Assessment of Knowledge, Attitude and Practice (KAP) on Human and Bovine Tuberculosis Among Cattle Owners in Ethiopia

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Abstract

Background: Tuberculosis (TB) is a re-emerging disease occurring worldwide and causing multi-billion-dollar loss and human death annually. The situation is worse in developing countries like Ethiopia, where lower knowledge, attitude, and practice (KAP) of the people is imminent.

Methods: A questionnaire-based cross-sectional study was conducted. A total of 349 study participants were addressed through face to face interview. Descriptive statistics and Pearson's chi-squares analysis were used to observe the data and the association between outcome (KAP) and predictor variables.

Results: Out of the 349 respondents interviewed, 223 (63.9%) of them were males, while 126 (36.1%) were females. The KAP measuring interview indicated that almost all (97.4%) of the participants know human tuberculosis, while 84(24.1%) are aware of bovine tuberculosis cause and mode of transmission. Inhalation was reported as a common route of transmission for human TB (41.1%). In contrast, 50% of the respondent mentioned inhalation, contact, and ingestion of raw animal products as the main route of TB transmission from animal to human. Among those who have heard of *b*TB, only 56 (66.7%) of respondents consider bovine tuberculosis as a significant threat to public health.

Conclusion: The study showed that there is a lower KAP on bovine TB among cattle owners. Therefore, community awareness promotion and health education on human and bovine TB should be operated under a "One Health" umbrella.

1. Background

Tuberculosis (TB) is a re-emerging disease occurring worldwide and causing multi-billion-dollar loss and human death annually. The disease affects both humans and animals caused by a group of bacteria called Mycobacterium tuberculosis complex of different species, including *Mycobacterium tuberculosis* and *Mycobacterium bovis* [1]. M. tuberculosis *(m*TB*)* primarily causes TB in humans, whereas *M. bovis* predominantly affects cattle causing bovine tuberculosis. It is the cause of Zoonotic TB in humans that can spread from infected vertebrate animals to humans [2,3,4, 5, 6].

Ethiopia is one of the highest burdened countries in the world with human TB predominately caused by *mTB* [6,7]. The country remains an epicenter for potential zoonotic diseases such as *Bovine tuberculosis* (*b*TB) [8] putting public health and livestock sector endanger. The exponential growth of the population of the country demanded an increase in animal products. This scenario, in turn, resulted in an intensification of dairy and feedlot farms of productive breeds of animals [9, 10]. The situation created a conducive environment for the spread of zoonotic diseases like *b*TB [11]. Bovine TB in cattle is manifested throughout different agro-ecological zones of Ethiopia. Its prevalence in cattle ranges from 16.2–65.8% in different farming systems [12].

Researches conducted so far on human and bovine TB in Ethiopia indicated that there is still a gap in KAP towards the diseases. A study conducted in Addis Ababa indicated that only 13.9% knew bovine.

This indicates that community members living in the capital even have a knowledge gap about the disease. Besides a study conducted in Gondar on highs, cool students measuring their level of understanding about TB showed that only 59% were knowledgeable about the disease. All these results indicated that there is a knowledge gap to be filled [13, 14,15, 16, 17]. In developing countries like Ethiopia, a low living standard in both animals and humans play a significant role in bovine tuberculosis transmission between human to human and human to cattle or vice versa [18, 19]. Educational efforts were reserved for addressing human to human transmitted TB even though the impact of TB from animal to human is significant. Cattle owners and those who contact with the animal and their products are at risk of acquiring *b*TB. A community based public health education remains the most powerful weapon in promoting awareness among cattle owners. The knowledge about the implication of bovine tuberculosis in human cases has to be developed and disseminated adequately. Before planning an educational scheme, the level of understanding of livestock owners needs to be measured. With this understanding, a cross-sectional study to assess the community's KAP on human and bovine TB was designed.

2. Methods

2.1. Study period and area

The study was conducted from February to April 2019 in and around Gondar town. Gondar town is found northwestern part of Ethiopia at 748 kilometers away from Addis Ababa and 180 kilometers from North East of Bahir Dar. Astronomically it is located at latitude and longitudes of 12°36'N and 37°28'E, respectively with the altitude range from 1800-2200 meter above sea level. The area is located under a mid-altitude agro-climatic zone with an average annual rainfall of about 1172mm and 19.1^{o}C annual temperatures. The estimated human population is 207,044, of which 98,120 males and 108,924 females with a total area of the city covers 5560 hectares [20] (figure 1).

2.2. Study Design, Study population, and Sample size determination

The questionnaire-based cross-sectional study design was employed to household heads who live in and around Gondar town. The households included were those who rear either cattle only or cattle and other domestic animals; and who have contact with animals and their product. The sampling unit list comprises two major administrative classifications, namely the rural peasant association and town administration. The farming system of the rural peasant association is characterized as a mixed farming system where both cattle rearing and crop production equally practised. Concerning the town administrative participants, the farming system is semi-intensive cattle rearing where animals stay indoors.

As per the data obtained from Amhara national, regional state of Gondar town administrative agricultural and rural development directive (2019), the number of cattle owners in and around Gondar town was estimated at 5583 people. By using finite population correction for proportions formula and using a 5% margin of error at a 95% confidence interval, the total sample size was determined as 349.

$$n_0 = \frac{(z_{1-\alpha/2})^2 * p(1-p)}{d^2} \ldots\ldots \text{If N} \geq 10{,}000$$

Where; P: Estimated population proportion (0.5)

$Z_{0.975}$= 1.96(i.e. Z or at 95% CI) or

$$(z_{1-\alpha/2})^2 = 3.84 \ldots\ldots\ldots\ldots\ldots \alpha = 0.05$$

N: Study population N = 5583

d: (0.05) margin of error

q=1-p=0.5

n_0: number of sample unit to be studied

$$n_0 = \frac{(z_{1-\alpha/2})^2 * p(1-p)}{d^2} = n_0 = \frac{(z_{1-0.05/2})^2 * 0.5(1-0.5)}{0.05^2} = 384$$

Since N is <10,000, correction formula can be used to determine the final sample size i.e.

Where; *nf* = final sample unit to be studied = initial sample, N= study population

$$nf = \frac{n_0}{1+(\frac{n_0}{N})} = nf = \frac{384}{1+(\frac{384}{5583})} = \approx \mathbf{349}$$

2.3. Sampling and data collection Methods

Among the list obtained from Amhara national, regional state of Gondar town administrative agricultural and rural development office, 349 participants were selected. The entire study population comprises cattle owners living in the area. From this list, participants were selected randomly by a lottery system from the total study population. However, if a randomly selected participant refuses to be included, they were replaced with a similar manner.

A close-ended structured questionnaire suitable to assess the cattle owner's knowledge, attitude, and practice were prepared, pre-tested, and administered through face to face interviews in the house to house

visits. The KAP tool focused on information about TB in humans and animals, causes, transmission methods, and treatment, control and prevention mechanisms of human and bovine TB. Besides, the tool focused on habit of raw meat and milk consumption behaviour of owners, species of animals reared, husbandry/management practices, herd size and structure owned, watering and feeding and production system, presence of contact between human and cattle, and known current or previous history of TB status in their households. Besides, Socio-demographic history of each respondent was also recorded.

2.4. Data management and Analysis

The collected data were cleaned, checked entered using Epi data version 3.0 software. Then, it was exported to Microsoft Excel and imported to SPSS version 20 software package for analysis. Data cleaning was carried out by running the frequency of each categorical variable and cross-tabulation of independent variables with the KAP score. The KAP level was determined by calculating the mean score of responses. Respondents who scored greater than or equal to the mean value were grouped as having good KAP, and the score less than the mean value was considered as poor KAP level. The relationships between each predictor variable and KAP scores were examined using Pearson's chi-square (c^2). P-value of less than 0.05 was considered a statistically significant association.

3. Results

3.1. The socio-demographic character of respondent

A total of 349 cattle owners participated in this study. Among them, 223 (63.9%) were males, while 126 (36.1%) were females. Most of the respondents (39.5%) were in the age group of 18 to 30. Regarding the educational status, the highest number (25.2%) of the respondents were in the level of illiteracy. The majority of the respondents (40.4%) were engaged with the farming activity, and 236 (67.6%) study subjects resided in the rural peasant associations (Table 1).

Table 1
Sociodemographic characteristics of respondents

Variable	Category	Frequency (%)
Age	18–30	138 (39.5)
	31–40	95 (27.2)
	41–50	63 (18.1)
	> 51	53 (15.2)
Gender	Male	223 (63.9)
	Female	126 (36.1)
Marital status	Married	258 (73.9)
	Single	91 (26.1)
Educational status	Illiterate	88 (25.2)
	Write and read-only	53 (15.2)
	Less than grade 8	77 (22.1)
	Grade 8–12	76 (21.8)
	Above grade 12	55 (15.8)
Current occupation	Farmer	141 (40.4)
	Student	63 (18.1)
	Employee	24 (6.9)
	Merchant	87 (24.9)
	Labor	34 (9.7)
Residence	Rural	236 (67.6)
	Urban	113 (32.4)
Total		**349 (100.0)**

3.2. Species of animals owned, purpose and management system

Among the respondents, 232 (66.5%) owned local cattle breeds, and the remaining 117 (33.5%) had cross breed cattle. Besides, 194 (55.6%) had cattle only while the rest rear cattle and other livestock. The primary purposes of keeping livestock were milk production (42.75%), milk and draft (36.5%), and meat production. Regarding husbandry practices of cattle, 168 (48.1%) graze their animals free in the fields, 110 (31.5%) keep their animal in modern management, and the rest 71(20.3%) respondents practice semi-intensive management systems (Table 2).

Table 2
Species of animal owned, the purpose of rearing and management system

Variables	Category	Frequency (%)
Species of animal owned	Cattle only	194 (55.6)
	Cattle and sheep	101(28.9)
	Cattle, sheep, and goat	41 (11.7)
	Cattle, sheep, goat, and poultry	13 (3.7)
Breeds of cattle	Local	232(66.5)
	Cross	117 (33.5)
Purpose of rearing	Milk	149 (42.7)
	Meat	28 (8.0)
	Milk and draft	127 (36.4)
	Milk, meat, and draft	45 (12.9)
Herd size	< 10	251 (71.9)
	10–20	63 (18.1)
	> 20	35 (10.0)
Management system	Free grazing	168 (48.1)
	Intensive (indoor keeping)	110 (31.5)
	Semi-intensive	71 (20.3)
Total		**349(100.0)**

3.3. Knowledge of respondents related to cause and transmission of human and bovine tuberculosis

From the total participants, human TB was recognized by 97.4% of respondents, while 75.9% never heard about bovine TB. From those who heard about the diseases, 154 (45.3%) and 53(63.1%) understand the infectious cause of humans and bovine TB, respectively. However, misperceptions such as bad weather (both hot and cold) and genetically from parents were implicated in causing TB. Most of the respondents mentioned that TB patients (40.0%) and radio/TV (41.1%) were the primary sources of information on human and bovine TB, respectively. The highest number of respondents mentioned TB as a contagious disease. Concerning the modes of human TB transmission, 130 (41.1%) respondents replayed TB that can be transmitted through exhaled air when a person with TB coughs sneezes and speaks or sings. Among the respondents who had information about bovine TB, 42.9% of them explained the ingestion of the raw animal products (milk and meat) as the mode of transmission from animals to humans (Table 3).

Table 3
Participants understanding and information source about cause and transmission of human and bovine tuberculosis

Variable	Category	Human TB Frequency (%)	Bovine TB Frequency (%)
Heard of the diseases	Yes	340 (97.4)	84 (24.1)
	No	9 (2.6)	265 (75.9)
Source of information	Newspaper	17 (5.0)	4 (4.8)
	Radio /TV	71 (20.9)	35 (41.7)
	TB patient	136 (40.0)	12 (14.3)
	Health institute	37 (10.9)	-----
	School	6 (1.8)	-----
	Family	19 (5.6)	-----
	Multiple sources	54 (15.9)	33 (39.3)
Cause of the disease	Bad weather	107 (31.7)	7 (8.3)
	Microorganism(bacteria)	154 (45.3)	53 (63.1)
	Genetically from parents	25 (7.4)	16 (19.0)
	Did not know	54 (15.9)	8 (9.5)
Way of transmission	Inhalation	130 (41.1)	4(7.1)
	Contact	21 (6.6)	------
	Ingestion of raw milk and meat	------	24 (42.9)
	Inhalation, contact and ingestion (raw milk and meat)	31 (9.8)	28 (50.0)
	Inhalation and contact	112 (35.4)	-----
	Did not know	22 (7.0)	-----
Total		**349 (100.0)**	**349 (100.0)**

3.4. Knowledge of respondent towards human tuberculosis prevention and control

The majority of respondents believed that TB is a curable disease. More than 90% of participants 298 (94.3%) stated that specific drugs given by health centers are the best treatments for TB. The highest number of respondents said that TB transmissions could be preventable. Besides, 99 (31.7%) mentioned that covering mouth and nose when coughing and sneezing, avoiding sharing of utensils, and separation of the patient room were commonly used to prevent the spread and transmission of TB. Moreover, 51(16.7%) respondents mentioned that the spread of TB could be reduced through vaccination. Among participants who had awareness about TB in humans and animals, 30.9% witnessed the existence of TB among their family members or friends. Regarding the type of TB observed, 78.2% referred to a pulmonary form and 21.9% to an extrapulmonary form of TB. About the treatment history of the TB patients, 92.0% of them took modern drugs given by the health center (Table 4).

Table 4
Knowledge of respondents related to control and prevention of human tuberculosis

Indicative variable	Category	Frequency (%)
Do you know TB a curable disease?	Yes	316 (92.9)
	No	24 (7.1)
In what ways TB can be cured?	Herbal remedy	12 (3.8)
	A specific drug is given health center	298 (94.3)
	Home rest and pray	6 (1.9)
Do you know TB preventable?	Yes	312 (91.8)
	No	28 (8.2)
What methods can be used to reduce transmission of TB	**	99(31.7)
	Covering mouth and nose	58(18.6)
	Vaccination	51(16.7)
	Isolating patients	44(14.1)
	Avoid sharing of utensils	41(13.1)
	Early treatment of patients	8(2.6)
	Eating only cooked animal products	7(2.2)
	Eating a balanced diet	4(1.3)
Is there a TB patient family member or a friend?	Yes	105(30.9)
	No	235 (69.1)
What type of TB was observed in family/friend	Pulmonary	82(78.1)
	Extrapulmonary	23 (21.9)
Were they treated?	Yes	100(95.2)
	No	5(4.8)
What type of treatment given?	Traditional	8(8.0)
	Modern	341(92.0)

3.5. The attitude of respondents towards human tuberculosis

Regarding the feeling towards people with TB disease, 233 (68.5%) respondents feel compassion and desire to help, 57(16.8%) feel compassion, but they tend to stay away, 31 (9.1%) responds fearing them because they may be infected. The remaining 19 (5.6%) participants have no particular feelings towards TB patients. Most of the respondents 143(42.6%), said that most of the community usually segregate TB patients. Among the participants, 48(14.1%) responded that TB affects only poor people. The highest proportion of the respondents, 212 (62.4%), did not consider the consumption of the raw animal product (milk and meat) expose to TB, whereas 31(9.1%) respondents were not sure about it. Two-thirds of respondents (67.6%) stated that vaccination against TB would protect anyone from TB disease (Annex 1).

3.6. The practice of participant towards bovine tuberculosis

10.3% of the household practices raw milk consumption, while 41.3% boil fresh milk before consumption. Most respondents boiled milk by fearing milk-borne diseases, while 42.2% of the household heads boil milk for cultural reasons. More than one-fourth (27.5%) of participants responded that they share the same watering point with cattle. 28(8%) respondents stated they share the same house with their animals. Nearly three-fourths (74.1%) of the respondents advised TB patients to accessed health centres. Nine among ten (90.3%) respondents will go to the hospital if they think they had been infected with TB, and 23(6.8%) goes to the pharmacy, whereas the rest would prefer visiting traditional healers (Table 5).

Table 5
General practice of study participants towards TB in the study area

Indicative variable	Category	Frequency (%)
The habit of milk drinking	Boiled/pasteurized	144 (41.3)
	Raw milk *	31 (10.3)
	Both **	169 (48.8)
Reason for milk boiling	Fear of milk born disease	181 (57.8)
	Culture	132 (42.2)
Habit of meat consumption	Raw meat	15 (4.3)
	Cooked meat	249 (71.3)
	Both ***	85 (24.4)
Sharing of the same water source with animal	Yes	96 (27.5)
	No	253 (72.5)
Sharing of a house with animal	Yes	28(8.0)
	No	321 (92.0)
What do you do if you see TB patients?	Advise them to go to the hospital	252 (74.1)
	ignore them	88(25.9)
What do you do if you had infected with TB?	Go to hospital	307 (90.3)
	Go to pharmacy	23(6.8)
	Go to a traditional healer	10 (2.9)
Total		**349 (100.0)**
NB: -* Including fresh milk and yogurt **Boiled and raw milk ***Raw and cooked meat		

3.7. Knowledge, attitude, and practice towards the zoonotic potential of bovine tuberculosis

Among the study participants who had information about *b*TB, 66.7% of them regarded it as a significant public health threat. More than half (60.7%) of participants stated that raw milk and meat as the source of *b*TB. However, more than thirty per cent (33.3%) respondents think bovine TB affects animals only. Most of the respondents (69.6%) mentioned that using cooked meat and boiled milk reduces the transmission of *b*TB from animals to humans (Annex 2).

3.8. Factor associated with KAP of the respondent towards human and bovine tuberculosis

KAP level was calculated by scoring one for a correctly provided answer and zero for the wrong answer. The average score of respondents was categorized as good KAP, and poor KAP based on a KAP score of $\geq 11.02 \pm 3.575$ as good and KAP score $\geq 3.07 \pm 2.058$ as poor KAP for human TB. Similarly, for bovine TB, the KAP score $< 11.02 \pm 3.575$ regarded as good KAP, while score $< 3.07 \pm 2.058$ was categorized as poor KAP. Based on this calculation, about 178(51%) and 65(18.6%) respondents had good KAP levels for human TB and Bovine TB, respectively. There was a significant association between KAP scores and the age of the respondent ($p < 0.05$). The highest proportion of respondents 25(7.1%) having good KAP level towards BTB were in the age group of 31–40, while respondents having good KAP towards human TB was in the age group of 18–30. Educational status and current occupation were significantly associated with KAP scores ($p < 0.05$). The residence of the study participants also has a significant association with the KAP scores on bovine TB ($\chi^2 = 10.361$, $p < 0.05$) (Table 6).

Table 6
Factor associated with cattle owners KAP towards human TB

Variables	KAP level		x^2	P-value
	Good KAP	Poor KAP		
Age				
18–30	58(16.6%)	80(22.9%)		
31–40	52(14.9%)	43(12.3%)	8.266	0.041
41–50	39(11.1%)	24(6.8%)		
> 51	29(8.3%)	24(6.8%)		
Gender				
Male	110 (31.5%)	113(32.4%)	0.694	0.405
Female	68 (19.5%)	58 (16.6%)		
Marital status				
Married	134(38.4%)	124(35.5%)	0.346	0.556
Single	44(12.6%)	47 (13.5%)		
Educational status				
>Grade 12	43 (12.3%)	12 (3.4%)		
Grade8-12	41(11.7%)	35(10.0%)		
< Grade 8	40 (11.5%)	37(10.6%)		
Write and read only	34(9.7%)	19(5.4%)	48.369	0.000
Illiterate	20 (5.7%)	68 (19.5%)		
Current occupation				
Farmer	60 (17.2%)	81 (23.2%)		
Merchant	55 (15.8%)	32 (9.2%)		
Student	35 (10.0%)	28 (8.0%)		
Employee	19 (5.4%)	5 (1.4%)	25.552	0.000
Labor	9 (2.6%)	25 (7.2%)		
Residence				
Rural	117(33.5%)	119(34.1%)	0.594	0.441
Urban	61 (17.5%)	52 (14.9%)		
Total	**178(51%)**	**171(49%)**		

Table 7
Factor associated with cattle owners KAP towards bovine TB

Variables	KAP level		x^2	P-value
	Good KAP	Poor KAP		
Age				
18–30	19(5.4%)	119(34.1%)		
31–40	25(7.1%)	70 (20.1%)	8.839	0.032
41–50	15(4.3%)	48 (13.8%)		
> 51	6 (1.7%)	47(13.5%)		
Gender				
Male	38(10.9%)	185(53.0%)	1.023	0.312
Female	27 (7.7%)	99 (28.4%)		
Marital status				
Married	53(15.2%)	205 (58.7%)	2.402	1.21
Single	12 (3.4%)	79 (22.6%)		
Educational status				
>Grade 12	20(5.7%)	35(10.0%)		
Grade8-12	17(4.9%)	59(16.9%)		
< Grade 8	15(4.3%)	62(17.8%)		
Write and read only	10(2.9%)	43(12.3%)		
Illiterate	3(0.9%)	85 (24.4%)	25.604	0.000
Current occupation				
Merchant	25(7.1%)	62 (17.8%)		
Farmer	15 (4.3%)	126 (36.1%)		
Student	12 (3.4%)	51 (14.6%)		
Employee	11(3.2%)	13(3.7%)	27.175	0.000
Labor	2(0.6%)	32 (9.2%)		
Residence				
Rural	33 (9.5%)	203 (58.2%)	10.361	0.001
Urban	32 (9.1%)	81 (23.2%)		
Total	**65(18.6%)**	**284(81.4)**		

Key: Good KAP: KAP score ≥ 11.02 ± 3.575, and KAP score ≥ 3.07 ± 2.058 respectively for human and bovine TB KAP. Poor KAP: KAP score < 11.02 ± 3.575 and KAP score < 3.07 ± 2.058 respectively for human and bovine TB KAP

4. Discussion

The present study revealed that almost all cattle owners (97.4%) have information about human TB, while it was extremely low in bTB cases (24.1%). This result was in agreement with a study conducted in Addis Ababa that reported 99.5% [14] and in southern Ethiopia 99.6% [15], who found a profound awareness on human TB among high school students. Nevertheless, [21] indicated a lower (29.7%) awareness on TB occurrence in animals among cattle owners in the southern part of Ethiopia. Likewise, [22] reported that 69.0% of respondents have no information about bTB among the community in the Gambella region, southwest Ethiopia. The current study revealed a higher proportion of bTB knowledgeable respondents as compared to the report of [14] explaining 13.9% of knowledgeable high school students in Addis Ababa, Ethiopia. In contrary, different studies showed a higher proportion of knowledgeable respondents about bTB [23] in Jimma zone in South West Ethiopia, [24] in Adama, Central Ethiopia, [25] in Zambia and [26] in China reported 45.6%, 35%, 39.6%, and 88% respectively). More than 20% of cattle owners said that they get information and awareness from radio/TV. Similarly, [27] reported

(64.6%) respondents get information from television. This may be due to the recent attention given by the government and NGOs operating in Ethiopia. These firms always air information on these diseases on Tv and radio to create awareness. On the other hand, [28]) described that neighbors, friends, and family members as a significant source of information in India. Thus, different intervention means and efforts are suggested to consider each setting's peculiar nature and target group [27]. In this study, the awareness variation seen between the two types of TB could be a reflection of remarkable educational efforts towards human TB through multiple information sources, participation large number of multicultural respondents in animal production, health, and husbandry.

Despite a higher proportion of the study participants had information about human TB, more than half (56.7%) of them had little knowledge about the cause of the disease. Whereas, more than half (63.1%) of the respondents mentioned germ/bacteria is the actual cause of bTB. However, misperceptions like bad weather (cold and hot air) and genetically from parents were implicated as a cause of human and bovine TB. This finding is in line with [29]; [30] and [22] who reported similar misperceptions among the general community in Addis Ababa and Gambella region, southwestern part of Ethiopia.

We found that the zoonotic potential of bTB was not well known by cattle owners. Among those who have an awareness of bTB, (33.3%) of them believed that no transmission of TB from animal to human occurs. In line with this, [14] reported similar results among high school students in Addis Ababa. Likewise, [31] and [21] highlighted that only 22.9% and 16.6% of respondents believed the fact that TB can be acquired from animals, respectively. Apart from the variation due to the study population's differences in multicultural practice in the respective study areas, it also implicates the wide knowledge gap among the general community regardless of age group.

From respondents who had information about bTB, 42.9% of them stated that the ingestion of raw animal products (milk and meat) as the mode of bTB transmission of zoonotic TB. Similarly, different studies reported the culture of raw milk consumption in Ethiopia as a potential transmission way of *M. bovis* to humans [24, 31, 21]. More than half (57.8%) of study participants boil milk due to fear of milk born disease. Similar but much higher findings were reported by [14] in Addis Ababa, and [22] in the Gambella region, southwest Ethiopia with 66.2% and 90.9% of respondents, boil milk due to fear of milk-borne diseases respectively. This proves awareness of people who practice boiling improves disease prevention practice. Less than half (41.1%) of the respondents recognized that human TB could be transmitted through exhaled air when a person with TB coughs, sneezes, speaks, or sings. This result was inconsistent with the studies conducted in different areas of Ethiopia [32, 33, 34] who reported 80.8% and 96% respectively. This could be due to the variability of information and study population.

Significant portions (30.9%) of respondents have closely witnessed the presence of TB cases in their family members or friend. Regarding the type of TB observed, more than three-fourth (78.2%) of participants referred to a pulmonary form and 21.9% to an extrapulmonary form. However, the rates were higher than those reported by [14] in Addis Ababa and [22] in southwest Ethiopia, where 21.7% and 19.3% reported pulmonary forms respectively. Regarding the treatment history of the TB patients, 92.0% of them

took a modern drug given by health centers. This is in line with a study conducted in southwestern Ethiopia [22].

Most of the participants responded that TB is curable with modern drugs, covering their mouth and nose when coughing and sneezing, avoids sharing of utensils and separating patient room as important prevention and control approach. the appropriate treatment and prevention measure could play a significant role in reducing the spread of the disease [31] (Bati et al., 2013).

More than two-thirds (68.5%) of the respondents feel compassion and desire to help TB patients. This finding was higher than the study reported by [13] Hibstu and Bago (2016) among high school students in southern Ethiopia. However, 42.6% of respondents said that most of the community usually segregate TB patients. More than ten percent (14.1%) of the entire study participants stated that TB affects only poor people. This was in line with the finding in rural Ethiopia by [35] Yimer et al. (2009). Nine among ten (90.3%) respondents would go to a health facility if they think TB had infected them, and the rest would prefer to find other self-treatment options like herbs and to visit traditional healers. This result was nearly similar to a study conducted in southern Ethiopia [13] (Hibstu and Bago, 2016).

The educational status of the study participant for awareness of TB in humans and animals was significantly associated with the KAP score ($P < 0.05$). All respondents with grade eight and above educational level had good KAP of TB in both humans and animals. The possible reason could be as the level of education increases; people would have acquired better information access about the diseases. This result is consistent with previous reports in Ethiopia [36, 31] (Mesfine *et al.*, 2005 and Bati et al., 2013). The finding of this study revealed that farmers and merchants were more knowledgeable than the rest of the study groups.

5. Conclusions

Even though a relatively higher understanding of TB was observed compared to previous studies, the level of KAP was not adequate. More than three-fourth and almost half of the participants have a reduced level of KAP towards bovine and human TB, respectively. Respondents had a lower level of understanding of the zoonotic potential of bovine TB than human TB. It is an indication that the public health wing of the Veterinary service provider of the country has work to be done about this and other zoonotic diseases. If the country needs to eradicate such disease with a substantial public health impact, the plan should start from grass root level by creating awareness to livestock owners and consumers about the diseases. To achieve this, community health education about transmission, control, and prevention of human and bovine TB should be integrated with the animal health care system. One health-oriented research needs to be promoted to enable public health awareness in combating tuberculosis.

6. Declarations

Ethics approval and consent to participate

According to the National Research Ethics Review Guideline of Ethiopia, this research doesn't require formal ethical approval. However, we had verbal consent with participants for the right of confidentiality of information they provide and to withdraw from the interview if they didn't feel comfortable.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used during the current study are available from the corresponding author on reasonable request

Competing interests

The authors declare that they have no conflict of interest in the publication of this manuscript

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Authors' contributions

AB designed the study, analyze data and wrote the manuscript, SZ implemented the study, wrote the manuscript, YM analyzed the data and wrote the manuscript, AA wrote the manuscript. All authors read and approved the final manuscript.

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Abbreviations

bTB, Bovine tuberculosis

mTB, Mycobacterium tuberculosis

TB, tuberculosis

KAP, Knowledge Attitude and Practice

TB, tuberculosis

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Figures

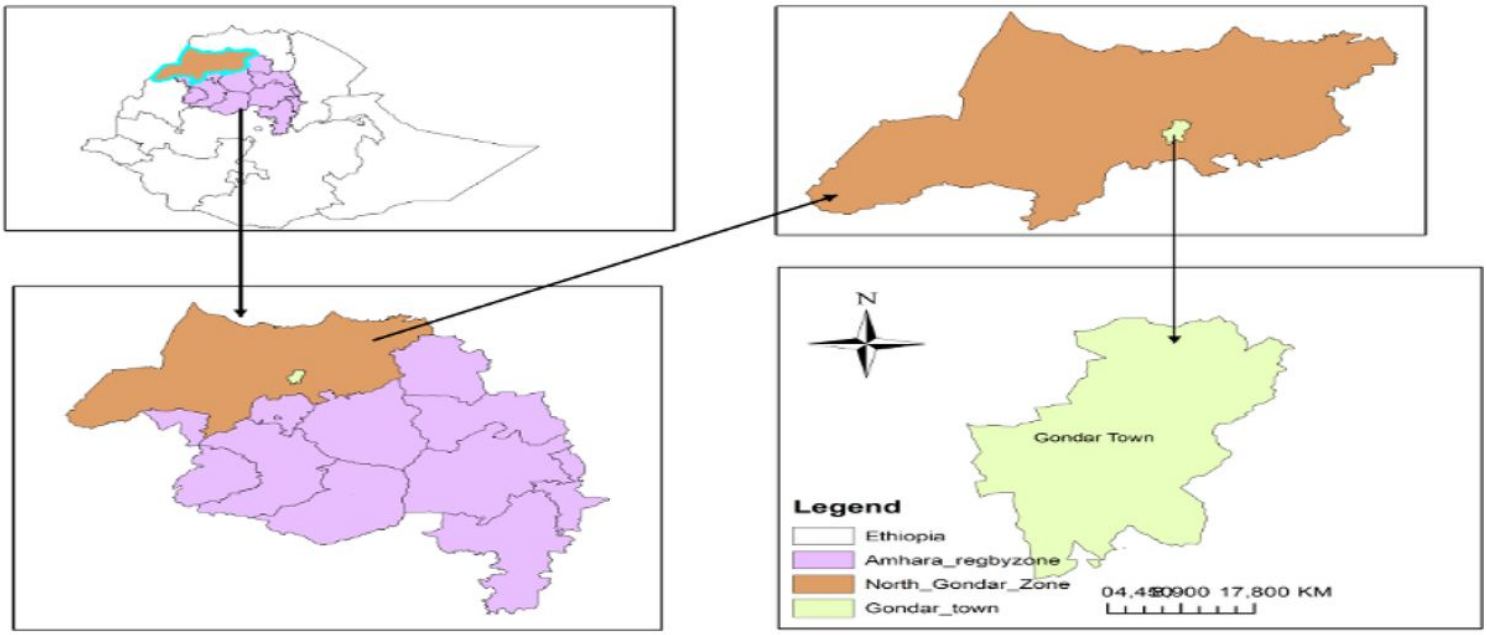

Figure 1

Location map of the study area (source of Figure: authors work)

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