and approved the final case study.

Acknowledgements

The authors wish to thank the residents of the Kenya field epidemiology and laboratory training program who carried out the investigations. We wish also to thank AFENET and organizers of the case study design and development course at Emory University School of Public Health for logistical and technical support during development of the case study.

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