

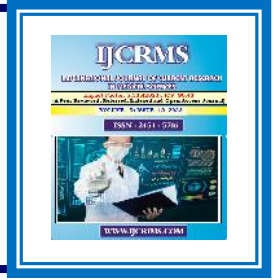


International Journal of Current Research in Medical Sciences

ISSN: 2454-5716

(A Peer Reviewed, Indexed and Open Access Journal)

www.ijcrims.com



Original Research Article

Volume 9, Issue 12 -2023

DOI: <http://dx.doi.org/10.22192/ijcrms.2023.09.12.002>

Assessment of Public Knowledge, Attitude and Practices Towards Anthrax in Dessie City, Ethiopia

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Abstract

A cross-sectional study was conducted from June 2022 to September 2022 to assess the knowledge, attitudes and practices (KAP) on Anthrax and associated risk factors among the community of Dessie City, Amhara regional state, Ethiopia. A simple random sampling procedure was employed to select kebeles. From the list of kebeles, five were randomly selected using the lottery method. Then, 40 households were selected and interviewed from each kebeles using a systematic random sampling method. A structured questionnaire was used to collect the data through face-to-face interviews among 190 respondents. Then, the data were analyzed using Excel spread sheets. Out of the 190 respondents interviewed, 65.2 % of them were males and 34.7 % female. The majority of the respondents 63.6 % were Muslim followed by Orthodox 36.3%. From the total of respondents, (55.2%) had awareness about Anthrax. The result also established that (28.4%) of them know that eating raw meat transmit the diseases from animal to humans. Sudden death (46.8%) followed by stop eating and drinking (19.5%) were described as a major clinical sign of Anthrax in animals by the majority of the respondents. Of the participants, (51.1%) knew that the disease could not easily treatable. From the total of respondents, (31.5%) respondents agree on Grazing pasture is source of infection for animal. Of the participants, (54.1%) were aware of the fact that Anthrax is a very serious disease in humans and animals. Regarding safety measure (79.4%) respondents take any safety measure when they are caring anthrax suspected animal. Majority of the respondents (87.8%) were aware of animal's vaccination as a means of Anthrax prevention. More than (65%) of the respondents vaccinate their Animals while (34.7%) didn't vaccinate their Animals. Educating the community about the health risk of anthrax and the ways of prevention should be given priority by health extension workers, veterinary professionals and the government at large. Medical and veterinary personnel should be collaborating in multidisciplinary approach for the prevention and control of anthrax.

Keywords: Anthrax, Attitude, Dissie City, Ethiopia, knowledge, practice.

1. Introduction

Anthrax is a zoonotic bacterial disease caused by *Bacillus anthracis*, a gram-positive rod-shaped and capsulated bacillus [1]. It is the most common bacterial disease in sub-Saharan countries [2].

The name of the bacterium is derived from “anthracis”, the Greek word for coal, because anthrax in humans causes black, coal-like lesions on the skin at the site of inoculation [3]. The bacterium forms spores when exposed to oxygen and allowing it to remain viable in the environment for many years before coming into contact with a susceptible host and when exposed to a nutrient rich environment, such as the tissues or blood of an animal or human host [4].

The disease in animal is characterized by septicemia and sudden death with exudation of tarry blood from the natural orifices of the cadaver. Failure of the blood to clot, the absence of rigor mortis and the presence of splenomegaly are the most important necropsy findings of the disease. Prior to the development of the anthrax vaccine and antibiotics it was the foremost cause of uncontrolled mortality in different species of animals worldwide [5].

Animal anthrax is an endemic disease and seasonal in Ethiopia which occurs in May and June every year in different localities of the country. Several districts of the country are reporting suspected cases of anthrax outbreaks in animals, few of those are confirmed by laboratory [6]. A number of factors such as changing rainfall patterns, soil disturbance, increased animal and human populations, and poor grazing systems and human behavior have been reported to be

associated with outbreaks of anthrax. Interaction of wildlife with livestock and humans has also been reported as a key predisposing factor of anthrax among humans and livestock. Disease usually re-occurs in areas where there has been a previous outbreak, making vaccination of the recommended form of control [7].

The objectives of this study were;

- ❖ To assess the level of knowledge, attitudes, and practices of communities in Dessie city, Ethiopia.
- ❖ To identify factors associated with community knowledge, attitudes, and practices about anthrax in the study area.

2. Materials and Methods

2.1 Study area

The study was conducted from June 2022 to September 2022 to assess the level of knowledge, attitudes and practices towards Anthrax in Dessie city, Amhara regional state, Ethiopia. Dessie city has a total of 8 kebeles which are located 410 km far from Addis Ababa, the capital city of Ethiopia. The City is found at a longitude of 38°E and latitude of 11-40°N with an elevation or altitude of 2,470 to 2,550 m above sea level (m.a.s.l). The area receives an annual rainfall of 1000-1400mm. The average temperature is 15c⁰-17.5c⁰[8]. Based on projections from the 2007 Ethiopian national census, the 2018/19 total population of the city was estimated to be 200,000 with an area of 161,828 square kilometers. The City livestock population is estimated to be 23,750 cattle, 27,096 sheep, 23,406 goats, 8,231 equines and 125,252 poultry [9].

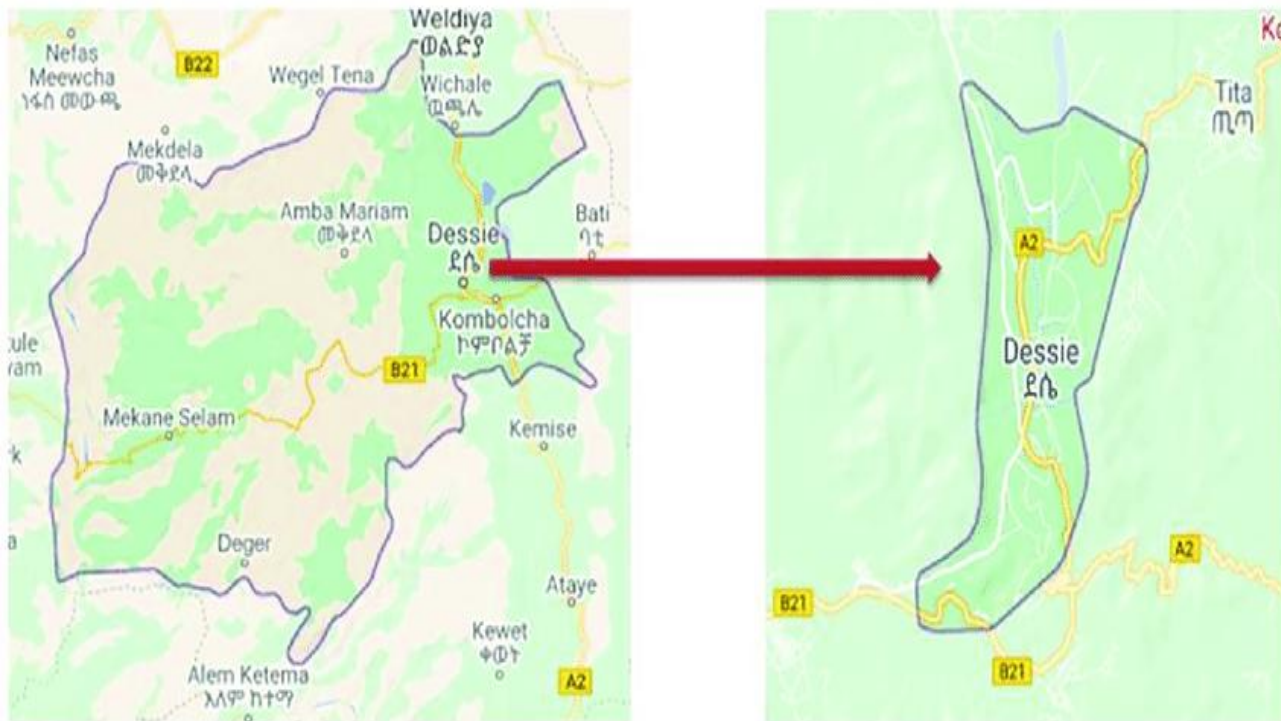


Figure 1. Map of the study area of Dessie City in the Amhara regional state

2.2. Study design and study period

A cross-sectional study design was employed to assess the knowledge, attitudes, and practices (KAP) on Anthrax and associated risk factors among the community of Dessie City from June 2022 to September 2022.

2.3. Study populations

The study population was animal owners who have been lived in randomly selected kebeles of Dessie City. (Gerado, Tita, Kurkur, Boru, and Boruselase) as permanent residents for more than six months. Both male and females with age group above 15 years of age was included in this study. Questions were answered by a single adult from a given house hold.

2.4. Sample size determination and Sampling techniques

In order to generate sufficient information of the knowledge, attitudes and practices regarding anthrax among community members in Dessie City, sample size was determined by using Slovin Formula for qualitative data of small sample size with a margin error of (e=8%) with an average

household size of 1250 livestock in one kebeles and a total of 10,000 livestock population size in the study population in the total kebeles [10]. Generally, sample size of the study can be calculated by using the general formula for small size qualitative data:

$$n = \frac{N}{(1 + N * e^2)}$$

Where n=sample size

N=the size of the population
e = the margin of error (margin of error=8%)

Therefore the sample size of the study would

$$ben = \frac{10000}{(1+10000*(0.08)^2)} = 154-200$$

As a result, **190** respondents were selected as study population by adding 10% non-response rate; thus, the total sample size was **209** subjects. From the entire primary sampling unite that is, 8kebeles (lowest administrative structure); Five were randomly selected using the lottery method. Then, 40 households were selected and

interviewed from each kebeles using the systematic random sampling method, as there was no significant difference in the number of households. Whenever the selected household was found locked, the next household (on the right side) was substituted automatically for interview. A pretested structured questionnaire consisting of closed-ended questions was used for this study. The data were collected via face-to-face interviews. The questionnaire was first developed in English and then translated into Amharic language (native language) for appropriateness and easiness in approaching the study participants.

2.5. Data management and analysis

After collecting, the data were cleaned and checked for its completeness. Those incomplete and inconsistent were corrected when possible and removed otherwise. After a complete check-up, the data were coded and entered into a Microsoft Excel sheet and analyzed by using Excel. The frequency distribution of both dependent and independent variables was worked out by using descriptive statistics techniques.

2.6. Ethical Clearance

The study protocol was reviewed and approved by the Ministry of Agriculture in collaboration with the Food and Agriculture Organization of the United Nations (FAO); Oral informed consents were obtained from each participant after informing them about the purpose of the study as well as the risks, benefits, and rights of the study participants. Only voluntary participants were involved in the study. All the information

obtained from the study participants was kept confidential.

2.7. Data Quality Assurance

Before the beginning of the full study, the pre-test was performed on some participants to see the applicability of the questionnaire. Each questionnaire was checked for incompleteness, missed values, and unlikely responses, and then manually cleaned upon such indications. The data was cross-checked for consistency and accuracy.

3. Results

3.1. Socio-Demographic characteristics

Two hundred nine (209) heads of household were interviewed during the study period. Of these, the data collected from nine tin respondents were found to be incomplete and excluded from the analysis. Only data from 190 households were considered for the analysis. The majorities of the respondents were male 124 (65.3%) and were above 15 years of age, of which 28% and 37.9% were between 15 to 30 and 31 to 46 years old, respectively. The majority of the respondents 121(63.6%) were Muslim followed by orthodox 69 (36.3%). Concerning educational status, 58(33.5%) of the participants were illiterate (cannot read and write).Of the participants, 49 (25.7%) and 56 (29.4%) were in primary school and secondary school, respectively. In addition, these 27(14.2%) were in higher education. The majority of the respondents were farmers 97 (51%) (Table 1).

Table 1: Socio-Demographic information of the study participants.

Socio-Demographic Variables	Frequency	Percentage %
Sex		
Male	124	65.2
Female	66	34.7
Religion		
Muslim	121	63.6
Orthodox	69	36.3
Educational status		

Illiterate(cannot read and write)	58	33.5
Primary school	49	25.7
Secondary school	56	29.4
Higher education	27	14.2
Age		
15-30	64	33.7
31-46	73	38.4
>46	53	27.8

3.2. Knowledge of participants related to cause and host range of Anthrax

From the total of respondents, 105 (55.2%) had awareness about Anthrax. Thirty-nine (20.5%) of respondents knew that Bacteria is the cause of Anthrax. The majority of the participants 137

(72.1%) responded that they do not know the causative agent, however, fewer numbers of the respondents 14 (7.3%) were found to have a misperception about a causative agent which were virus. (Table 2). The majority of the respondents 132 (69.4%) knew that Cattle can be affected by the disease (figure 2).

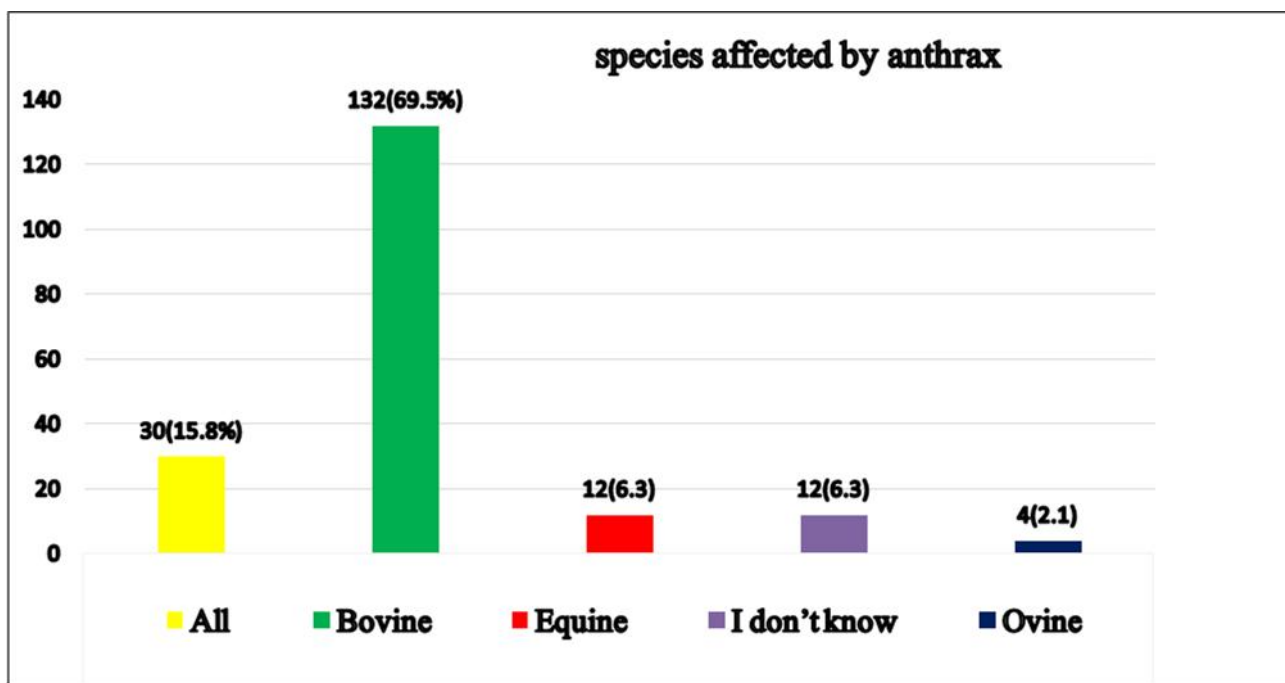


Figure 2. Knowledge of participants related to cause and host range on Anthrax

Table 2: Knowledge of participants related to cause and host range on Anthrax

Awareness on anthrax	Frequency	Percent
Yes	105	55.2
No	85	44.7
Cause of Anthrax		
Bacteria	39	20.5
Virus	14	7.3
I don't know	137	72.1

Out of 190 respondents, 84 (44.2%) were not have the knowledge about Anthrax and 67(35.2%) got the knowledge from veterinary clinic, 9 (4.7%) and 3(1.6) of the respondents had the awareness from Books/magazines and from social media respectively. However, 14 (7.4%) and 13

(6.8%) of the respondents had the awareness through formal ways (such as radio and television) and informal (such as traditional healer’s, neighbors, friends and relatives respectively, as shown in figure 3.

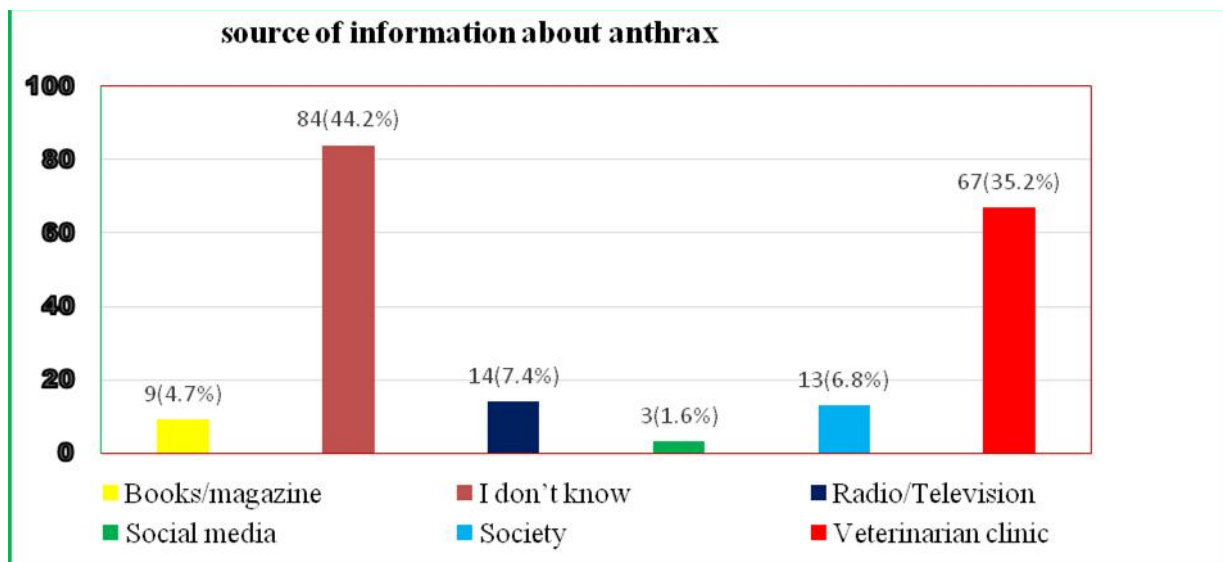


Figure 3.Source of information about Anthrax.

3.3. Knowledge of participants related to modes of transmission, clinical signs and symptoms and treatment of Anthrax

As shown in figure 4, sixty-four (33.7%) respondents didn't know the means of transmission from animal to humans. While 54 (28.4%) and 22(11.5%) of them know that eating raw meat and slaughtering of infected animals transmit the diseases from animal to humans

respectively. Sudden death 89 (46.8%) followed by stop eating and drinking 37(19.5%) were described as a major clinical sign of Anthrax in animals by the majority of the respondents, described in figure 5. Ninety seven (51.1%) of the respondents knew that the disease could not easily treatable. Of the participants, 101 (54.1%) were aware of the fact that Anthrax is a very serious disease in humans and animals (Table 3).

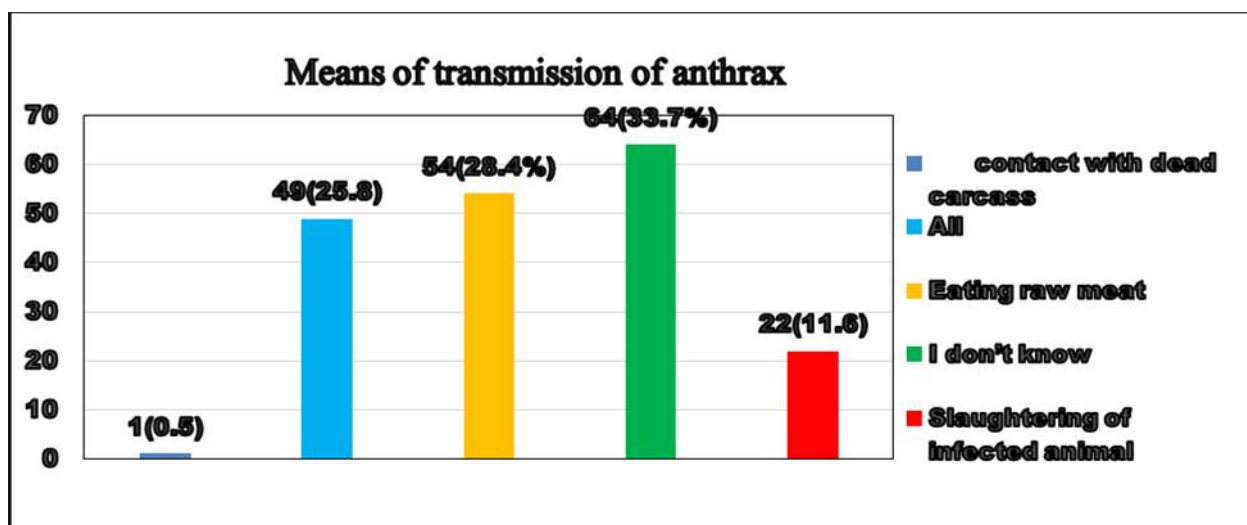


Figure 4.Frequencies and percentages of modes of transmission on Anthrax

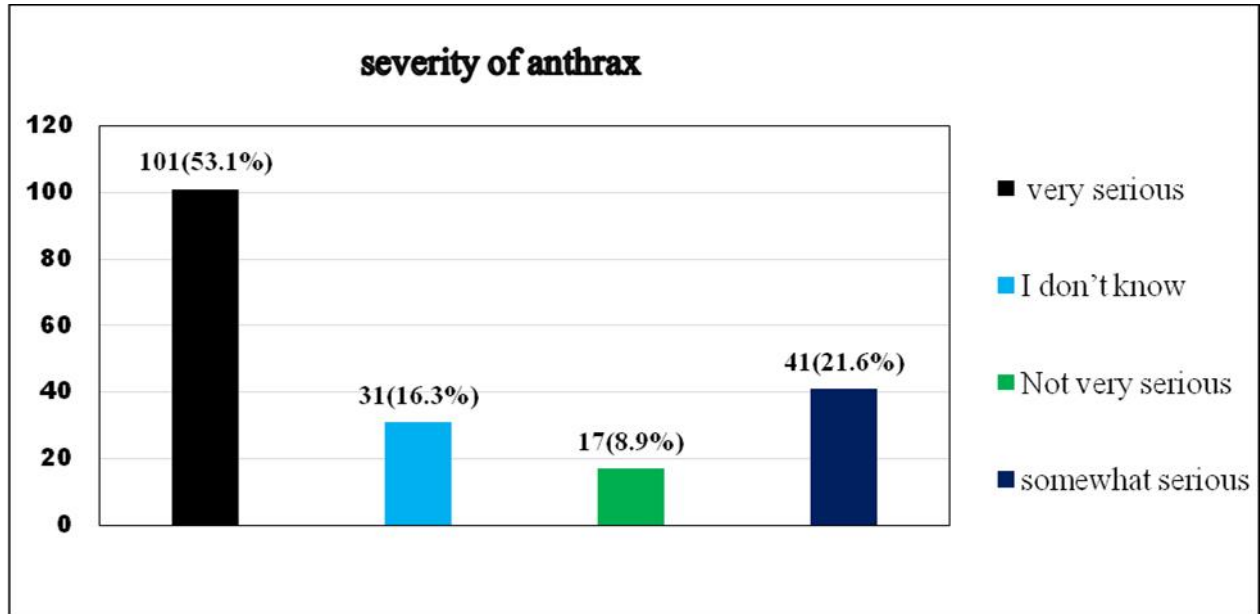


Figure 5: Knowledge on the severity of anthrax

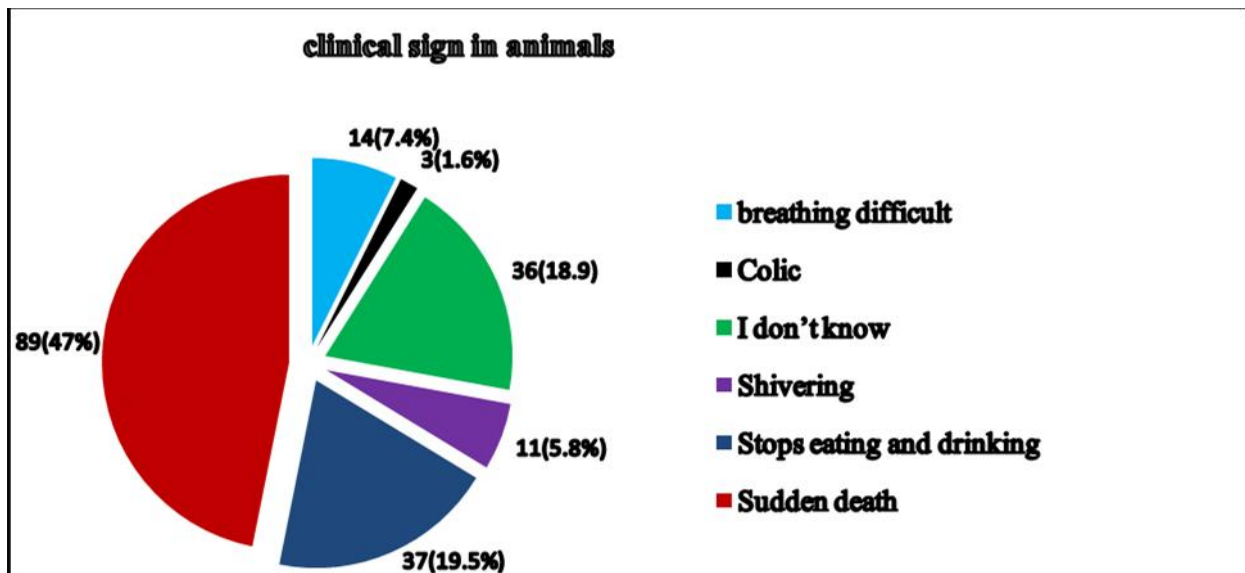


Figure 6: Percentage of clinical sign of anthrax in animals

Table 3: Knowledge of participants related to severity and treatment of Anthrax

Knowledge Related Variables	Frequency	Percentage
Have you ever get training		
Yes	27	14.2
No	163	85.7
How serious a disease in humans and animals		
very serious	101	54.1
somewhat serious	41	21.5
Not very serious	17	8.9
I don't know	31	16.3
Easily treatable after onset of clinical signs		
Yes	93	48.9
No	97	51.1

3.4. Knowledge of participants about Human Anthrax

Majority of the respondents 178(93.6%) were not seen human with Anthrax while 12(6.3%) were seen human with Anthrax. The greater number of the respondents 180 (94.7%) were didn't know clinical signs observed in infected human. While

10(5.2%) know that skin ulcer with black center were described as a major clinical sign of human Anthrax.167(87.8%) were aware of animal'svaccination as a means of Anthrax prevention. The greater numbers of the respondents 121 (63.6%) were willing to use Anthrax vaccine for their animals (Table 4).

Table 4: Knowledge of participants about Human Anthrax.

Knowledge Related Variables	Frequency	Percent
Have you ever seen human with Anthrax		
Yes	12	6.3
No	178	93.7
What kind of signs could be observed in infected human		
Skin ulcer with black center	10	5.2
Don't know	180	94.7
How can a person prevent him from getting Anthrax?		
avoid anthrax infected animal	17	8.9
Burn all suspected anthrax animal carcasses	15	7.9
Bury all suspected anthrax animal carcasses	66	34.7
Vaccinate animals annually	23	12.1
I do not know	101	53.1

3.5. Attitudes of participants towards Anthrax

Eighty eight respondents (46.3%) strongly agree on Consumption of raw meat of an animal is source of infection for human anthrax. 38(20%) respondents agree on Consumption of raw meat of an animal is source of infection for human anthrax. Fewer of the respondents 20(10.5%)dis agree onConsumption of raw meat of an animal is source of infection for human anthrax. 60 (31.5%) respondents agree on Grazing pasture is source of infection for animal.Majority of the

respondents 99 (52.1) uncertain that Grazing pasture is source of infection for animal. One hundred twenty-three respondents (64.7%)strongly agree on Anthrax can be prevented through vaccination of animal. Fewer respondents10 (5.2%) uncertain that vaccination of animals can prevent Anthrax.116 (61.1%) respondents strongly agree that Anthrax can be controlled through burying of dead animal and 66(34.7%) agree that Anthrax can be controlled through burying of dead animal.(Table 5).

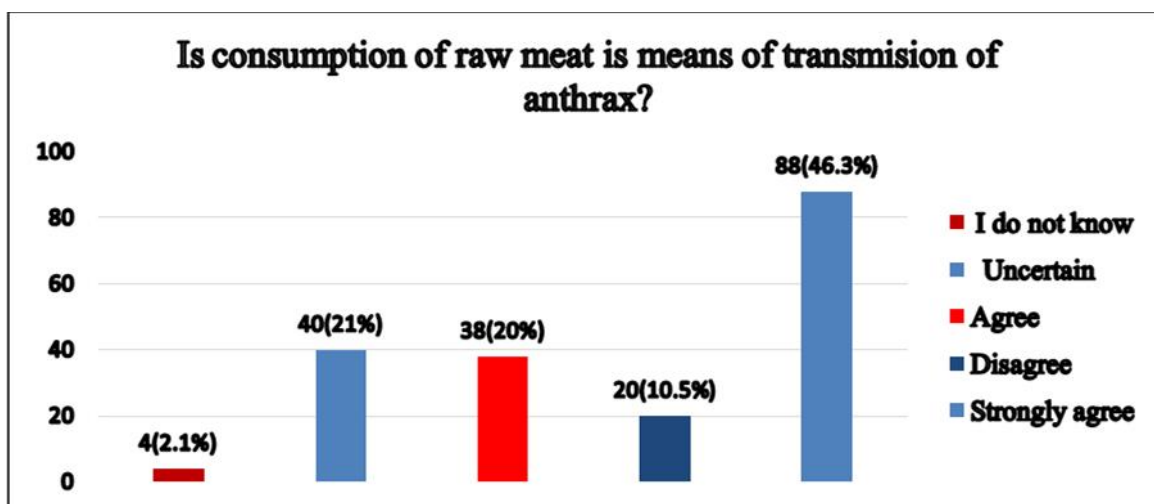


Figure 7. Attitudes of participants towards Anthrax.

Table 5: Attitudes of participants towards Anthrax.

Attitude Related Variables	Frequency	Percent
Grazing pasture is source of infection for animal		
Strongly agree	24	12.6
Agree	60	31.5
Uncertain	99	52.1
Disagree	7	3.7
Anthrax can be prevented through vaccination of animal		
Strongly agree	123	64.7
Agree	52	27.3
Uncertain	10	5.2
Disagree	5	2.6
Anthrax can be controlled through burying of dead animal		
Strongly agree	116	61.1
Agree	66	34.7
Uncertain	6	3.1
Disagree	2	1.1

3.6. Practices of participants towards Anthrax

Out of 190 respondents one hundred twenty-one (63.6%) use indoor management for their animals while 69(36.3%) didn't use indoor management for their animals. 128 (67.3%) respondents vaccinate their Animals while 66 (34.7%), didn't vaccinate their Animals. Majority of the respondents 167 (87.8%) have knowledge as

Table 6: Practices of participants towards Anthrax

Variables	Frequency	Percent
Indoor management for your animals	121	63.6
Vaccinated your animals?	128	67.3
Dose vaccination animals help to prevent anthrax	167	87.8
Safety measure taken caring anthrax suspected animal patient?	151	79.5
	39	20.5

vaccination of animals help to prevent anthrax. Regarding safety measure 151(79.4%) respondents take any safety measure when they are caring anthrax suspected animal while 39(20.5%) respondent didn't take any safety measure when they are caring anthrax suspected animal.(Table 6).

respectively with the findings of Dutta *et al.*, 2021 [14] in selected rural areas of Bangladesh and Few participants mentioned that the disease was

caused by spores/germs[12]. In this study 46.3% respondents strongly agree on Consumption of raw meat of an animal is source of infection for human anthrax. (20%) of respondents agree on Consumption of raw meat of an animal is source of infection for human anthrax, this result was consistent with Chacha, 2017 [13]. About 75.2% of the participants reported that they would not consume meat from cattle found dead, because they were discouraged by veterinary authorities but there were high cases of consumption of meat from an anthrax related carcass [15].

More than 35% of respondents in this study obtained information from veterinary clinic and 12.1% of the respondents had the awareness from Books/magazines and from social media respectively. This finding is higher than the findings of Chacha, 2017 [13] 21.0% from veterinarians and veterinary Paraprofessionals and 15.1% from the radio.

Sudden death was mentioned as a major clinical sign by the majority of the respondents which is in line with Dutta *et al.*, 2021 [14]. Stop eating and drinking were described as a second major clinical sign in this study next to sudden death. From the total (72.1%) participants responded that they do not know the causative agent while (20.5%) of respondents knew that Bacteria is the cause of Anthrax. However, fewer numbers of the respondents (7.3%) were found to have a miss-perception about a causative agent which was virus. Consistent with this study, Opare *et al.*, .2000 [16] showed that most respondents do not know the causes of anthrax but recognize the signs of the disease. Moreover, in the

4. Discussion

The study was aimed to assessing public knowledge, attitudes and practices towards anthrax in Dessie city. In this study, from the total of the respondents (55.2%) were have knowledge towards Anthrax. This finding is lower than the findings of different studies done by Mesfen *et al.*, 2021 [11] in South Gonder, Romhaet *et al.*, 2020 [12] in Northern Ethiopia and Chacha, 2017 [13] in Maragua, Kenya, which were reported knowledge rates of 71%, 62% and 96.3%, respectively. These differences could be associated with the awareness level of the community, educational status, and information access. In this study (33.7%) and (28.4%) of respondents didn't know the means of transmission of anthrax from animal to humans and eating raw meat transmit the diseases from animal to humans which is 43.16% and 47%

questionnaire survey, the number of respondents who knew the clinical signs was higher than that of respondents who knew the cause of the disease. Since anthrax is zoonotic and its main transmission to humans is from animal then animal keeping becomes one of the major risky practice towards anthrax in animals and humans [13]. this study (54%) of the respondents thought that anthrax was a very serious disease; (21.5%) of them thought that anthrax is somewhat serious while only (8.9%) thought that anthrax is not a serious disease, this concurs with a study by Munyuaet *al.*, 2016 [17].

In livestock, anthrax can be prevented largely by vaccination of all grazing animals in the endemic area and implementation of control measures during epizootics Vaccination should be done 2-4 Weeks before the season when outbreaks may be expects [18].

In this study More than half of the respondents vaccinate their Animals and have knowledge as vaccination of animals help to prevent anthrax. similar study from in Maragua, Kenya and Tigray Vaccination of animals helps to prevent their animals against anthrax; almost all (98.0%) participants agreed that indeed vaccination helps A few (2.0%) said no, while giving reasons of vaccine failure [13].

Proper and early diagnosis is one of the important components for treatment, prevention and control of anthrax. But diagnostic facilities were insufficient in the endemic districts, which is similar with the observations from other studies in Asia and Africa [19, 20]. It was revealed that timely diagnosis can control the outbreak of anthrax [21]. It is important to respond quickly to eliminate anthrax confirmed or suspected carcasses by immediate incineration, since spores are rapidly formed and spread by flies and scavengers, especially vultures, that may transmit anthrax over long distances [22]. It is necessary to ensure increased public awareness on vaccination of the livestock population along with sufficient coverage of the anthrax vaccine that will make a large contribution to the control of anthrax outbreaks [14].

5. Conclusion and Recommendations

This study revealed that there were some gaps in the community concerning with knowledge of anthrax in the study area by community members on cause, transmission, signs and control. Due to this people continue to consume raw and un-inspected meat, fail to present their animals for vaccination. In addition, there is also lack of knowledge about human with Anthrax and clinical signs observed in infected human. The knowledge among the community members has been enhanced over time by awareness created by veterinarians in the area were the major risk factors of consumption of anthrax related meat, failure to vaccinate their livestock and poor disposal of carcasses contributed to anthrax transmission. There was a gap between medical and veterinary personnel collaboration in terms of anthrax control given the fact that this disease need multidisciplinary approached specially from the two professionals for effective control. Educating the community about the health risk of anthrax and the ways of prevention should be given priority by health extension workers, veterinary professionals and the government at large.

Based on the above conclusions the following recommendations are forwarded

- ✓ Creating awareness for the community on cause, transmission, signs and control anthrax disease.
- ✓ Creating awareness for the City health office to enhance the surveillance system so that anthrax cases could be identified earlier and increase livestock vaccination.
- ✓ With availability of resources, additional studies should be extended to other regions of Ethiopia so as to compare findings and wholesome intervention measures of the disease
- ✓ The capacity of Veterinary and Medical workers should be strengthened in diagnosis of zoonotic diseases for early outbreak detection and subsequent interventions
- ✓ Medical and veterinary personnel should be collaborating in multidisciplinary approach for the prevention and control of anthrax.

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Tigist Awraris Dejene. (2023). Assessment of Public Knowledge, Attitude and Practices Towards Anthrax in Dessie City, Ethiopia. Int. J. Curr. Res. Med. Sci. 9(12): 7-19.
DOI: <http://dx.doi.org/10.22192/ijcrms.2023.09.12.002>