



Assessment of community knowledge, attitude and practices toward bovine tuberculosis in Jinka Town, Southern Ethiopia

Asrat Solomon Kenasew^{1*}, Said Mohammed Harar¹, Alemitu Ketema Tamirat¹, Metadel Molto¹

¹College of Agricultural and Natural Resource, Department of Veterinary Medicine, Jinka University, P.O. Box: 165, Jinka, Ethiopia

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ABSTRACT

Bovine tuberculosis is yet a major public health problem throughout the world, including African countries like Ethiopia. This is due to lower knowledge, attitude, and practice of the people about the disease. A cross-sectional study was carried out from March 2023 to July 2023 to assess the community knowledge, attitude, and practice on Bovine Tuberculosis in Jinka Town. Questionnaire survey and retrospective data were used as a tool for data collection. Among 382 respondents, 254 (66.5%) knew about Bovine tuberculosis, whereas 128 (33.5%) respondents did not have any idea about the disease. Except sex, other predictors like age, marital status, educational level and occupation were significantly associated with knowledge and preventive practices towards Bovine tuberculosis. Respondents had misconceptions on zoonotic importance of the disease and 95 (24.87%) respondents consume raw milk. Regarding retrospective data result, among 1278 patients examined for Tuberculosis, 316 (24.7%) and 5 (0.39%) were positive for pulmonary and extra pulmonary Tuberculosis in 2020 G.C. During 2021 G.C, among 1066 patients examined for Tuberculosis, 190 (17.8%) and 12 (1.12%) patients were positive for pulmonary and extra pulmonary Tuberculosis respectively. Number of patients for pulmonary and extrapulmonary were increased to 18.25% and 4% respectively in 2022 G.C. Since there were misconceptions among the respondents, awareness creation and detailed investigation on the status of Bovine and human Tuberculosis was recommended.

INTRODUCTION

Background of the Study

Ethiopia has 70 million cattle, 42.9 million sheep, 52.5 million goats, 2.15 million horses, 10.8 million donkeys, 0.38 million mules and 8.1 million camels. Accordingly, donkeys are the overwhelming majority compared with the other draught animals (CSA, 2020). Despite this abundant cattle population in the country, the livestock sub-sector is generally less productive,

its capacity is small, and its direct contribution to the national economy is minimal (Shitaye *et al.*, 2007). The poor health condition of its livestock has been one of the responsible factors for the low productivity (Giday and Teklehaymanot, 2013).

Bovine tuberculosis (BTB) continues to be a major public health problem throughout the world, including Ethiopia. The situation is worse in developing countries like Ethiopia, where lower knowledge, attitude, and practice

*Corresponding author:

Email: asratsolomon48@gmail.com +251920440837

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(KAP) of the people is poor about the disease (Adugna *et al.*, 2023). Bovine Tuberculosis (TB) infection is generally defined by the formation of tubercles, which are distinct granulomatous lesions in affected organs and tissues with variable degrees of calcification, necrosis, and encapsulation (Thakur *et al.*, 2020).

This disease is the second main cause of death from an infection disease world-wide, after the human immunodeficiency virus (HIV). Tuberculosis (TB) is one of the most serious public health issues in the world, infecting billions of people each year and ranking as the second highest cause of death from an infectious disease behind HIV/AIDS. In 2013, about 9 million new TB cases and 1.5 million TB deaths were estimated. About 85 percent of the disease burden is found in Asia and Africa (WHO, 2014). The TB situation has worsened over the last three decades, which can be attributed to the HIV/AIDS pandemic (Getahun *et al.*, 2010).

Mycobacterium bovis is not the major cause of human tuberculosis, but humans remain susceptible to bovine tuberculosis (Bulto, 2012). Humans can be infected primarily by ingesting the agent by drinking raw milk containing the infective bacilli, secondly, by inhaling infective droplets when there is close contact between the owner and his/her cattle, especially at night since in some cases they share shelters with their animals. In some countries, it is estimated that up to 10% of human tuberculosis are due to bovine tuberculosis (Gebremedhin *et al.*, 2014). Furthermore, *M. bovis* can infect by consuming raw meat and their products from infected animals (Malama *et al.*, 2013) or by inhaling infective droplets or direct exposure to infected animals (Verma *et al.*, 2014).

Ethiopia has one of the world's highest rates of human tuberculosis, which is primarily caused by *Mycobacterium tuberculosis*. It is imperative that tuberculosis positive animals must be slaughtered (culled); hygienic measures to prevent the spread of infection should be instituted as soon as the first group of reactors is removed. Feed troughs should be cleaned and thoroughly disinfected with hot, 5% phenol. In general terms, control measures of bovine tuberculosis in the traditional extensive production systems are more difficult and complex (OIE, 2009).

Statement of Problem

Bovine tuberculosis is a zoonotic disease transmitted from animal to human. It makes a significant economic impact. It comes from high cost of eradication programs and has serious consequences for movements of animals and their products, biodiversity, public health and significant economic effect (Le Roex *et al.*, 2013, Rodriguez-Campos, *et al.*, 2014). Zoonotic tuberculosis incidence is higher in some regions and countries than others, particularly where there is a close association between number of cattle (the major source of *M. bovis*) and people where milk and dairy products are often consumed unpasteurized (Kock *et al.*, 2021).

Ethiopia is one of the African countries where BTB is considered as protruding disease in animals. Detection of BTB in Ethiopia is carried out most commonly on the basis of tuberculin test, abattoir meat inspection and rarely on bacteriological techniques (Ameni *et al.*, 2003). But researchers conducted milk borne zoonosis so far in Jinka town indicated that there is still a gap in KAP towards the zoonotic diseases. The

KAP towards BTB alone was not studied in Jinka town and that is why the current research was contemplated in the study area. Therefore, the objective of this study was to assess the knowledge, attitude and practices towards Bovine tuberculosis in Jinka town of southern, Ethiopia.

MATERIALS AND METHODS

Description of the Study Area

The study was conducted from March 2023 to July 2023 in Jinka town which is the capital city of South Omo Zone. It is located in the hills north of the Tama Plains. Currently, Jinka is the center of Jinka town administration. It has a latitude and Longitude of 5°47' N and 36°34' E Coordinates respectively and an elevation of 1490 meters above sea level. The average annual temperature and precipitation are 21.1°C and 1274 mm, respectively. It is 750 KM south of the main capital city of the country, Addis Ababa. Currently, it is one of the seats for six regional bureaus of Southern Ethiopia. The town has 40,311 cattle, 11,411 Goats, 2868 Sheep, 95,718 poultry, and 1402 equine population (Jinka town Agriculture office, 2023).

Study Population

The study population were individuals who are resident in Jinka town with different Socio-demographic characteristics. This study includes individuals of sex, different age categories, different occupation, different marital status, and those, which were found on different educational levels. Besides this, the target populations were interviewed with specific questions related to knowledge, attitude, and

practice of the community toward Bovine Tuberculosis.

Study Design

A cross-sectional study was carried out from March 2023 to July 2023 to assess the community knowledge, attitude, and practice on Bovine Tuberculosis in Jinka Town. Accordingly, individuals will be selected by simple random sampling.

Sample Size Determination

The study population of the current study was comprised of simple randomly selected students of different educational levels (elementary, high schools, colleges), farmers, a governmental and self-employee that are found in Jinka town and its surroundings. Thus, the required sample size for this study was estimated by considering the formula given by Yamane (1967) for the questionnaire survey.

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

where n -sample size, N-population size = 20,267 Jinka town Population (Jinka town Finance and economic development office, 2023), e-acceptable sampling error =0.05, 95% confidence level and p= 0.05 were assumed. Hence, the total sample size was calculated to be 392.

Method of Data Collection

Questionnaire Survey

A structured questionnaire was prepared to assess the knowledge, attitude, and practice of the community settled on urban and peri-urban areas of the study area. In addition, the socio-

demographic history of each respondent was recorded. The target groups of the study were randomly selected individuals who live within the different locality of the study areas (i.e. the study population). The questionnaire was administered to the randomly selected individuals by common local language in (Amharic and Ari language) during the interview. There was a brief discussion on the objective of the survey and respondents were asked for their consent before administration of the questionnaire.

Retrospective Data

Retrospective data (cases of Tuberculosis in 3 consecutive years starting from 2020 to 2022) was collected from Jinka General Hospital in order to compare the prevalence of the disease and the level of the knowledge in the town. It was also important to have data of age-related cases of Tuberculosis.

Data management and Analysis

All collected data were entered into the Microsoft Excel 2010 spreadsheet, coded and

then imported to STATA version-13 statistical software for descriptive statistical analysis. Pearson's chi-square (χ^2) test was used to access knowledge, attitude and practice with their respective age, sex, education level, marital status and occupation towards bovine tuberculosis disease. In all the analysis, confidence level was held at 95% and statistical analysis was considered as significant at $p < 0.05$

RESULTS

Socio Demographic Characteristics of Respondents in Jinka Town

The response rate was 382 (97.45%). 10 (2.55%) respondents didn't respond for the questionnaire during the study period. Among the respondents, 284 (74.3%) and 98 (25.7%) were male and female, respectively. Among the age groups, adults were the dominating group with 292 (76.4%) and youths were 90 (23.6%). Of the total respondents, 268 (70.2%) were married and 114 (29.8%) were unmarried, 50 (13.09%) were illiterate and 232 (86.92%) were considered as educated (Table 1).

Table 1: Socio demographic characteristics of respondents in Jinka Town (n=382)

Variables	Frequency	Percentage (%)
Sex	Male	284
	Female	98
Age	Youth (15-24 yrs)	90
	Adult (>25 yrs)	292
Marital Status	Married	268
	Unmarried	114
Educational level	Illiterate	50
	Primary School	116
	Secondary School	96
	Diploma, degree and above	120

Knowledge of Respondents on Bovine Tuberculosis

A total of 254 (66.5%) respondents in the study area knew about bovine tuberculosis whereas 128 (33.5%) respondents haven't heard about the disease. Among the informed / knowledgeable respondents, 213 (83.86%) knew that bacteria causes Bovine tuberculosis. About

80% (n=204) respondents clearly mentioned emaciation as a clinical sign of BTB. Among the respondents who knew about BTB (n=254), 208 (81.89%) knew that Bovine tuberculosis is a zoonotic disease where as 46 (18.11%) did not have any idea about its zoonotic nature. Likewise, 147 (57.87%) respondents knew that consumption of raw milk can transmit Bovine TB from animal to human (Table 2).

Table 2: Knowledge of respondents regarding Bovine Tuberculosis (n=382)

Variables		Frequency	Percentage (%)
Know BTB before	Yes	254	66.5
	No	128	33.5
Knowledge on cause of the disease (n=254)	Bacteria	213	83.86
	Parasite	11	4.33
	Shortage of feed	12	4.72
	Religion	18	7.09
Clinical signs of BTB (n=254)	Lethargy	17	6.7
	Coughing	31	12.2
	Lymph node enlargement	2	0.79
	Emaciation	204	80.31
Zoonotic disease (n=254)	Yes	208	81.89
	No	46	18.11
Method of transmission to human (n=254)	Consumption of raw milk	147	57.87
	Consumption of raw meat	62	24.41
	Through cold air	26	10.24
	I do not know	19	7.48

Relationship Between Knowledge about Bovine Tuberculosis and the Variables

Among 284 male and 98 female respondents, 195 (68.79%) and 59 (60.2%) were knowledgeable on BTB, respectively. The remaining 31.33% males and 39.9% females did not have any idea about the disease. Regarding the age groups, only 40% of the youths knew

about the disease and 74.66% of the adults had good knowledge towards BTB. Based on educational level, 78% of Illiterate respondents had poor knowledge on the disease. Except sex, all independent variables (Age, Marital Status, and Educational Level) of the respondents were significantly associated with the Knowledge of Bovine Tuberculosis (P<0.05) (Table 3).

Table 3: Relationship between knowledge on Bovine Tuberculosis and the variables

Variables		Number of respondents	Know About BTB		χ^2	P-value
			Yes (%)	No (%)		
Sex	Male	284	195 (68.67)	89 (31.33)	2.3393	0.126
	Female	98	59 (60.2)	39 (39.8)		
Age	Youth (15-24 yrs)	90	36 (40)	54 (60)	37.0886	0.000
	Adult (>25 yrs)	292	218 (74.66)	74 (25.34)		
Marital Status	Married	268	206 (76.87)	62 (23.13)	43.5410	0.000
	Unmarried	114	48 (42.1)	66 (57.9)		
Educational level	Illiterate	50	11 (22)	39 (78)	66.2325	0.000
	Primary School	116	66 (56.9)	50 (43.1)		
	Secondary School	96	56 (58.33)	40 (41.67)		
	College level & above	120	109 (90.83)	11 (9.17)		

Attitudes Toward Disease prevention

Among the respondents, 137 (35.86%) considered the disease prevention status in Jinka town as poor and 245 (64.14%) considered it as good. Among the 382 respondents, 233 (82.2%) had positive attitude towards the disease to prevent BTB and the remaining 149 (27.8%) were remained with negative attitude towards BTB.

Relation Ship Between Educational Level and Preventive Practices

All considered preventive practices such as consumption of milk, boiling of milk, actions taken when animal and human are affected with the disease were significantly associated ($p < 0.05$) with the educational level of the respondents (Table 4).

Table 4: Relationship Between Educational Level and Preventive Practices toward BTB

Variables		Educational Level				t^2	P-value
		Illiterate (50)	Primary school (116)	Secondary school (96)	Diploma and above (120)		
Consumption of raw milk	No (287)	10 (20%)	96 (82.8%)	77 (80.2%)	104 (86.7%)	31.1480	0.000
	Yes (95)	40 (80%)	20 (17.2%)	19 (19.8%)	16 (13.3%)		
Boiling of milk before consumption prevent BTB	Yes (265)	37 (74%)	55 (47.4%)	64 (66.67%)	109 (90.8%)	52.1416	0.000
	No (117)	13 (26%)	61 (52.6%)	32 (33.33%)	11 (9.2%)		
Actions taken if human is affected with TB	Seek doctor (260)	40 (80%)	56 (48.28%)	58 (60.41%)	106 (88.3%)	0.000	
	Seek traditional healers (58)	7 (14%)	24 (20.69%)	18 (18.75%)	9 (7.5%)		
	No action (64)	3 (6%)	36 (31.03%)	20 (20.84%)	5 (4.2%)		
Actions taken if animal is affected with BTB	Seek veterinarian (39)	39 (78%)	54 (46.55%)	58 (60.42%)	103 (85.8%)	51.7462	0.000
	Seek traditional healers (8)	8 (16%)	27 (23.28%)	20 (20.83%)	13 (10.8%)		
	No action (4)	3(6%)	35 (30.17%)	18 (18.75%)	4 (3.34%)		

Retrospective Data Results

Retrospective data on the prevalence of Pulmonary and extrapulmonary Tuberculosis was collected from Jinka General Hospital. The data include a 3-years registered disease report of the hospital from 2020 to 2022. The data was classified in to different age and sex groups. The data revealed higher prevalence of Human tuberculosis and its prevalence was higher in males. Among 316 people which were positive

for pulmonary TB, 163 (51.6%) were males and 153 (48.4%) were females in 2020. In 2021, there were 190 peoples from which 118 (62.1%) were males and 72 (37.9%) were females. This number was increased to 205 peoples in 2022, among which 127 (61.95%) were males and 78 (38.05%) were females. The result also indicated the presence of extrapulmonary TB in Jinka town. Accordingly, there were 5, 12 and 45 peoples positive for this condition during 2020, 2021 and 2022, respectively (table 5).

Table 5: Retrospective data result based on sex groups

Year	Total examined for TB	Positive cases		Prevalence (%)	Type of TB	
		Male	Female		Pulmonary	Extra Pulmonary
2020	2045	163 (51.6%)	153 (48.4%)	15.69	316	5
2021	1732	118 (62.1%)	72 (37.9%)	11.66	190	12
2022	2111	127 (61.95%)	78 (38.05%)	11.8	205	45

DISCUSSION

Based on the detailed assessment of KAP towards BTB, 254 (66.5%) respondents in the study area knew about BTB, while the remaining 33.5% respondents did not have any idea about the disease. This finding is higher than the finding of Abebe *et al.* (2020) who revealed KAP towards BTB as 39.39% at Jinka town. This difference might be due to increased provision of awareness to the community by the different stake holders and those NGOs implementing their community services at the study area and the surroundings. Even though, there is still a knowledge gap towards BTB, the higher knowledge might be related with the recommendation of the previous study of Abebe *et al.* (2020) who recommended awareness creation as a part of zoonotic disease prevention.

The current finding is lower than the study conducted in Jarso district West Wollega zone, Oromia Region by Hailu *et al.* (2022) who revealed that 100% participants defined TB as a disease of lung. Boshorum *et al.* (2020) revealed almost similar finding in Gambia who reported that most participants had heard about tuberculosis. Moreover, study conducted in Gambella by Bati *et al.* (2013) revealed higher KAP than the current finding. Hailu *et al.*, (2021) reported 57.2% respondents were knowledgeable about TB in Bahir dar, Amhara region Ethiopia. Furthermore, Zeru *et al.* (2014) revealed that 30.8% of the respondents have good knowledge about BTB in Mekelle town, Ethiopia. This finding is lower than the findings of the current study (66.5%). The difference of KAP between different regions and countries might be partly related with the difference of awareness level and it might be due to their ecological, socio-cultural and socio-economic

differences. Since the studies were implemented in different levels of urbanization where awareness creation level through media and access to internet might be different.

The current study indicated that, among the knowledgeable respondents (n=254), 208 (81.89%) knew that BTB is a zoonotic disease. This result was higher than the report of Hailu *et al.* (2022) and Zeru *et al.* (2014) who reported 24.4% and 15% respondents, respectively, agreed with the idea that tuberculosis can be transmitted from animals to humans and vice versa. Furthermore, Wendmagegn *et al.* (2016) reported that 48% of the respondents in Woldiya knew that BTB is zoonotic. The inconsistency between different studies might be due to differences in the level of awareness among the participants in the study areas of concern.

The predictors of the knowledge were sex, age, marital status, and educational level. Males have higher knowledge (68.67%) towards BTB than females (31.33%) but gender /sex was the only factor not associated with the knowledge of BTB ($p>0.05$). There is no difference between sex groups. The current study predicted that knowledge about BTB is higher in older age groups than youths. This is inconsistent with the finding of Hailu *et al.* 2021 who revealed as knowledge about BTB is higher in the age groups between 46 and 60 years. It might be suggested that elders have low level of knowledge due to limited access to training and awareness associated with BTB due to different reasons. The current finding is consistent with the result of Ismiala *et al.* (2015) who reported that age groups greater than 58 years are knowledgeable than the youngsters in Nigeria. As underlined by Hailu *et al.* (2021), knowledge increases with years of working experience.

Similar study by Addo *et al.* (2011) in Ghana supported this finding suggesting that herds men with long practical experiences had a greater knowledge due to past experiences on BTB in their herd. Ngoshe *et al.* (2023) also suggested that despite their lower level of education, older farmers were more knowledgeable on animal diseases compared to younger farmers.

In the current study, marital status is significantly associated ($p<0.05$) with the knowledge towards TB. Among 268 married respondents, 206 (76.87%) were knowledgeable than the unmarried ones (42.1%). This might be due to previous experience and exposure to training. As couples are two, one of them might have awareness and they can share it together. In addition to this, in order to take care of their children, married respondents might be likely to have more access to health centers where awareness creation takes place than unmarried ones.

Regarding education, those who attend college (diploma level) and above have high knowledge and practice on BTB as compared to those who attend primary and no formal education. Similar findings were reported in Ethiopia by Asebe and Gudina (2018), Kerorsa (2019) and recently by Hailu *et al.* (2021). The study conducted in Nigeria by Ismaila *et al.* (2015) revealed similar result. As stated by Asebe and Gudina (2018), providing education plays an important role in adding knowledge. Moreover, Education is an important tool in increasing awareness towards BTB among livestock owners and limited access to education results in low awareness among the community. Furthermore, education was among the factors associated with good level of preventive practice for BTB. This finding is consistent with the finding of Hailu *et al.*

(2021), who revealed education as a factor which is associated with level of practice for BTB.

Regarding the causes of BTB, among the knowledgeable respondents about BTB (n=254), most of the respondents 213 (83.86%) knew that bacteria cause BTB. This finding is similar to Buregyeya *et al.* (2011) in Ethiopia where 79.9% of the respondents knew the source of TB. But the current study indicated that yet 7.09%, 4.33% and 4.72% have misconception that religion, parasite and shortage of feed, respectively cause BTB. Onyango *et al.* (2020) also revealed very similar result who stated there was high misconception that cold air and dust cause TB.

Regarding consumption of raw milk, 95 (24.87%) of respondents consume raw milk. This result is lower than the study conducted in South Gondar Zone by Alelign *et al.* (2019) who reported that 69% respondents consume raw milk and dairy products. Similarly, Wario *et al.* (2018) showed that 66.2% respondents consume raw milk in Yabello. Moreover, the finding of Tschopp *et al.*, (2013) from Arsi zone, Ethiopia revealed that 55.4% respondents consume raw milk.

The study conducted in Ghana by Addo *et al.* (2011) and by Ngoshe *et al.* (2023) in Far Northern Kwa Zulu-Natal reported that 40% and 51.98% of the study participants consume raw milk respectively. This might be associated with food consumption behavior and geographical difference (Hailu *et al.*, 2021). Unlike the current study, most of the studies mentioned were conducted in rural and agro-pastoral areas, where raw milk consumption is likely to be practiced. According to Ismaila *et al.* (2015), the

inconsistency might be due to difference in knowledge on zoonosis and consequence of raw food consumption. Educational level is among the factors significantly associated with raw milk consumption ($p < 0.05$). The prevalence of raw milk consumption was 80%, 17.2%, 19.8% and 13.33% in illiterate, primary, secondary and diploma and above educational levels respectively. This indicates that as educational level of the respondent increases, awareness level on the consequence of raw milk consumption also increases.

Among 120 respondents educated to college level and above, 109 (90.8%) considered boiling milk before consumption as a preventive method of the transmission of BTB from animals to humans. In another side, among 50 respondents who have no formal education, 74% respondents considered boiling milk as preventive method. This result is almost similar to the result of Hailu *et al.*, (2021) who stated that 99% of the respondents knew boiling milk before consumption can prevent the transmission of BTB to humans. The current finding is different from that of Hailu *et al.* 2022 and Bihon *et al.* (2021) who indicated that more than 60% respondents disagree that pasteurization of milk before consumption prevents TB. This difference might be due the difference in the educational level of the respondents in the study areas.

The retrospective data revealed that there was high prevalence of Human tuberculosis in Jinka town and its surroundings. This might be related with low awareness towards the transmission of BTB to human and limitations to follow possible preventive measures including boiling of milk destined for consumption. This in turn increases the frequency of raw milk

consumption in the study area and the surrounding. Furthermore, most TB patients fail to get treatment in the study area as there is not enough health services. Almost 92% people do not come back to clinics for follow up after their first treatment because of fear of what people will say about them (Onyango *et al.*, 2020). Concomitantly, this increases the transmission rate of TB to susceptible ones. The prevalence of TB was higher in males than females. Among the individuals who showed-up to Jinka General hospital for medical support and diagnosed positive for tuberculosis, majority of them were males. The higher prevalence of human TB in male might be related with occupational behavior, wider home range and exposure to TB patients. Occupationally, females remain in the home and have low exposure to sick people and the other risk factors associated with human TB than males.

CONCLUSION & RECOMMENDATION

This study has identified that relatively there is good level of knowledge and moderate level of attitude and practices towards the prevention and control of the disease and yet there are misconceptions which require additional work to minimize the gap of KAP among the community. This study revealed that there is high prevalence of human tuberculosis as a result of low attitude and practice towards the preventive and control measures of BTB. Moreover, they also have knowledge gap on the impact of consumption of raw milk and possible disease prevention strategy. Analysis of the retrospective data also indicated that, there is high prevalence of human TB in the study area which is believed to be due to the above problems. It also indicates that the disease can affect all age and sex groups.

Based on the above conclusions, regular community awareness creation work on the possible prevention strategies of the disease, and collaborative engagement of veterinarians and physicians for the control and further investigation of the level of BTB and Human TB in the region are recommended.

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