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Assessment of Knowledge, Attitude and Practice of Livestock Owners Towards Anthrax in Kelafo District, Shabele Zone, Somali Region, Ethiopia

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Assessment of Knowledge, Attitude and Practice of Livestock Owners Towards Anthrax in Kelafo District, Shabele Zone, Somali Region, Ethiopia

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ABSTRACT

Background: Anthrax is a major zoonotic disease affecting livestock and humans in Ethiopia, particularly in pastoralist communities. However, limited data exists on livestock owners' knowledge, attitudes, and practices (KAP) in the Somali Region, especially in Kelafo District.

Objective: This study aimed to assess the knowledge, attitude, and practices of livestock owners towards anthrax in Kelafo District, Shabele Zone, Somali Region, Ethiopia.

Methods: A community-based cross-sectional study was conducted from March to May 2026. Using multi-stage stratified systematic random sampling, 384 livestock owners were selected and interviewed using a pre-tested structured questionnaire. Data were analyzed using SPSS version 26.

Results: The majority of respondents were male (70.6%), farmers (93.4%), and aged over 55 years (45.1%). While 87.0% recognized animal anthrax signs and 81.5% vaccinated their animals, only 8.1% were aware of human anthrax signs, 12.5% practiced proper carcass disposal, and 88.5% had close contact with infected animals. Overall, 92% had poor knowledge and 85% demonstrated poor practices, though 74.2% showed positive attitudes.

Conclusion and Recommendations: This study revealed a significant knowledge-practice gap among livestock owners in Kelafo District. Despite good awareness of animal anthrax, high vaccination coverage, and positive attitudes towards vaccination, critical preventive practices remain dangerously low. Urgent One Health interventions focusing on zoonotic risk education and safe carcass disposal are needed.

Keywords: Anthrax, Knowledge, Attitude and Practice (KAP), Livestock Owners, Kelafo District and Somali Region.

1. INTRODUCTION

1.1. Background

Anthrax is a zoonotic bacterial disease caused by *Bacillus anthracis* affecting livestock and humans(Subedi et al., 2024).Anthrax is a severe infectious disease caused by *Bacillus anthracis*. While it primarily affects livestock and wild animals, it can also be transmitted to humans, making it a zoonotic disease(Raza et al., 2023). Anthrax remains a serious, often fatal, zoonotic disease globally, with Sub-Saharan Africa being a hotspot for endemicity. It primarily affects herbivores both livestock and wildlife and poses a significant threat to human health and economic stability in regions with limited veterinary infrastructure, often resulting in widespread livestock mortality, economic losses, and fatal human cases through contact with contaminated meat(Elisha et al., 2024). The research conducted highlights that anthrax is hyper-endemic in Ethiopia, with the Amhara region being one of the most frequently affected areas. Recurrent outbreaks are driven by humid environmental conditions, high livestock density, and traditional practices that facilitate transmission(Assefa et al., 2020). Anthrax spores exist in the soil and, when ingested by herbivores (cattle, sheep, goats), cause rapid illness and sudden death, often with blood oozing from bodily openings. Humans become infected through several routes when they come into contact with these contaminated carcass(Okunlade et al., 2026). Anthrax in livestock is characterized by sudden death, often with no premonitory signs, and rapid bloating, sometimes with dark, unclotted blood discharging from natural orifices. Acute symptoms include high fever 42ºC, congestion/hemorrhage of mucous membranes, severe depression, difficulty breathing, and abortion(Alam et al., 2022). Anthrax in livestock can be controlled primarily through annual vaccinations and strict carcass disposal. Treatment involves high-dose antibiotics (e.g., penicillin) for early-stage cases. Prevention requires quarantining affected areas, vaccinating at-risk herds, and forbidding the opening of carcasses to prevent spore formation(Ndiva Mongoh et al., 2008). Anthrax causes significant economic disruption, primarily through high mortality rates in livestock, leading to severe losses for farmers, particularly in endemic regions of Africa and Asia. Key impacts include the costs of animal treatment/vaccination, reduced productivity, disposal of carcasses, and human medical costs, often surpassing average monthly household incomes(Aminu et al., 2025). Anthrax is a serious zoonotic disease caused by Bacillus anthracis spores, primarily impacting humans through contact with infected livestock or animal products (hides, meat)(Rahim et al., 2023). It causes high mortality (up to

90-100% for untreated inhalation, 50% for gastrointestinal), with ~20,000–100,000 annual human cases worldwide. It presents as cutaneous (most common), gastrointestinal, or deadly inhalation forms(Khairullah et al., 2024)

1.2. Statement of the Problem

Several studies conducted on Anthrax in Ethiopia on the assessment of knowledge, attitude, and practice (KAP) among livestock owners in Ethiopia reveals a critical gap between recognizing the disease and implementing safe prevention measures. Available national and regional KAP studies on anthrax in Ethiopia generally indicate moderate awareness among livestock keepers, with pooled estimates showing approximately 51% adequate knowledge, 59% positive attitudes, and only 50% safe practices. (Adugna et al., 2025; Awraris, 2024; Getahun, 2023; Mesfin et al., 2021; Tschopp & Kidanu, 2024; Yizengaw et al., 2026).

Although several studies have assessed the knowledge, attitude, and practice (KAP) of livestock owners regarding anthrax across different parts of Ethiopia, the overall body of research remains geographically uneven. Most existing studies are concentrated in the central, northern, and western regions of the country. In contrast, very limited empirical research has been conducted in the Somali Region, with particularly scarce data from Kalafo District in Shabelle zone, Ethiopia

Despite recurrent outbreaks of anthrax among both livestock and humans in Kelafo District, there is a notable absence of localized, district-specific investigations into livestock owners' perceptions, knowledge levels, carcass management practices, or barriers to prevention. This information gap is significant because limited awareness of transmission routes, prevention methods, and control measures among pastoral and agro-pastoral communities reduces the effectiveness of interventions. In addition, inadequate vaccination coverage and weak veterinary service delivery leave large herds vulnerable, while harmful traditional practices such as leaving carcasses exposed or consuming meat from animals that died suddenly continue to promote environmental contamination and long-term spore persistence. Furthermore, prevailing knowledge gaps and community attitudes hinder active participation in control programs.

The scarcity of context-specific studies in the Somali Region, especially Kalafo District, undermines evidence-based planning and contributes to the persistent circulation of anthrax. This ultimately affects

livestock productivity, household income, food security, and public health. Filling this research gap through targeted studies is essential for designing culturally appropriate and regionally relevant prevention and control strategies

1.3. General Objective

- To assess the knowledge, attitudes, and practices of livestock owners towards anthrax in Kelafo District.

1.3.1. Specific Objectives

- To measure the level of knowledge about anthrax among livestock owners.
- To explore livestock owners' attitudes toward anthrax prevention and control.
- To describe livestock husbandry and health practices relevant to anthrax transmission.
- To identify behavioral factors associated with good practices toward anthrax control.

2. METHODOLOGY

2.1.Description of Study area

Kelafo District is located in the Shabelle Zone of the Somali Regional State in eastern Ethiopia. It shares borders with Somalia to the south, Adadle District to the west, Gode District to the northwest, Mustahil District to the east, and Korahe Zone to the northeast. The district lies along the Shabelle River, which serves as a vital source of water for livestock and supports small-scale agriculture. Kelafo town is the administrative and economic center of the district.

It situated approximately 1,074 km and 690 km from Addis Ababa and Jigjiga respectively, the district faces challenges in accessing infrastructure, markets, and veterinary services. The climate is arid and semi-arid, characterized by hot temperatures, low and erratic rainfall, and predominantly pastoral and agro-pastoral livelihoods.

According to recent estimates, Kelafo District has a total population of about 77,471, of whom the majority live in rural areas. The population is predominantly Somali and Islam religiously. Livestock production is the mainstay of the economy, with cattle, camels, goats, sheep, and donkeys being the major species reared.

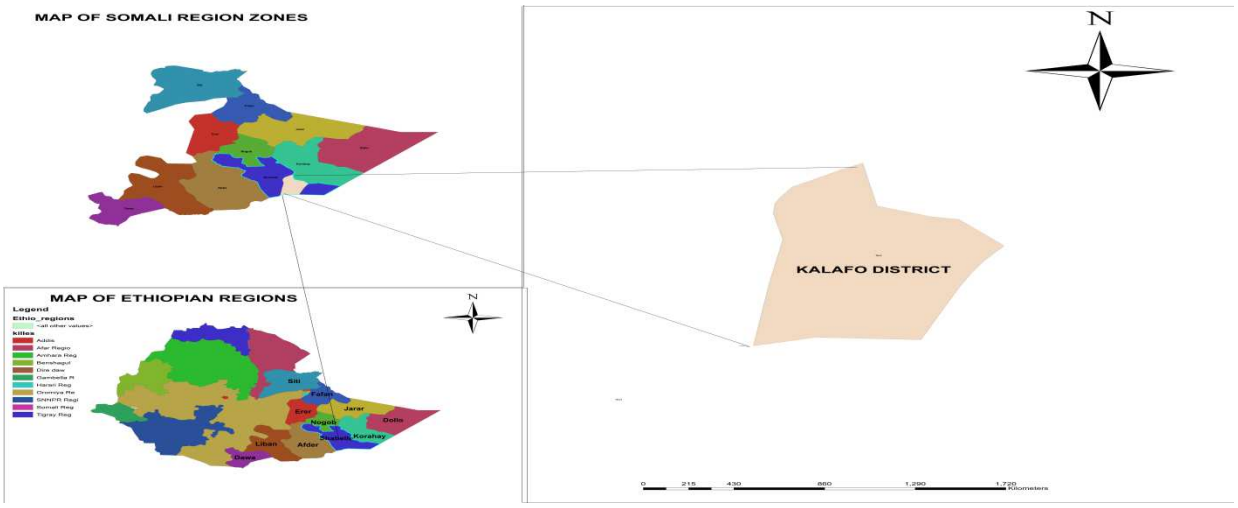


Figure 1: Map of study district(Kelafo)

Administratively, the district is divided into 15 kebeles. Major livestock diseases reported in the area include: Anthrax, Foot and Mouth Disease (FMD), Contagious Caprine Pleuropneumonia (CCPP), Peste des Petits Ruminants (PPR), Trypanosomiasis,and various parasitic infections. These diseases pose significant threats to livestock productivity and pastoral livelihoods.

2.2. Study Design and Period

A cross-sectional study was conducted from March up to May 2026 to assess the current KAP towards anthrax infection among livestock owners. A total of 10 kebeles (PA's) were selected randomly from the 15 kebeles (11 rural and 4 Urban Kebeles).

2.3. Study Population

The study population consisted of livestock owners residing in the selected kebeles of Kelafo District. Participants included household heads or adult livestock caretakers who were available during the data collection period. Individuals aged 18 years and above who had lived in the study area for at least six months were eligible for inclusion. Those who were seriously ill during data collection or unwilling to participate were excluded from the study.

2.4. Sample Size Determination

The sample size was calculated using the single population proportion formula

:$n = (Z^2 * P * (1-P)) / d^2$

Where: n = required sample size, Z = standard normal value at 95% confidence level (1.96), p = assumed proportion of good knowledge/practice (50% if no prior study), d = margin of error (5%) Assuming p = 0.5 and d = 0.05:

n= $(1.96)^2 * 0.5 * (1-0.5)) / (0.5)^2$=384. Thus, the final sample size was 384 participants.

2.5. Sampling Procedure

A multi-stage stratified systematic random sampling technique was employed in this study. The study area was first be stratified into urban and rural kebeles to ensure the sample accurately reflects the district's demographic composition. Within each stratum, kebeles was randomly selected. Then, using an updated list of households in the selected kebeles, livestock-owning households were be systematically sampled at a fixed interval. In households with more than one eligible respondent (household head or adult livestock caretaker), only one participant was randomly selected to avoid clustering bias.This approach ensured both representativeness across urban-rural divides and equal probability of selection for eligible participants.

2.6. Data Collection Tools

A total of 384 participants were selected from the livestock-owning population in the selected kebeles of Kelafo District using a simple random sampling technique. Data were collected through face-to-face interviews using a pre-tested, structured questionnaire. To ensure accuracy and linguistic equivalence, the questionnaire was originally developed in English, translated into the local Somali language, and then back-translated into English.

2.7.Data Management and Analysis

All collected data were checked for completeness and consistency immediately after each interview. The questionnaires were coded and entered into a specially designed Microsoft Excel database using double data entry to minimize errors. Data were analyzed using SPSS version 26. Descriptive statistics such as frequencies, percentages, and means were used to summarize socio-demographic characteristics and the levels of knowledge, attitude, and practices regarding anthrax. Knowledge, attitude, and practice scores were calculated and categorized into "good" and "poor" based on a standard cut-off point (≥%44 for good).

2.8. Ethical Consideration

Ethical approval was obtained from the Kelafo Pastoral Development Office. Prior permission was also secured from relevant local authorities, including woreda administration, agricultural, and veterinary

offices, as well as community leaders to ensure cultural sensitivity and acceptance. All participants were fully informed about the purpose, procedures, and voluntary nature of the study. Informed verbal or written consent was obtained from each participant before data collection. Confidentiality and anonymity were strictly maintained throughout the study, and participants had the right to withdraw at any time without any consequences.

3. RESULT AND INTERPRATIONS

3.1.Socio-Demographic Characteristics

The study analyzed the socio-demographic characteristics of 384 respondents in the Kalafo district, with a predominance of males (70.6%) compared to females (29.4%). The majority of participants were over 55 years of age (45.1%), followed by those aged 36–55 years (33.6%), while the youngest age group (18–35 years) constituted only 21.4%, indicating a notably older study population. In terms of education, nearly half of the participants had completed only primary school (45.8%), over one-fifth were illiterate (23.4%), and only 6.5% had attained higher education, reflecting an overall low educational profile. Most participants were married (85.2%), with small proportions being single (8.6%) or divorced (6.3%). The sample was religiously homogeneous, with all participants (100%) identifying as Islam and no representation of other religious groups. Occupationally, the vast majority were farmers (93.4%), while students (5.5%) and government employees (1.0%) formed negligible minorities. (See below table 1).

Table 1: Socio-demographic characteristics

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	271	70.6
	Female	113	29.4
Age Group	18-35 years	82	21.4
	36-55 years	129	33.6
	> 55 years	173	45.1
Education Level	Illiterate	90	23.4
	Primary school	176	45.8
	Secondary school	93	24.2
	Higher education	25	6.5
Marital status	Single	33	8.6
	Married	327	85.2
	Divorced	24	6.3
Religiuos type	Christian	0	0
	Islam	100	100
	Prostatant	0	0
	Wekafata	0	0
	Catholic	0	0
Occupation type	Farmer	359	93.4
	Student	21	5.5
	Government employee	4	1.0
Overall		**384**	**100%**

3.2.Knowledge Assessment Regarding Anthrax in Kalafo District

The assessment of knowledge levels among respondents in the Kalafo district reveals a significant disparity between general awareness and technical understanding of Anthrax. A total of 384 respondents participated in the anthrax knowledge assessment in Kalafo District. The majority (62.2%) had never heard of zoonotic diseases, indicating poor foundational awareness. While knowledge of animal anthrax signs was high (87.0%), awareness of human anthrax signs was critically low (8.1%). Regarding transmission, 68.5% correctly identified eating infected meat as the route from animals to humans, but

18.5% incorrectly believed soil was the route and 13.0% had no knowledge. Only 24.0% knew that the anthrax causative agent can survive in soil for more than 60 years, while 76.0% were unaware of this crucial fact. Seasonal occurrence was reasonably understood, with 59.4% correctly identifying spring as the peak season, followed by autumn (32.3%). Health professionals (43.5%) and newspapers (37.2%) were the primary sources of anthrax information, while family (15.1%) and social media (4.2%) played lesser roles. In conclusion, the community demonstrated good knowledge of animal anthrax signs and seasonality but severely deficient knowledge of human anthrax, spore persistence, and general zoonotic disease awareness, highlighting urgent needs for targeted health education. (See below table 2).

Table 2: Knowledge Assessment Regarding Anthrax in Kalafo District

Knowledge Items	**Response**	**Frequency (n)**	**Percentage (%)**
Heard about zoonotic diseases	Yes	145	37.8
	No	239	62.2
Knowledge about signs of Anthrax	Yes	234	87.0
	No	50	13.0
Knowledge about Signs of human anthrax	Yes	31	8.1
	No	353	91.9
Knowledge of Anthrax Transmission Routes from Animals to Humans	Eating infected meat	263	68.5
	Soil	71	18.5
	Don't know	50	13.0
Causative Agent Survive in Soil > 60 years	Yes	92	24.0
	No	292	76.0
Seasonal Occurrence of Anthrax	Spring	228	59.4
	Summer	15	3.9
	Autumn	124	32.3
	Winter	17	4.4
Source heard from anthrax	Health professionals	167	43.5
	Family	58	15.1
	News paper	143	37.2
	Social media	16	4.2
	Overall	**384**	**100**

3.3.Attitudinal Assessment Toward Anthrax in Kalafo District

The attitude assessment among 384 respondents in Kalafo District revealed a mixed and paradoxical profile across four key statements. Regarding the statement, "Contact with infected animal has no problem," the majority of respondents (65.1%) agreed, indicating a dangerous and high-risk attitude, while only 9.4% disagreed correctly, and 25.5% remained uncertain. Concerning the second statement, "Belief in effectiveness of prevention vaccine against Anthrax," the vast majority (84.1%) agreed that the vaccine is effective, with 15.9% uncertain and notably no respondent disagreeing. For the third statement, "Anthrax contaminated soil is source of infection," the majority (75.3%) disagreed, while only 6.3% agreed correctly and 18.5% were uncertain. Finally, regarding the statement, "Anthrax can be treated by traditional medicine," the majority (79.4%) disagreed, with only 6.0% agreeing and 14.6% uncertain (See below table 3).

Table 3: Attitude Level of Respondents towards Anthrax at Kalafo District

Attitude Statement items	Responses	Frequency (n)	Percentage (%)
Contact with infected animal has no problem	Agree	250	65.1
	Uncertain	98	25.5
	Disagree	36	9.4
Belief in effectiveness prevention of vaccine against Anthrax	Agree	323	84.1
	Uncertain	61	15.9
Anthrax contaminated soil is source of infection	Agree	24	6.3
	Uncertain	71	18.5
	Disagree	289	75.3
Anthrax can be treated by traditional medicine	Agree	23	6.0
	Uncertain	56	14.6
	Disagree	305	79.4
	Overall	**384**	**100**

3.4.Anthrax Prevention Practices in Kalafo District

The practice assessment among 384 respondents in Kalafo District evaluated six key prevention practices related to anthrax. Regarding carcass disposal, only 48 respondents (12.5%) reported burying or burning carcasses of dead animals, while the vast majority, 336 (87.5%), did not practice this recommended method. Concerning the practice of slaughtering infected animals, a substantial majority of 320 respondents (83.3%) reported that they slaughter infected animals, while only 64 (16.7%) did not. Regarding consumption practices, 77 respondents (20.1%) admitted to eating meat from animals that died suddenly, whereas 307 (79.9%) refrained from this practice.

Regarding close contact with infected animals, an alarming 340 respondents (88.5%) reported having close contact, while only 44 (11.5%) avoided it. Concerning veterinary consultation, only 101 respondents (26.3%) had ever consulted a veterinarian for an anthrax-suspected or sick animal, while 283 (73.7%) had not.

Regarding vaccination practices, a positive finding emerged: 313 respondents (81.5%) reported vaccinating their animals against anthrax, while only 71 (18.5%) did not.

Finally, among those who vaccinated, the majority (93.8%) obtained vaccines from state veterinary services, while only 6.3% used other sources, indicating good access to and trust in government veterinary services (See below table 3).

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Table 4: Practice Level of Respondents regarding Anthrax Prevention practices at Kalafo District

Practice Item	Response	Frequency (n)	Percentage (%)
Burying or burning carcasses of dead animals	Yes	48	12.5
	No	336	87.5
Ever Slaughtered infected animal	Yes	320	83.3
	No	64	16.7
Eating meat from animals that died suddenly	Yes	77	20.1
	No	307	79.9
Close contact with infected animal	Yes	340	88.5
	No	44	11.5
Ever consulted with veterinarian for anthrax suspected or sick animal	Yes	101	26.3
	No	283	73.7
Vaccinate animals against anthrax	Yes	313	81.5.
	No	71	18.5
Sources of Vaccine	State vet services	360	93.8
	Others	24	6.3
	Overall	384	100

4. DISCUSSIONS

The findings of this study provide important insights into the knowledge, attitudes, and practices (KAP) regarding anthrax among communities in Kalafo District, Ethiopia.

Reflecting the knowledge level of anthrax; regarding awareness of zoonotic diseases from this study respondents found that 62.2% of respondents had never heard of zoonotic diseases indicates a significant foundational knowledge gap. This is comparable to a study by (Munyua et al., 2016) in Kenya, where 58.7% of pastoralists had no prior knowledge of zoonotic diseases. Similarly, (Zhang et al., 2016) in Tanzania reported that 94% of livestock keepers were aware of the term "zoonosis," despite experiencing animal deaths. However, this finding is considerably higher than reports from more intensively educated populations, such as study reported by (Moritz et al., 2013) in Cameroon, where this community had never heard of zoonotic diseases.

Similarly, responding on knowledge of animal and human anthrax signs; this study revealed a striking finding and displayed substantial disparity between knowledge of animal anthrax signs (87.0%) and human anthrax signs (8.1%). This pattern is well-documented in the literature As reported by (Tschopp & Kidanu, 2024) in Ethiopia found that 65.7% of respondents could recognize anthrax in cattle.. In contrast, (Senyange et al., 2025) in Uganda reported that 74.5% of community didn't know any signs of animal anthrax .This disparity reflects the reality that pastoralists primarily observe animal deaths and have less exposure to diagnosed human cases, as human anthrax is often underreported and misdiagnosed.

In terms of knowledge of anthrax transmission routes, the study's finding of 68.5% is comparable to rates in the broader Oromia/general regions (65.2%) by (Adugna et al., 2025) and the Afar region (70.1%) by .(Tschopp & Kidanu, 2024) However, this study's finding is lower than reports from) in the Somali region (78.3%), possibly due to differences in prior outbreak experiences(Tschopp & Kidanu, 2024). The 18.5% who incorrectly believed soil itself is the transmission route, and 13.0% with no knowledge, are concerning. Similar misconceptions were reported by Beyene et al. (2015) in Ethiopia, where 16% believed soil contact alone causes anthrax.

Regarding respondents' knowledge of spore survival in soil, this study revealed that only 24.0% knew that anthrax spores can survive in soil for over 60 years. This is alarmingly low but consistent with other

studies in Africa (Wood et al., 2015). In contrast, in Bangaladesh found higher awareness (56.82%) by (Dutta et al., 2021) and this difference is due to integrated veterinary-public health education programs. .

Moreover, reflecting knowledge of anthrax seasonal occurrence, this study found that 59.4% correctly identified spring(long rainy season) as the peak season aligns with the known epidemiology of anthrax in Ethiopia. This is closely similar with study conducted in the Afar and Somali regions reported that 63% and 61% of respondents associated anthrax with the spring (dry-to-wet transition) season (Tschopp & Kidanu, 2024). This study was lower with study reported by (Kibebew et al., 2026) who found that 87.63% of anthrax cases were concentrated during the long rainy season in West Arsi Oromia region. This consistent finding across studies suggests that communities have good observational knowledge based on years of experience with livestock deaths, which can be leveraged for seasonal vaccination campaigns.

The attitude assessment revealed a paradoxical profile. While 84.1% of respondents believed in vaccine effectiveness (with no respondent disagreeing), 65.1% agreed with the dangerous statement that "contact with infected animal has no problem." This disconnect between positive attitudes toward vaccination and high-risk risk perception is concerning. According with study conducted by (Mesfin et al., 2021) in Northwest Ethiopia reported similar findings, where positive attitudes toward vaccination coexisted with complacent attitudes toward personal protective measures. The finding that 75.3% disagreed that "anthrax contaminated soil is source of infection" represents a critical misconception, given that spore-contaminated soil serves as the primary environmental reservoir for anthrax(Subedi et al., 2024). This misconception likely contributes to the persistence of anthrax in the district despite vaccination efforts.

The majority (79.4%) correctly disagreed that anthrax can be treated by traditional medicine, which is encouraging and suggests that communities recognize the limitations of traditional healing for this particular disease. This finding is higher than that reported by (Awraris, 2024) in other parts of Ethiopia, where traditional medicine use for anthrax was more prevalent, possibly due to better access to veterinary services in Kelafo District.

The practice assessment revealed a significant gap between knowledge/attitudes and actual practices. Despite 81.5% vaccination coverage (a notable success compared to other Ethiopian regions), only 12.5% practiced proper carcass disposal through burying or burning. This finding is consistent with studies across Ethiopia. Acoording to (Mesfin et al., 2021) reported that only 15.3% of farmers practiced safe carcass disposal in Farta district. Similarly, (Adugna et al., 2025) found low rates of proper carcass

disposal in Meta Welkite District. The persistence of improper carcass disposal practices is particularly dangerous because carcasses of animals that die from anthrax contain massive numbers of bacilli that form spores upon exposure to oxygen, contaminating the environment for decades(Raza et al., 2023; Subedi et al., 2024)..

The finding that 83.3% of respondents reported slaughtering infected animals and 20.1% consumed meat from animals that died suddenly is alarming from a public health perspective. These practices are well-documented risk factors for human anthrax. (Khairullah et al., 2024) reported that consumption of meat from animals that died suddenly is a primary driver of human gastrointestinal anthrax in endemic regions. Also, (Elisha et al., 2024) noted that traditional slaughter practices in Sub-Saharan Africa significantly increase the risk of cutaneous anthrax through direct contact with infected tissues.

The finding that 88.5% of respondents reported close contact with infected animals represents the highest-risk practice identified in this study. This is particularly concerning given that cutaneous anthrax, the most common form in humans, occurs through direct contact with infected animals or their products(Aminu et al., 2025; Rahim et al., 2023) documented that lack of personal protective equipment and handling of infected carcasses contribute substantially to the human anthrax burden in rural Africa.

Only 26.3% had ever consulted a veterinarian for an anthrax-suspected animal, which is lower than the 35.6% reported by (Yizengaw et al., 2026) in East Gojjam Zone. This low consultation rate may reflect limited access to veterinary services in this remote pastoral area, despite the high reported vaccination coverage (81.5%). The finding that 93.8% of those who vaccinated obtained vaccines from state veterinary services indicates good functional access to government veterinary services for vaccination campaigns, suggesting that the infrastructure exists but may be underutilized for other veterinary services.

The most striking finding of this study is the substantial knowledge-practice gap. Despite good knowledge of animal anthrax signs (87.0%) and high vaccination coverage (81.5%), dangerous practices such as improper carcass disposal (87.5%), slaughtering infected animals (83.3%), and close contact with infected animals (88.5%) persist. This gap has been documented elsewhere in Ethiopia. (Getahun, 2023) reported that knowledge of anthrax did not translate into safe practices in Kellem Wollega Zone. (Tschopp & Kidanu, 2024) found similar knowledge-practice mismatches in both Afar and Somali regions, attributing them to economic necessity, cultural practices, and lack of feasible alternatives for

carcass disposal. As (Okunlade et al., 2026) noted, closing the knowledge-practice gap requires not just education but also provision of practical alternatives and addressing underlying economic constraints.

This study has several strengths, including the use of a validated, pre-tested questionnaire, rigorous sampling methodology, and high participation rate. However, limitations include the cross-sectional design, which cannot establish causality, and potential social desirability bias, as respondents may have over-reported vaccination rates and under-reported risky practices

5. CONCLUSION AND RECOMMENDATIONS

This study found that communities in Kalafo District possess good knowledge of animal anthrax signs and seasonality, excellent attitudes towards vaccination, and high vaccination coverage. However, they simultaneously exhibit critically poor knowledge of human anthrax and spore persistence, dangerous attitudes regarding risk perception, and highly risky practices including improper carcass disposal, slaughtering infected animals, and close contact with infected animals. These findings are broadly consistent with studies across Ethiopia and sub-Saharan Africa, where pastoralist communities face similar knowledge-practice gaps. The high vaccination coverage in this study is a notable success compared to other Ethiopian regions and should be sustained. However, without addressing the dangerous practices driven by economic necessity and lack of risk awareness, vaccination alone will not eliminate anthrax transmission. Integrated interventions combining vaccination, risk communication, safe carcass disposal training, and community-based surveillance are urgently needed.

Based on the above mentioned conclusion, the following recommendations were forwarded:

- **Establish Routine Awareness**: Launch systematic educational campaigns for livestock owners focused on the zoonotic risks associated with anthrax.
- **Enhance Community Capacity**: Implement community-led capacity-building initiatives and training on essential anthrax biosafety measures including proper carcass disposals and safe practices.
- **Foster One Health Collaboration**: Foster multi-stakeholder partnerships to strengthen integrated "One Health" strategies for comprehensive anthrax control.

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AUTHOR CONTRIBUTIONS

AMA: Conceptualization. Methodology, Validation, & Investigation and Supervision, Writing - Original Draft, Data Curation, Writing - Original Draft, Writing - Review & Editing. MAA: Methodology, Validation, Data Curation, Writing - Original Draft, Writing - Review & Editing, Visualization. SH: Coordination and Supervision

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DECLARATIONS

Ethical approval was obtained from Jigjiga University, Ethiopia and all human participants gave written informed consent.

DECLARATION OF ARTIFICIAL INTELLIGENCE USE

We here by confirm that no Artificial Intelligence (AI) tools were utilized at any stage of this study, including during data collection, analysis, visualization, or manuscript preparation. All work presented in this study was conducted manually by the authors without the assistance of AI-based tools or systems.

COMPETING INTERESTS

The authors declare no competing interests.

AVAILABILITY OF DATA

Data will be made available on request.

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