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# ASSESSING LIVESTOCK FARMERS' KNOWLEDGE OF THE CAUSES, PREVENTION, AND CONTROL OF ANTHRAX IN DOGOLOYA VILLAGE, KOINADUGU DISTRICT, SIERRA LEONE

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## ABSTRACT

### Background

Anthrax is a zoonotic bacterial disease caused by *Bacillus anthracis* that primarily affects herbivorous animals and can be transmitted to humans, posing significant public health and economic challenges.

### Objective

To assess the knowledge, attitudes, and practices (KAP) regarding anthrax prevention and control among livestock farmers in Dogoloya Village, Koinadugu District, Sierra Leone.

### Methods

A community-based cross-sectional study was conducted among 130 livestock farmers selected through simple random sampling. Data were collected using a structured questionnaire translated into Fula, Madingo, and Krio. Data were analyzed using Microsoft Excel, SPSS, and Vassar Statistics. Descriptive statistics were used to summarize respondents' characteristics and KAP levels, while inferential statistics were employed to examine associations between selected variables.

### Results

The majority of respondents were male (78%), 49% had no formal education, and only 12% were formally employed. Although 98% had heard of anthrax, only 18% correctly identified *Bacillus anthracis* as the causative agent, and 47% had received training on anthrax prevention and control. Most respondents (88%) reported previous anthrax outbreaks among their livestock, 56% practiced commercial livestock farming, and 76% relied on grazing systems. Carcass disposal methods included dumping (40%), composting (34%), and burial

(19%), while 46% believed antibiotics alone were effective against anthrax. Cross-tabulation analysis showed no statistically significant association between gender and knowledge of the cause of anthrax ($\chi^2 = 10.59$, df = 5, $p = 0.60$).

**Conclusion**

Although awareness of anthrax was high among livestock farmers, considerable gaps exist in their knowledge, attitudes, and preventive practices. Inappropriate livestock management and carcass disposal practices may increase the risk of anthrax transmission. Strengthening community education, improving access to veterinary services, and promoting routine livestock vaccination and safe carcass disposal are recommended to improve anthrax prevention and control.

**KEYWORDS:** Anthrax, *Bacillus anthracis*, Knowledge, Attitudes and Practices, Livestock Farmers, Zoonotic Disease, Koinadugu District, Sierra Leone.

## Background of the Study

Anthrax is a zoonotic disease that can infect humans, pets, livestock, and wild animals. Numerous vertebrate animals are susceptible to the zoonotic bacterium Bacillus anthracis, which can be lethal to both animals and humans.[1]. It is a rare disease in developed countries.[2] Nonetheless, a disease that is still common in developing countries [3] The anthrax-causing bacterium B. anthracis establishes a bimodal lifecycle, in which the vegetative form grows within the host, and the spore form appears outside. The spores can survive for years in an adverse environment and spread an illness when favourable conditions are present [4]

The livestock business is essential to raising the standard of living for the majority of rural residents in many developing countries. [5]. Since they serve a significant economic role in the sale of these animals and their goods, they offer a variety of ways as a source of food, companionship, sociocultural activities, and money [6 ].Anthrax is a major concern to public health since it can badly injure and kill people and animals [2]. The disease has a considerable detrimental impact on cow production, causing farmers to lose money and preventing the growth of agriculture [7]. In a nation where agriculture is a vital business, anthrax epidemics could endanger the food security and means of sustenance of animal farmers in Sierra Leone. [8]

Livestock farming is essential to the economy of the Koinadugu District. The area is great for rearing various livestock species like cattle, sheep, and goats due to its favorable climatic

conditions and ample grazing land. The district's continuing anthrax outbreaks may, however, be a result of livestock farmers' lack of knowledge about the best strategies to stop and manage anthrax epidemics [9]. People who depend on livestock are more prone to contracting zoonotic diseases. The livestock rearing system is vital in the transmission of anthrax from animal to human, where there is direct contact between animals and owners. Cattle are among the herbivores that are most frequently affected by anthrax due to their grazing habits. Mortality from bovine anthrax is four times higher, and it is thirteen times more common [10]. The prevention and management of anthrax require a comprehensive approach that includes immunization campaigns, moral carcass disposal, and public awareness efforts [12].

**Problem Statement**

Despite decades of coordinated international effort, substantial investments in annual ivermectin distribution, and demonstrated efficacy of pharmaceutical interventions in reducing micro filarial loads, onchocerciasis persists as a significant public health problem in Bo District, Sierra Leone, and numerous other endemic foci across sub-Saharan Africa. This persistence occurs paradoxically alongside high disease awareness levels, general community acceptance of ivermectin treatment, and documented reductions in severe clinical manifestations such as blindness, suggesting that conventional biomedical approaches alone are insufficient to achieve WHO's 2030 elimination targets.

The core problem addressed by this research is the insufficient understanding of the complex socio-ecological determinants that shape onchocerciasis burden, community responses, and Programme effectiveness in endemic rural communities.

**General Objective**

The study aims to assess livestock farmers' knowledge of the causes, prevention, and control of anthrax in Dogoloya Village, Koinadugu District, Sierra Leone.

**Specific Objectives**

- To assess the demographic characteristics of the respondents
- To assess livestock farmers' knowledge of the causes, prevention, and control of anthrax in Dogoloya Village, Koinadugu District, Sierra Leone.

**Research Questions**

- What are the demographic characteristics of the livestock farmers in Dogoloya Village?
- What is the level of knowledge among livestock farmers regarding the causes,

prevention, and control of anthrax in Dogoloya Village, Koinadugu District, Sierra Leone?

**Significance of the study**

For the purpose of creating specialized educational initiatives and interventions, it is essential to comprehend the knowledge gaps in anthrax prevention and control. Previous research has demonstrated that there are large knowledge gaps among healthcare practitioners

This study will be able to identify these knowledge gaps and provide detailed information on the particular subjects that need more research and understanding. By looking at attitudes and actions related to the prevention and control of anthrax, it is feasible to pinpoint obstacles and enablers to the implementation of preventative measures.

**Literature Review**

**Knowledge of livestock farmers on anthrax prevention and control.**

The zoonotic bacterium Bacillus anthracis poses a life-threatening risk to both animals and people and affects a large variety of vertebrate species, including humans [18](Dutta et al., 2021). The livelihoods of pastoralists are impacted by livestock illnesses. In this system, brucellosis, a neglected zoonotic disease, is extremely common; in sub-Saharan Africa, the disease is thought to affect 16% of the livestock population [19]. Additionally, the most important determinants of farmers' knowledge and awareness of the disease were their degree of education and the existence of anthrax cases. Therefore, it is crucial to reduce the presence and persistence of B. anthracis spores in the environment, as they may contribute to the transmission of the infection between cattle and humans if the ecology of anthrax is not understood [2]. The majority of human anthrax cases in Kenya are associated with animal anthrax. Human actions are responsible for the majority of cases, particularly the slaughter of animals and the eating of their meat [11 ]. In a poll on anthrax done in Kenya, 334 participants revealed that 99.1% had heard of the disease, 94.8% were aware that it was contagious, and 64.4% had engaged in domestic animal slaughter or skinning. Knowledge and practice were substantially correlated with gender, age, and years of cattle rearing [20]

***Knowledge of livestock farmers on anthrax prevention and control.***

The zoonotic bacterium Bacillus anthracis poses a life-threatening risk to both animals and humans, affecting a wide variety of vertebrate species, including humans [18]. Livestock illnesses impact the livelihoods of pastoralists. In this system, brucellosis, a neglected zoonotic disease, is extremely common; in sub-Saharan Africa, the disease is thought to

affect 16% of the livestock population [19]. Additionally, the most important determinants of farmers' knowledge and awareness of the disease were their degree of education and the existence of anthrax cases.[11] Therefore, it is crucial to reduce the presence and persistence of B. anthracis spores in the environment, which may contribute to the transmission of the infection between cattle and humans if the ecology of anthrax is not understood [20].

***Practices of livestock farmers regarding anthrax prevention and control***

**Vaccination**

**Anthrax vaccine for veterinary use**

One of the first vaccines created was the veterinary vaccination Louis Pasteur used to immunize livestock in 1881. It was an attenuated strain of B. anthracis produced after 8 days of recurrent culture at high temperatures (42-430C) [27] . Pasteur's culture most likely had both bacilli, complete with both plasmids, and bacilli that only had the capsule-encoding plasmid pX02. Though the virulence of the Pasteur vaccine strain was lower than that of the wild-type B. anthracis, there were still sporadic cases of vaccinated animals dying due to differences in the level of protection and virulence across batches. For over 100 years, the cause of attenuation remained a mystery [28], demonstrating that raising the culture temperature to 420 °C causes the toxin-encoding plasmid pX01 to disappear partially. Attenuated, non-encapsulated Sterne strain (34F2) live spores are now most frequently employed to immunize animals. [25]

**Immune response after vaccination**

After receiving a vaccination, the memory B and memory T cells are stimulated, allowing them to recognize the antigen from the germ and act swiftly and efficiently to stop disease.[25] Memory B and memory T cells that have been activated recall the antigen from the vaccine and react more quickly and effectively to subsequent infections with the same antigen.

**Anthrax vaccine mode of action**

Because this protein is crucial for the development of anthrax immunity following both infection and immunization, protective antigen (PA) is a vital component of the anthrax toxin [29]. The capacity of a variety of B. anthracis antigens to trigger a protective response against the illness has been investigated.[25]

**Surveillance**

Information should be available throughout prevention, control, and elimination/eradication through surveillance, the systematic collection, collation, and analysis of data, and the

transmission of that information to those who need to know so that action may be taken [35]. If surveillance is not a key component of program management, control will not be economical or effective. In cattle husbandry, surveillance systems are the foundation for early disease epidemic detection and response. These systems gather, analyze, and interpret data from multiple sources to keep track of the well-being of cattle populations.[35]

## METHODOLOGY

### Research design

**The study adopted a quantitative research design, utilizing a cross-sectional survey conducted from July to August 2025 to collect data within the study population.**

### Study area/setting

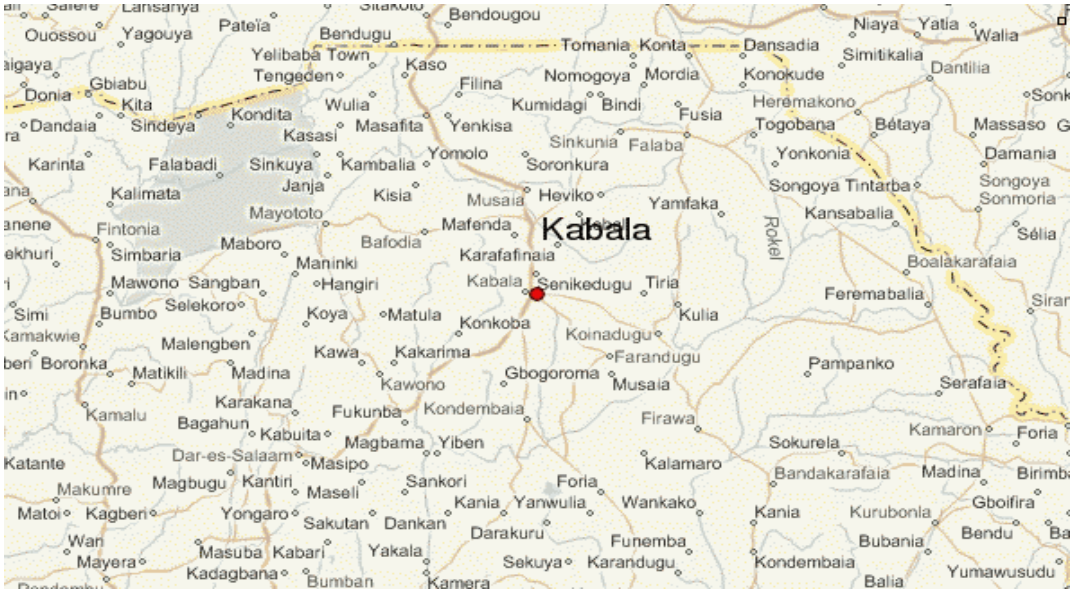


***Figure 1: Map of the Study Area (Dogoloya Village, Koinadugu District, Sierra Leone)***

**Map of Koinadugu District showing Dogoloya Village.**

The study was conducted in Kabala Town, the headquarters of Koinadugu District in Northern Sierra Leone. Kabala is a major rural town located about 137 km north of Makeni and 320 km east of Freetown, close to the Guinea border, which facilitates cross-border interactions and trade. The town is surrounded by mountains and small hills and had an estimated population of 18,770 in 2015, with a predominantly Muslim population and a sizable Christian minority.

### *Population*

The study aimed to investigate the target population of the study that included livestock farmers. The study also included religious leaders, opinion leaders, women leaders, local

government leaders, service providers and coordinators of zoonotic diseases as key informants.

***Sample and sampling methods***

**Sample**

The sample is chosen so that every member of the population has an equal chance of taking part. The researcher used Microsoft Excel 2010 to determine the sample size for this study, and adjusted the prevalence of anthrax to 50%, which was done to get the maximum number of samples at 95% confidence level, and a margin of error 5%.

**Sample frame**

- **Inclusion and exclusion criteria**

Households that qualified for this study had the following characteristics:

• Households that own livestock

• A household that is headed by a person who is older than eighteen years

**Households that were excluded from this study had the following characteristics:**

• Households that are headed by those who are eighteen years of age or younger

• Households that did not own livestock

- **Sample Size**

The sample size for this study was calculated using an Android app called *Relief Application* (Google Play Store) at a 95% confidence interval with a 5% (0.05) precision of accepted error. A sample size of 130 respondents was drawn from a population of 195 Livestock farmers in Dogoloya Village, Koinadugu District, using the *Relief Application.*

**Sampling Technique**

The Village where the study was conducted was picked using a simple random sampling method from a list of Villages that have livestock farmers. Households were randomly selected, according to any person, preferably the household owner over the age of 18 years of age, in a house that owns livestock or has owned livestock.

**Sources of data**

Primary data was collected using questionnaires that were developed using Kobo Collect and interviews. In this study, the researcher has taken advantage of the readily available secondary data relevant to the study, including books, journals, articles, electronic articles, and other already available scientific findings that will help widen the understanding of the research problem.

***Data Collection Instruments***

Data collection instruments are used to collect the data. The study made use of a structured questionnaire to collect data through face-to-face interviews. The questionnaire consists of closed- and open-ended questions in English. The same questions were translated into (Krio, Koranko, Fula, and Madingo), which is the local language spoken in the town. The questionnaire consists of four sections.

***Data Collection Procedures***

Data was collected on a face-to-face basis, using a structured questionnaire that was developed into a Kobo collect. Data collection for this study started after approval. Data was collected by me. I spent July - September 2025 collecting data in Dogoloya Village. Data collection followed an established sampling frame that was clearly explained in the earlier topics of this report under Sampling.

**Ethical Issues: Every step of this work; the research topic, objectives, and questionnaire were reviewed by the supervisor to ensure that the study follows the steps as required of a scientific research paper. The assurance of confidentiality was another aspect of quality that was assured through the explanation of the project to the respondents. Procedures that ensured quality data collection and analysis were closely observed, and included the following:**

a) Pre-testing of the questionnaire was done before the research process, defects were corrected, and changes were made where necessary.

b) Permission was taken from the Livestock farmers before conducting this interview in the Household.

**Reliability and validity: In ensuring the validity and reliability of findings, multiple methods were used in data collection, analysis, and presentation in this study. The use of multiple methods was useful in enriching each other, thereby supplementing the drawbacks of one another.**

**Data Analysis:** Data was collected through mobile phone; the questionnaire questions were developed into Kobo Collect. Vassar statistics was used to calculate the confidence interval, and Microsoft Excel was used to build and design the charts (pie charts, bar charts) and tables; SPSS was used to calculate the frequencies, percentage and relationships between variables. The questionnaire questions were asked and interpreted to

## RESULTS

### *Demographic Characteristics of the Respondents*

**Gender distribution of livestock farmers in Dogoloya Village, Koinadugu District, Sierra Leone**

In the current study, the gender analysis shows that 102(78%) of the respondents were male, while 28(22%) were female. This implies that there are more males practicing livestock farming than females.

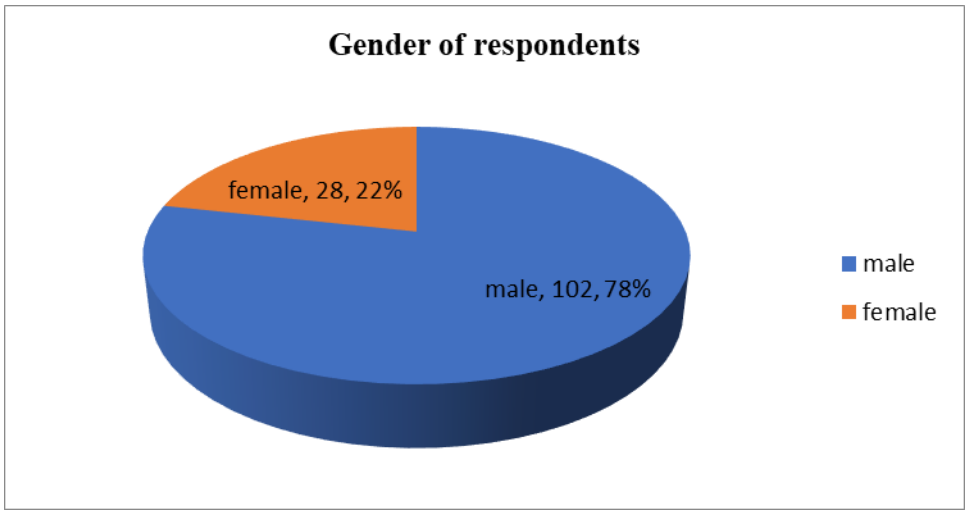


**Figure 2: Gender Distribution of Respondents.**

**Source:** Field data 2025

**Age of the Livestock Farmers**

The majority 47(36.2%) of the study respondents were between the ages 18 – 28 years, 36(27.7%) were 49 and above, 30(23%) represented the age category of 39 – 48 years and 17(13%) were between the ages 29 – 38 years.

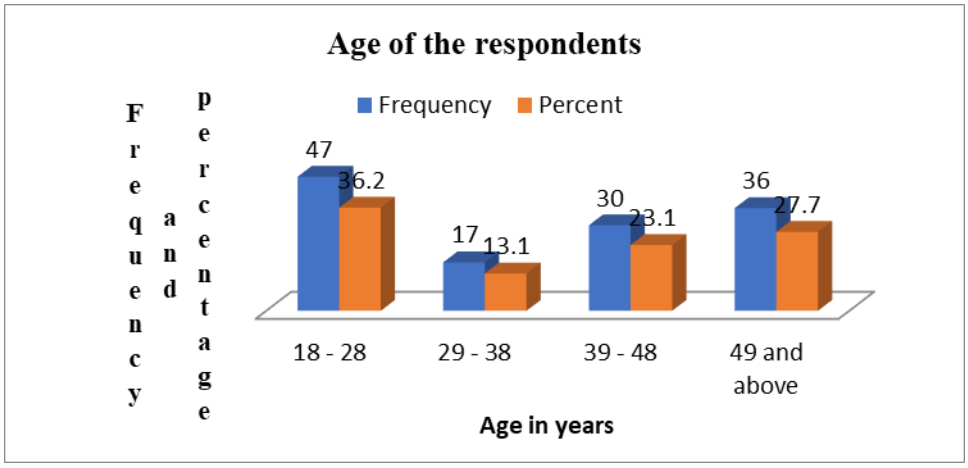


**Figure 3: Age Distribution of Livestock Farmers.**

**Source: Field data 2025.**

**Educational background of livestock farmers in Dogoloya Village, Koinadugu District, Sierra Leone**

More than half 64(49%) of the respondents have no formal education, 46(35%) have primary education, 16(12%) of the respondents have tertiary education, and 4(3%) have secondary education.

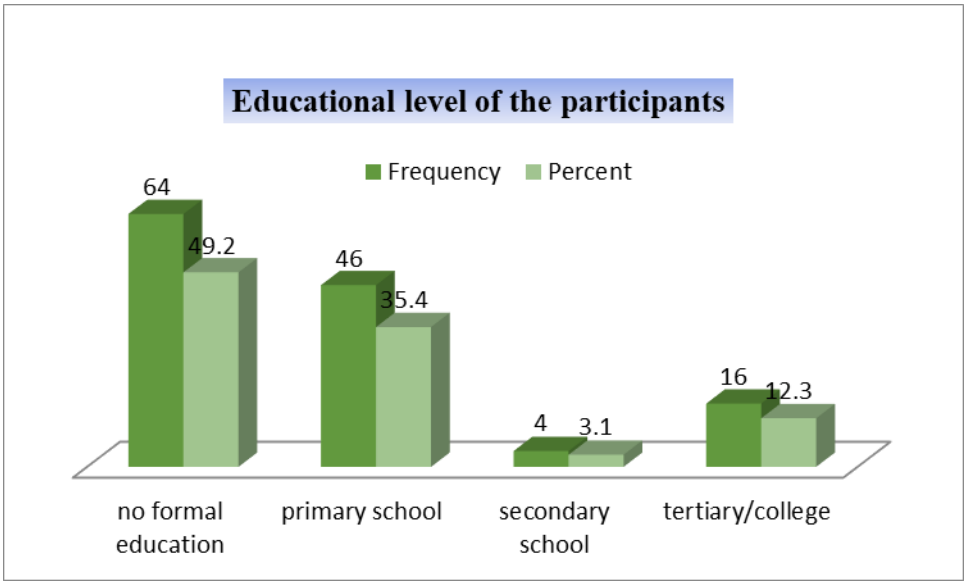


**Figure 4: Educational Level of Participants.**

**Source**: Field data 2025.

**Employment Status of Livestock Farmers**

A total of 69(53%) of the respondents were self-employed with a confidence interval of (44.54–61.54), 46(35%) were unemployed with a confidence interval of (27.69-43.91), and only few 13(9%) respondents were employed with a confidence interval of (7.12-18.17)

**Table 1: Employment Status of Livestock Farmers.**

| Employment status | Frequency | Percent | CI |
|---|---|---|---|
| employed | 15 | 11.5 | 7.12 – 18.17 |
| Self employed | 69 | 53.1 | 44.54 – 61.45 |
| Un employed | 46 | 35.4 | 27.69 – 43.91 |
| Total | 130 | 100.0 | |

**Source:** Field data 2025.

**Marital status of livestock Farmers.**

In the current study, 63% of the respondents were married, followed by 18% were divorced/Separated, 14% were single, and only 5% of the respondents were widows.

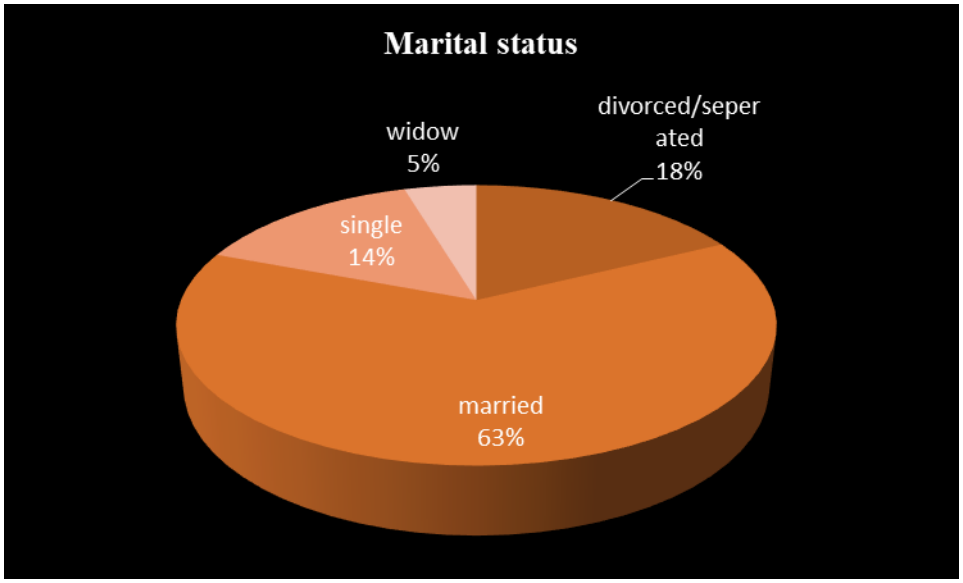


**Figure 5: Marital Status of Respondents.**

**Source:** Field data 2025.

**Religion of livestock farmers**

The study sample consisted of 88% Muslims and 12% Christians. This indicates that there were more Muslims than Christians in the study.

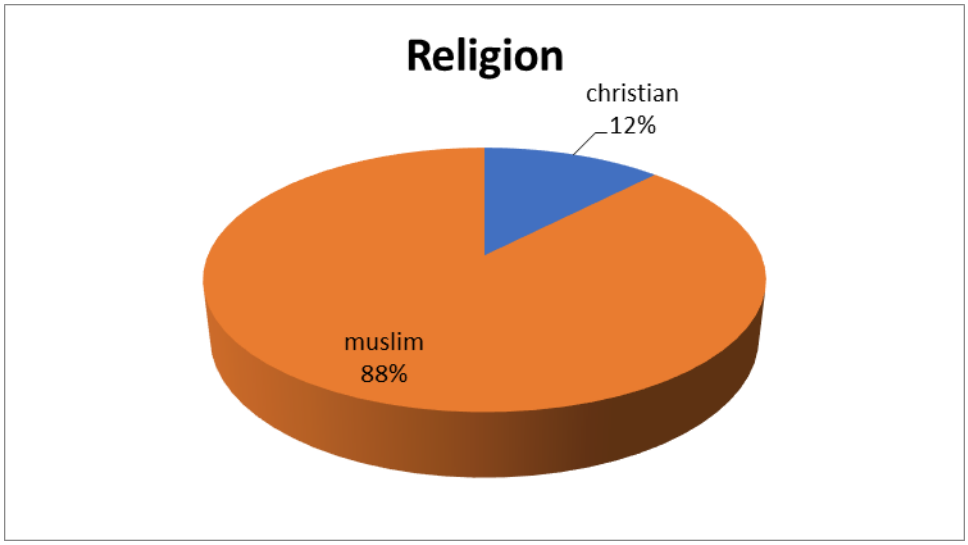


**Figure 6: Religion of Livestock Farmers.**

**Source:** Field data 2025.

**Number of livestock raised**

The study revealed that, Majority 87(67%) of the respondents raise more than 60 Livestock with a confidence interval of (58.45 – 74.42), followed by 26(20%) raise between 41 – 60 Livestock with a confidence interval (14.03 – 27.69), the other 9(7%) raise between 21 – 40

livestock with a confidence interval (3.68 – 12.63) and 8(6%) raise between 1 – 20 Livestock with a confidence interval of (31.5 – 11.67).

**Table 2: Number of Livestock Raised by Respondents.**

| Number of livestock raise | Frequency | Percent | CI |
|---|---|---|---|
| 1-20 | 8 | 6.2 | 31.5 – 11.67 |
| 21 - 40 | 9 | 6.9 | 3.68 – 12.63 |
| 41 - 60 | 26 | 20.0 | 14.03 – 27.69 |
| 60 and above | 87 | 66.9 | 58.45 – 74.42 |
| Total | 130 | 100.0 | |

**Source:** field data 2025

**Distribution of respondents by years of experience in livestock farming in Dogoloya Village, Koinadugu District, Sierra Leone**

In the study, Majority of the respondents 50(39%) have between 11 – 15 years of experience in livestock farming with a C.I (14.03 – 27.69), 44(34%) have above 15 years of experience with a C.I (26.28 – 42.34), the other 26(20%) have between 6 – 10 years' experience in livestock farming with a CI (14.03 – 27.69) and the remaining 10(8%) with a C.I (4.23 – 13.58) have between 1 – 5 years' experience in livestock farming.

**Table 3: Years of Experience in Livestock Farming.**

| Years of experience in livestock farming | Frequency | Percent | CI |
|---|---|---|---|
| 1 - 5 years | 10 | 7.7 | 4.23 – 13.58 |
| 6 - 10 years | 26 | 20.0 | 14.03 – 27.69 |
| 11 - 15 years | 50 | 38.5 | 30.54 – 47.04 |
| Above 15 | 44 | 33.8 | 26.28 – 42.34 |
| Total | 130 | 100.0 | |

**Source:** Field data 2025

**Type of Livestock raised**

Majority 62(48%) respondents raised all types of livestock, followed by 48(37%) raised cattle, 9(7%) raised sheep, 8(6%) raised goat, while 3(2%) poultry were the smallest type of livestock raised.

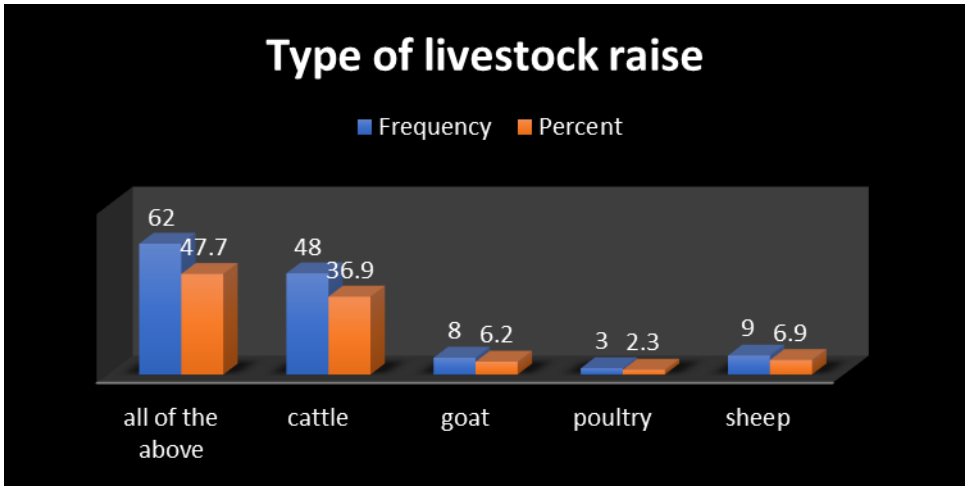


**Figure 7: Types of Livestock Raised by Respondents.**

## KNOWLEDGE CHARACTERISTICS OF THE RESPONDENT

***Respondents' awareness of anthrax diseases***

The majority 98% of the livestock farmers, have heard about anthrax diseases, while only 2% have never heard about the disease.

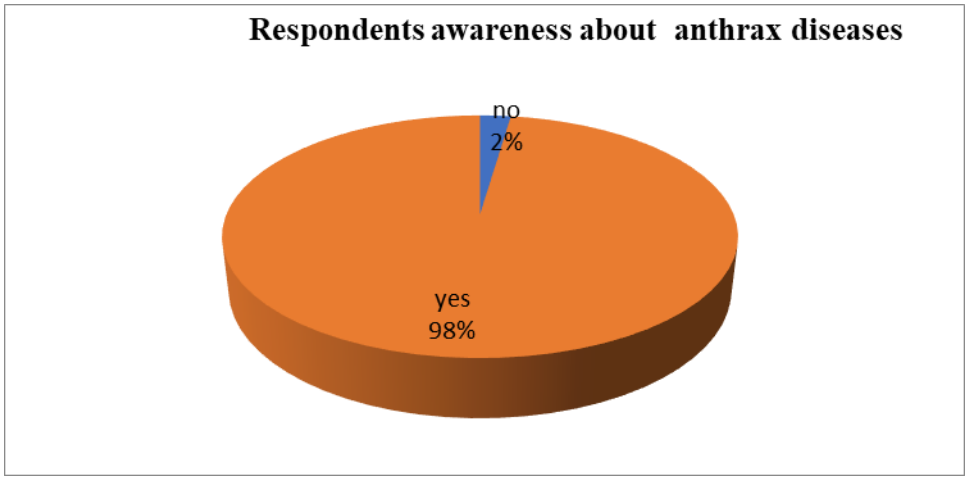


**Figure 8: Respondents' Awareness of Anthrax.**

**Source:** field data 2025.

**Source of information about anthrax disease**

A total of 47(36%) of the respondents had a C. I ( 28.40 – 44.70) get anthrax information from the government/livestock officer, 30(23%) of the respondents with a C. I (16.67 – 31.03) get anthrax information from radio/television/newspaper, 25(19%) of the respondents with a C.I (13.38 – 26.85) get information from other farmers, 18(14%) of the respondents with a C.I (8.94 – 20.83) get the information from health institutions, and 10(8%) of the respondents with a C.I (4.23 – 13.58) get anthrax information from the church/mosque.

**Table 4: Sources of Information on Anthrax Among Respondents.**

| Source of information | Frequency | Percent | CI |
|---|---|---|---|
| church/mosque | 10 | 7.7 | 4.23 – 13.58 |
| government/veterinary/livestock officer | 47 | 36.2 | 28.40 – 44.70 |
| health institutions | 18 | 13.8 | 8.94 – 20.83 |
| other farmers | 25 | 19.2 | 13.38 – 26.85 |
| radio/ television/ newspaper | 30 | 23.1 | 16.67 – 31.03 |
| Total | 130 | 100.0 | |

**Source: Field data 2025.**

**Causes of anthrax disease**

Majority of the respondents did not know the causative organisms for anthrax, 51(39%) of the respondents believe that it is caused by witch craft with a CI (31.26 – 47.8), 18(14%) of the respondent were able to identified both the causative organisms Bacillus anthracis and psychological problem with a CI (8.94 – 20.83) as the causes of anthrax, while the remaining 13(10%) of respondents believe that it is caused by Virus and Shortage of food and water.

**Table 5: Respondents' Knowledge of the Causes of Anthrax.**

| Causes of anthrax | Frequency | Percent | C.I |
|---|---|---|---|
| Bacteria bacillus anthracis | 18 | 13.8 | 8.94 – 20.83 |
| Others | 18 | 13.8 | 8.94 – 20.83 |
| Psychological problem | 17 | 13.1 | 8.33 – 19.95 |
| Shortage of food and water | 13 | 10.0 | 5.94 – 16.36 |
| Virus | 13 | 10.0 | 5.94 – 16.36 |
| Witch craft | 51 | 39.2 | 31.26 – 47.82 |
| Total | 130 | 100.0 | |

**Source: Field data 2025.**

**Livestock affected by anthrax**

A high proportion, 88% of the respondents' livestock have been affected by anthrax, while only 12% of the respondents' livestock have not yet been affected by anthrax

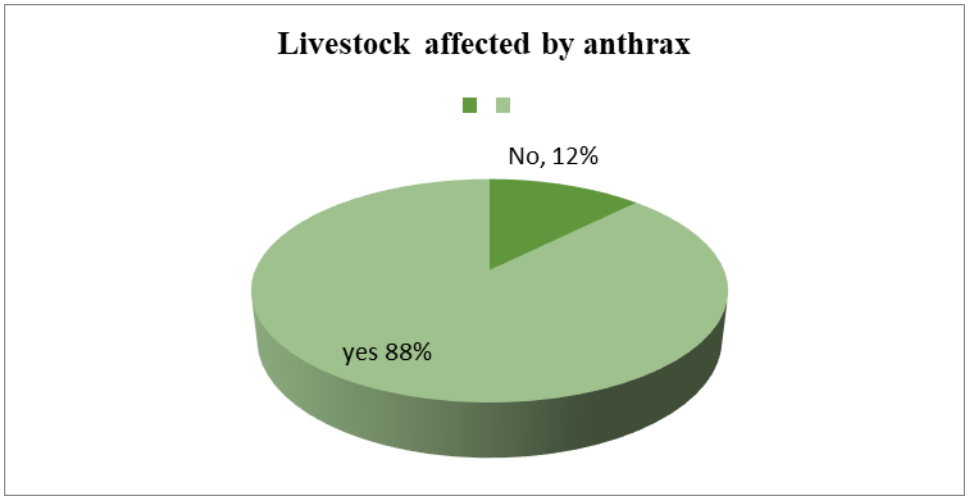


**Figure 9: Livestock Affected by Anthrax.**

**Source: Field data 2025.**

**Livestock affected by anthrax**

**Control of the anthrax outbreak in the farm**

In the study, Majority 59(45%) of livestock farmers believe in Vaccination for anthrax outbreak control, 31(24%) of the respondents believe in treatment, 29(22%) did nothing in anthrax outbreak control and 11(9%) of the respondents quarantine their livestock.

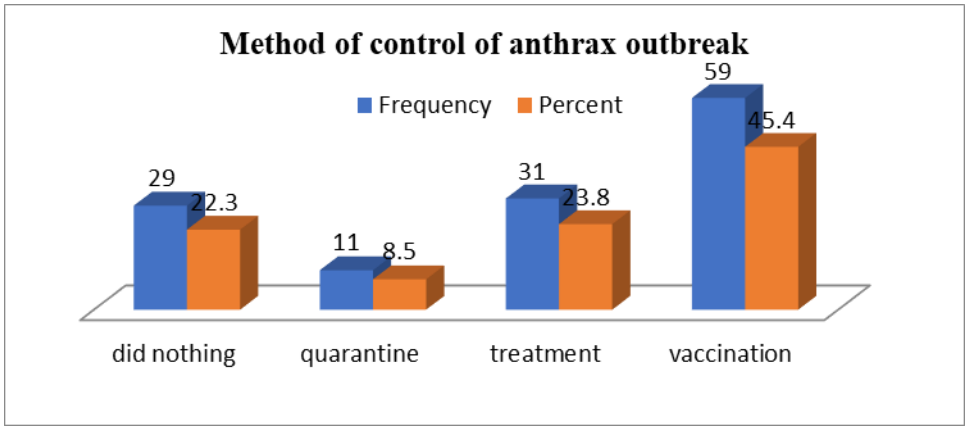


**Figure 10: Methods of Anthrax Control on the Farm.**

**Mode of transmission of anthrax**

About half of the respondents 51% identified all of the above as the mode of transmission of anthrax with a C.I of (10.18 – 22.57), 28(22%) stated that it is transferred by direct contact with infected animals with a C.I of (15.34 – 29.37), 20(15%) mentioned that it is transferred through air borne spores with a C.I of (10.18 – 22.57) and 8(6%) with a C.I of (3.15 – 11.67) stated that they did not know the mode of anthrax transmission.

**Table 6: Respondents' Knowledge of Anthrax Mode of Transmission.**

| Anthrax Mode of transmission | Frequency | Percent | C.I |
|---|---|---|---|
| air borne spores | 20 | 15.4 | 10.18 – 22.57 |
| all of the above | 66 | 50.8 | 42.28 – 59.22 |
| contaminated food water | 8 | 6.2 | 3.15 – 11.67 |
| direct contact with infected animals | 28 | 21.5 | 15.34 – 29.37 |
| do not know | 8 | 6.2 | 3.15 – 11.67 |
| Total | 130 | 100.0 | |

**Source:** Field data 2025.

**Signs and symptoms of anthrax disease**

A high proportion 43(33%) of the respondents knows all the signs and symptoms of anthrax, 32(25%) identified high fever swelling and edema, 22(17%) of the livestock farmers identified bloody discharge from body openings, 12(9%) says that sudden death without apparent symptoms and 10(8%) do not know the signs and symptoms of anthrax diseases**.**

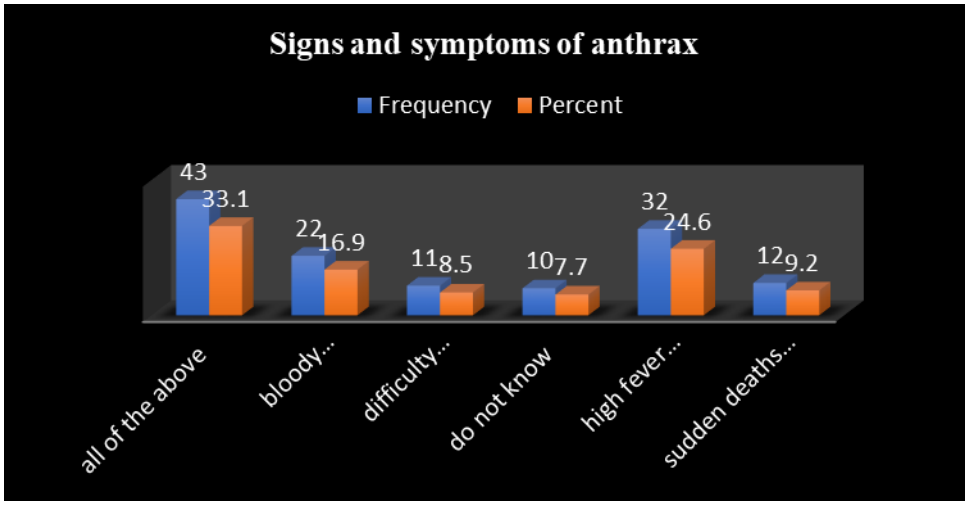


**Figure 11: Signs and Symptoms of Anthrax.**

**Source:** Field data 2025.

**Satisfaction with the availability of information about anthrax prevention and control from the Government/Health Organizations.**

There were 93(72%) respondents who were unsatisfied with the availability of information about anthrax prevention and control, 15(12%) were unsatisfied, 13(10%) were satisfied, 5(4%) were neutral and 4(3%) were neutral about the availability of information about anthrax prevention and control.

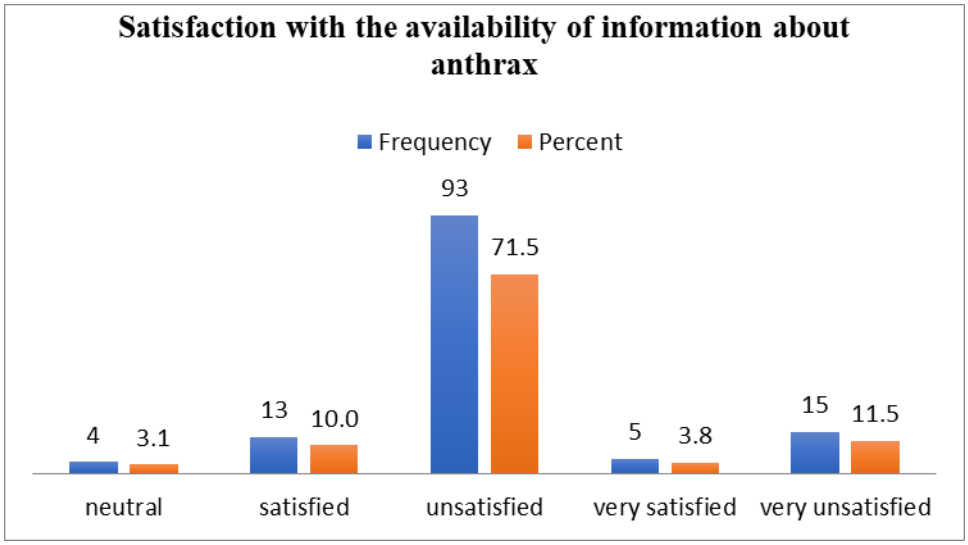


**Figure 12: Satisfaction with the Availability of Information on Anthrax.**

**Satisfaction with the availability of information about anthrax**

**Source:** Field data 2025.

**Respondents receive training/education on anthrax**

75% of the respondents have not received any training/education on anthrax, 21% have received training and education, and 4% were not sure of receiving training/education on anthrax diseases.

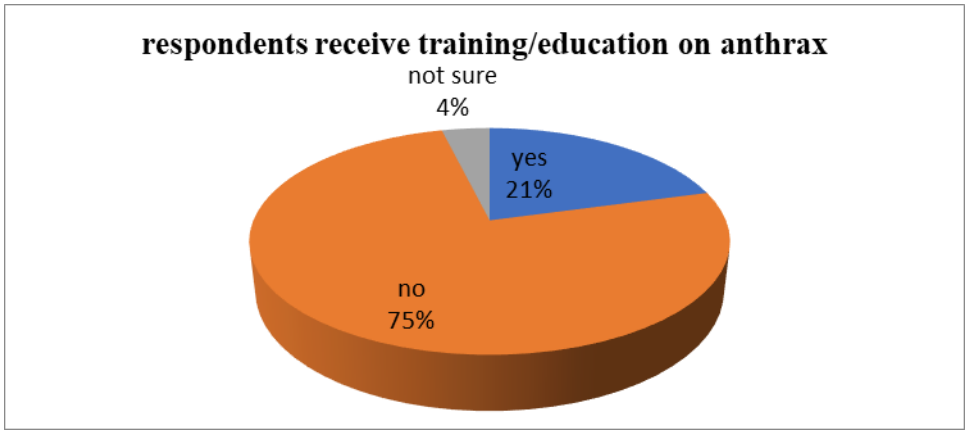


**Figure 13: Respondents' Training/Education on Anthrax.**

**Source: Field data 2025.**

**Respondents receive training/education on anthrax**

**Severity of anthrax disease in the community**

The majority, 94% of the respondents, said that anthrax is a serious problem in their community, while 5% were not sure, and only 1% said that anthrax is not a serious problem

in their community.

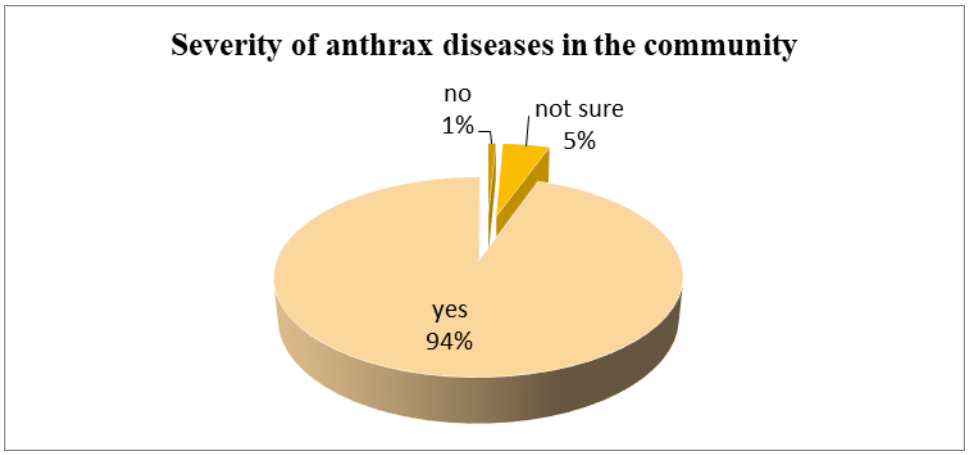


**Figure 14: Perceived Severity of Anthrax Disease in the Community.**

**Source: Field data 2025.**

**Severity of anthrax disease in the community**

***Relationship between variables***

**A cross-tabulation between the highest level of education and the causes of anthrax diseases.**

**Association between causes of anthrax and gender**

**Table 7: Association Between Gender and Knowledge of the Causative Agent of Anthrax.**

| | Female | Male | Total | Chi-square test | df | P-value | Cramer's V |
|---|---|---|---|---|---|---|---|
| **bacteria bacillus anthracis** | **4** | **14** | **18** | | | | |
| Others | 4 | 14 | 18 | 10.588 | 5 | 0.60 | 0.60 |
| psychological problem | 4 | 13 | 17 | | | | |
| shortage of food and water | 1 | 12 | 13 | | | | |
| Virus | 7 | 6 | 13 | | | | |
| witch craft | 8 | 43 | 51 | | | | |
| Total | 28 | 102 | 130 | | | | |

**Source:** Field data 2025.

***There was a significant association between gender and the causative agent of anthrax***

$$X^2=10.59,\ df=5,\ P=0.60$$

## DISCUSSION OF THE STUDY

### Demographic and Socioeconomic Characteristics

The study revealed that livestock farming in Kabala is predominantly male-dominated (78%), with most farmers being young (36% aged 18–28), married (63%), and self-employed (53%). Educational attainment was generally low, with 49% having no formal education, which may limit farmers' understanding and adoption of preventive practices. Similar demographic trends have been observed in Nigeria, Ghana, and Kenya, where livestock farming is male-dominated and low literacy contributes to gaps in disease knowledge.

### Livestock Ownership and Farming Experience

Most farmers raised large numbers of livestock (67% raising 60 or more) and had substantial experience, with 73% having more than 10 years in livestock farming. This reflects the reliance on livestock as a long-term livelihood strategy. Comparable patterns were reported in Uganda and Ethiopia, where experienced farmers manage large herds, yet face challenges in disease management due to limited veterinary support.

### Knowledge, Awareness, and Practices on Anthrax

Awareness of anthrax was high (98%), but accurate knowledge of its causative agent and transmission was poor. Many respondents (39%) attributed the disease to witchcraft, while only 14% correctly identified *Bacillus anthracis*. Preventive practices were inadequate: 22% did nothing during outbreaks, and only 45% relied on vaccination. Similar misconceptions and low adoption of preventive measures have been reported in Tanzania, Nigeria, and Ghana, where cultural beliefs, low education, and poor veterinary extension contribute to anthrax outbreaks.

### Satisfaction and Training on Anthrax Control

A majority (72%) were unsatisfied with the availability of information on anthrax, and 75% had not received any formal training. A significant association was observed between gender and perception of the causative agent ($\chi^2 = 10.59$, P=0.60). Similar gaps in training and access to information were reported in Kenya and Uganda, highlighting the need for structured education and veterinary outreach programs.

## SUMMARY

This study assessed the socio-demographic characteristics, knowledge, perceptions, and practices of livestock farmers regarding anthrax in Kabala Town, Koinadugu District. Findings revealed that livestock farming is predominantly male-driven, with most farmers being young, married, self-employed, and having low levels of formal education. Although

awareness of anthrax was very high, accurate biomedical knowledge of its causation and transmission was limited, with many farmers attributing the disease to witchcraft and other non-scientific causes.

**Conclusion**

The study concludes that anthrax remains a serious public health and livestock management challenge in Kabala Town. Despite widespread awareness, misconceptions about the causes and transmission of anthrax persist, undermining effective prevention and control efforts. The dominance of traditional beliefs, coupled with limited formal education and insufficient training opportunities, contributes significantly to poor disease management practices. The high prevalence of anthrax outbreaks reported among livestock further emphasizes the vulnerability of farmers and the need for stronger institutional support. These findings are consistent with studies conducted in other African countries such as Nigeria, Ghana, Ethiopia, and Tanzania, where cultural beliefs, weak veterinary services, and limited health education have similarly hindered effective anthrax control. Without targeted interventions, anthrax will continue to threaten livestock productivity, farmers' livelihoods, and public health in rural Sierra Leone.

**RECOMMENDATIONS**

***Based on the study findings and comparisons with related studies from other countries, the following recommendations are proposed:***

1. **Strengthen Veterinary Extension Services:**

The Ministry of Agriculture and Livestock, in collaboration with local councils, should expand veterinary outreach services to rural communities, ensuring regular farm visits, disease surveillance, and prompt response to anthrax outbreaks.

2. **Improve Farmer Education and Training:**

Regular community-based training programs should be organized to educate livestock farmers on the causes, transmission, signs, and prevention of anthrax, with emphasis on correcting misconceptions such as witchcraft-related beliefs.

3. **Enhance Vaccination Programs:**

Government and partner organizations should subsidize and scale up routine anthrax vaccination campaigns, particularly in high-risk and endemic areas like Kabala.

4. **Utilize Mass Media and Community Structures:**

Radio programs, community meetings, and religious institutions should be used to disseminate accurate and culturally appropriate information on anthrax prevention and

control.

**5. Promote One Health Approach:**

Collaboration between veterinary, human health, and environmental sectors should be strengthened to address anthrax as a zoonotic disease, protecting both livestock farmers and the wider community.

**6. Policy and Research Support:**

Further research should be encouraged to explore behavioral and cultural factors influencing disease control practices, while policies should prioritize livestock health as a key component of rural development and food security.

## Abbreviations

- **KAP** – Knowledge, Attitudes, and Practices
- **CI** – Confidence Interval
- **SPSS** – Statistical Package for the Social Sciences
- **WHO** – World Health Organization
- $\chi^2$ – Chi-square test

## Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this study.

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