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Assessment of Community Knowledge, Attitude and Practice on Milk Born Zoonoses Disease in Debre-Birhan Town, North Shewa, Ethiopia

Yeshibelay Girma*

College of Veterinary Medicine, Haramaya University, P.O.Box-301, Dire Dawa, Ethiopia

***Corresponding author:** Yeshibelay Girma, College of Veterinary Medicine, Haramaya University, P.O. Box-301, Dire Dawa, Ethiopia, Tel: +251255530084; E-mail: girmayeshibelay@gmail.com

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Abstract

A cross-sectional questionnaire survey was conducted in Debre-Birhan town, North shoa, Ethiopia, with the objective of assessing knowledge, attitude and practice (KAP) of the study participants with respect to milk born zoonosis; and to determine the effect of demographic character of respondents on Knowledge, Attitude and Practice of zoonosis disease. Data were collected through administering semi-structured questionnaire across the randomly selected Collection centers, Retailers, Consumers and Smallholder dairy farmers of the Towns. The questionnaire was administered to 230 respondents (5 milk collection centers, 100 consumers, 40 retailers and 85 smallholder dairy farms). The study result showed that 63.5% of the respondents from the total study population knew diseases can be acquired through cow milk, 61.3% of respondents did not know the names of milk borne zoonotic diseases, 50.9% of the respondents' forms of milk preference were raw milk. Of the total respondents, 35.2% had no idea of prevention of milk borne diseases. In this study 92.2% of the respondent did not get formal training on zoonotic disease. There was strong association between educational level and KAP of the respondents on milk borne zoonosis, with statistically significance difference ($p<0.05$). There was statistically significance difference ($p<0.05$) on KAP of milk borne zoonosis of the respondents between urban and peri-urban areas. The study population has low level of awareness regarding milk borne zoonosis. One way to approach this problem would be to develop educational outreach programs for dairy producers, as well as for the general public, that focus on issues related to the consumption of raw milk and milk borne zoonosis.

Keywords: Debre-Birhan; Milk borne; Zoonosis disease; Respondents

Introduction

Ethiopia, one of the developing countries, constitutes both urban and peri-urban dairying as an important subsector of the agricultural production system. For smallholder farmers, dairying provides the opportunity to efficient use of land, labor and feed resources and generates regular income [1]. Milk and milk products are economically important farm commodities and dairy farming is an investment option for smallholder farmers [2]. However, the productivity of the livestock resources and the benefits obtained from the sector does not proportionate with the high livestock population. Given the considerable potential for smallholder employment and income generation from high-value dairy products, development of the dairy sector in Ethiopia can contribute significantly to poverty alleviation and nutrition in the country [3].

Researchers conducted in Ethiopia revealed that the microbial counts of milk and milk products produced and marketed in the country are generally much higher than the acceptable limits on the microbial properties of marketed milk and milk products. Samples taken from 10 dairy potential areas in the country reported a similar observation and mentioned that microbial counts in samples of whole milk are higher than the standard [4]. The higher count in milk could be attributed to the substandard hygienic conditions practiced during production and subsequent handling, while the high count in fermented milk products can also be partly explained by the presence of lactic acid bacteria.

Nutritional-balanced foodstuff, milk is well known medium that favors growth of several microorganisms. Up to 90% of all dairy related diseases are due to pathogenic bacteria found in milk. Several documented pathogens known to cause milk-borne zoonotic diseases in humans including brucellosis, tuberculosis, leptospirosis, Q fever and Campylobacteriosis [5]. Food-borne diseases are serious threat to people in Africa, responsible for 33-90% cases of mortality in children [6]. Although foods of animal origin are minor constituent in most diets, animal origin diets are responsible for the majority of incidents of Food-borne illnesses; dairy products being implicated [7].

There has been emergence of new pathogenic bacteria along the food chain. For example, emergence of milk-borne bacterial pathogens with very serious health effects such as *Eschericia coli* 0157:H7 has been reported [8]. Some of the microbial contaminants are responsible for milk spoilage while others are pathogenic with potential health effects to cause milk–borne diseases [9]. Pathogenic bacteria contaminants pose serious threat to human health, and constitute to about 90% of all dairy related diseases [10]. The common raw milk pathogenic bacteria contaminants include: *Brucella abortus*, *Mycobacterium bovis*, *Campylobacter spp.*, *Coxiella burnetii*, *Leptospira spp.*, *Listeria monocytogene*, *Yersinia enterocolytica,* Shiga toxin producing *Escherichia coli*, *Staphylococcus aureus*, *Salmonella spp.*, and *Clostridium spp.* [11]; most of which are pathogenic and zoonotic [12].

Dairy-cattle feces and raw milk are sources of zoonotic bacteria such as *Campylobacter*, *Salmonella*, Shiga toxin producing *Escherichia coli* and Listeria [13]. Outbreaks of food-borne disease in humans are often caused by raw or improperly pasteurized milk and milk products

that are contaminated with these bacteria [14]. The traditional way of processing of milk plus the length of storage time with its high microbial count lead to serious health damage on consumers [15].

Resource constrained countries, especially those in Sub-Saharan Africa, often lack information on the distribution of zoonotic diseases [16]. The link among humans, animal population and the surrounding environment is very close in many developing countries, where animals provide transportation, draught power, fuel, clothing and source of protein in the form of milk, meat and eggs. In the absence of proper care, this linkage can lead to a serious risk to public health with huge economic consequences [17]. Furthermore, many African communities associate diseases shared between livestock and humans with misbehavior or witch-craft [18]. Ethiopia being one of the developing countries is exposed to the fate of animal diseases related health risks. In some part of Ethiopia there were reports about the habits of milk handling but there were few reports on milk born zoonosis assessing the specific knowledge, attitude and practice of the peoples about milk borne zoonotic disease. Therefore, the objectives of the present study were:

- To assess knowledge, attitude and practice of the community on milk borne zoonosis.
- To determine the effect of demographic back ground on knowledge, attitude and practice of milk borne zoonosis.

Materials and Methods

Study area

The study was conducted in Debre-Birhan town, which is located in Amhara Regional State of Ethiopia at latitude of 9°36`N and longitude of 39°38`E; 130 kms North East of Addis Ababa. It is situated at an altitude of 2,828 meters above sea level. The climate is characterized by bimodal rainfall consisting of a long rainy season (June- September), short rainy season (February/March- April/May) and a dry season (October-January). The mean annual rainfall of the area ranges from 781 to 1279 mm. The mean annual temperature is ranges from 5°C to 23°C [19].

Study population

A total of 230 questionnaires were administered to milk collection center (5), consumers (100), retailers (40) and smallholder dairy farmers (85). The population under this study was considered to be heterogeneous comprising of varied gender and age groups.

Study design

A cross–sectional questionnaire based study was employed to assess knowledge, attitude and practicing (KAP) of smallholder dairy farmers (SDF), Consumers, milk collection centers and retailers on milk borne zoonotic disease.

Data collection

Smallholder dairy farmers, Consumers, milk Collection centers and retailers were visited and the questionnaires were administered to randomly selected sample of the population in the study area. A close-ended questionnaire was developed to assess knowledge, attitudes and practice towards milk borne zoonosis.

Statistical analysis

The collected data was entered to MS- excel sheet (version-2010) and the data was analyzed by using SPSS version-20 to carry out the descriptive analysis of percentage and chi-square. Chi-square test was used to determine statistical association of variables. The level of significant was held at 95% confidence interval and less than 0.05 level of precision.

Results

Demographic characteristics of respondents

Out of 230 respondents 148 (64.3%) were females and 82 (35.7%) were males. Most of the respondents participating in milk value chain were females constituting 4 (80%) of milk collection center, 28 (70%) of retailers, and 61 (71.8%) of SDHs. In educational level perspectives 42.6% of the respondents were illiterate followed by elementary level comprising 27% part of respondents. High school and greater than high school each covers 15.2% of the total study sample (Table 1).

Demographic characters		Frequencies, percentage	Total
Gender	Male	82 (35.7)	230
	Female	148 (64.3)	
Residence	Urban	112 (48.7)	230
	Peri-urban	118 (51.3)	
Educational status	Illiterate	98 (42.6)	230
	Elementary	62 (27)	
	High school	35 (15.2)	
	>high school	35 (15.2)	
Age	<25	53 (23)	230
	≥ 25	177 (77)	

Table 1: Demographic characters of respondents.

KAP of the respondents

In this study, only 7.8% of the respondent took formal training on milk borne zoonosis. Of the total study population, 73.5% of the respondents had the habit of checking milk quality; however, most (72.6%) of the respondents employed organoleptic method of checking milk quality. Majority (61.5%) of the respondents in this study used boiling as a method to prevent milk borne disease. In this study, 61.3% of the respondents did not know diseases transmitted through unhealthy milk (Table 2).

Variables	No of Respondents (%)	Total
Got training yet?		
Yes	18 (7.8)	230
No	212 (92.2)	
Milk borne disease prevention methods		

Pasteurization	8 (3.5)	230
Boiling	141 (61.5)	
I do not know	81 (35.2)	
Disease transmission through milk		
Yes	146 (63.5)	230
No	84 (36.5)	
Name of milk borne disease you know		
Brucellosis	5 (2.2)	230
Tuberculosis	49 (21.3)	
Typhoid	35 (15.2)	
I don't know	141 (61.3)	
Checking of milk quality		
Yes	169 (73.5)	230
No	61 (26.5)	
Method of checking milk quality		
Organoleptic	167 (72.6)	230
Specific gravity	2 (0.9)	
Decision for bad milk		
Boil	9 (3.9)	230
Discard	84 (36.3)	
Sell	18 (7.8)	
Mix with normal	35 (15.2)	
Forms of milk preference		
Boiled	113 (49.1)	230
Raw	117 (50.9)	

Table 2: KAP of the respondents on milk borne zoonosis.

Effect of educational level on KAP of milk borne zoonosis

In this study, 64.3% of the illiterate did not know prevention methods of milk born zoonosis. 25% and 0% of the respondents with educational level of high school and greater than high school did not know prevention of milk born zoonosis. Most (57.1%) of the illiterate respondents did not check milk for its quality. However, 91.1% of elementary, 100% of high school and greater than high school had the habit of checking milk quality. In this study, there was strong association between educational level and KAP of the respondents against zoonotic disease, with statistically significance ($p<0.05$) (Table 3).

Variable		Education level (frequency,%)				χ^2 (p-value)
		illiterate	elementary	high school	>high school	
Knowledge						
Milk borne Diseases you know	Brucellosis	1 (1)	0 (0)	0 (0)	4 (11.4)	118.055 (0.000)
	TB	5 (5.1)	17 (27.4)	8 (22.9)	19 (54.3)	
	Typhoid fever	0 (0)	12 (19.4)	11 (31.4)	112 (34.3)	
	Nothing	92 (93.9)	33 (53.2)	16 (45.7)	0 (0)	
Prevention methods known	Pasteurization	1 (1)	1 (1.6)	0 (0)	6 (17.1)	86.694 (0.000)
	Boiling	34 (34.7)	52 (83.9)	26 (74.3)	29 (82.9)	
	I don't know	63 (64.3)	9 (14.5)	9 (25.7)	0 (0)	
Attitude						
Transmission through cow milk?	Yes	23 (23.5)	53 (85.5)	35 (100)	35 (100)	120.889 (0.00)
	No	75 (76.5)	9 (14.5)	0 (0)	0 (0)	
Practice						
Habit of checking milk quality	Yes	42 (42.9)	57 (91.9)	35 (100)	35 (100)	83.257 (0.000)
	No	56 (57.1)	5 (8.1)	0 (0)	0 (0)	
Method of checking	Organoleptic	42 (42.9)	57 (91.9)	35 (100)	33 (94.3)	93.337 (0.000)
	Specific gravity	0 (0)	0 (0)	0 (0)	2 (5.2)	

Forms of milk preference	Boiled	22 (22.4)	35 (56.5)	24 (68.6)	32 (91.4)	59.593 (0.000)
	Raw	76 (77.6)	27 (43.5)	11 (31.4)	3 (8.6)	

Table 3: Effects of educational levels of the respondents on KAP of zoonotic disease.

The effect of place of residence on KAP of milk borne zoonosis

Most (75.9%) of the urban respondents thought diseases can be transmitted through consumption of cow milk, and 1.8%, 26.8%, and 26.8% of urban respondents knew brucellosis, TB and typhoid, among the diseases transmitted by row milk, respectively. Large proportion (48.3%) of the respondents from pre-urban area thought that diseases could not transmitted through cow milk and 77.1% did not know any milk borne diseases. This study showed that there was statistically significance difference ($p<0.05$) on KAP of the respondents on milk borne diseases between urban and pre-urban areas (Table 4).

Variable		Residence place (frequency, percentage)		X^2 (p-value)
		Urban	Pre-urban	
Knowledge				
Prevention methods you know	Pasteurization	7 (6.2)	1 (0.8)	28.311 (0.0000)
	Boiling	84 (75)	57 (48.3)	
	I don't know	21 (18.8)	60 (50.8)	
Milk borne diseases you know	Brucellosis	2 (1.8)	3 (2.5)	32.314 (0.000)
	TB	30 (26.8)	19 (16.10	
	Typhoid fever	30 (26.8)	5 (4.2)	
	I don't know	50 (44.6)	91 (77.1)	
Attitude				
Thought of diseases Transmission through cow milk	Yes	85 (75.9)	61 (51.7)	14.513 (0.00)
	No	27 (24.1)	57 (48.3)	
Practice				
Habit of checking milk quality?	Yes	102 (91.1)	67 (56.8)	34.673 (0.000)
	No	10 (8.9)	51 (43.2)	
Method of checking	Organoleptic	100 (89.3)	67 (56.8)	35.946 (0.000)
	Specific gravity	2 (1.8)	0 (0)	
Forms of milk preference	Boiled	81 (72.3)	32 (27.1)	46.978 (0.000)
	Raw	31 (27.7)	86 (72.9)	

Table 4: The effect of place of residence on KAP milk borne zoonotic disease of respondents.

KAP of milk collection centers, retailers, users and smallholder dairy farmers (SDFs)

In this questionnaire survey the respondents were categorized into milk collection centers, retailer, users and SDFs. Most of the classes had significant relation with KAP ($p<0.05$). There was statistically significant difference (p-value<0.05) between prevention method and respondents types. There was no statistically significant difference (p-value> 0.05) between knowledge of diseases transmission through milk and respondents types. There was no statistically significance difference ($P>0.05$) between respondents types and milk of preference. 20% of milk collection centers, 12.5% of retailers, 2% of users and 0% of SDHs use pasteurization as prevention method of milk born zoonosis (Table 5).

Variables		Respondent types (frequency, percentage)				X^2	p-value
		Mcc	Retailor	User	SDH		
Knowledge							
Prevention methods you know	Pasteurization	1 (20)	5 (12.5)	2 (2)	0 (0)	36.42	0
	Boiling	4 (80)	12 (30)	61 (61)	64 (75.3)		
	I don't know	0 (0)	23 (57.5)	37 (37)	21 (24.7)		
Diseases known	Brucellosis	0 (0)	1 (2.5)	2 (2)	2 (2.4)	20.893	0.013
	TB	4 (80)	11 (27.5)	24 (24)	10 (11.8)		
	Typhoid fever	1 (20)	5 (12.5)	19 (19)	10 (11.8)		
	Nothing	0 (0)	23 (57.5)	55 (55)	63 (74.1)		
Attitude							
Diseases Transmission thought through milk	Yes	5 (100)	21 (52.5)	63 (63)	57 (67.1)	5.436	0.143
	No	0 (0)	19 (47.5)	37 (37)	28 (32.9)		
Practice							
Habit of checking milk quality	Yes	5 (100)	28 (70)	66 (66)	70 (82.4)	8.358	0.039
	No	0 (0)	12 (30)	34 (34)	15 (17.6)		
Method of checking	Organoleptic	3 (60)	28 (70)	66 (66)	70 (82.4)	98.001	0

	Specific gravity	2 (40)	0 (0)	0 (0)	0 (0)		
Forms of milk preference	Boiled	4 (80)	19 (47.5)	43 (43)	47 (55.3)	4.745	0.191
	Raw	1 (20)	21 (52.5)	57 (57)	38 (44.7)		

Table 5: KAP of milk collection centers, retailers, users, and SDFs on milk borne disease. mcc.=milk collection centers.

Influence of demographic characteristics on milk collection centers, retailers, users and SDFs

This study shows that statistically there was no significant difference between respondent types and sex ($p>0.05$). However, there was significant difference between respondent types and age ($p<0.05$). There was no statistically significant difference between respondent types and educational level (p-value>0.05). In contrast, there was statistically significance difference between place of residence and respondent types (p-value<0.05) (Table 6).

Variables	Respondents type (frequency, percentage)				X^2	P- value
	Mcc.	Retailers	Users	SDH		
Age						
<25 years	2 (40)	11 (27.5)	29 (29)	11 (12.9)	8.151	0.043
≥ 25 years	3 (60)	29 (72.5)	71 (71)	74 (87.1)		
Sex						
Female	4 (80)	28 (70)	55 (55)	61 (71.8)	6.938	0.074
Male	1 (20)	12 (30)	45 (45)	24 (28.2)		
Educational status						
Illiterate	0 (0)	13 (32.5)	48 (48)	37 (43.5)	11.444	0.247
Elementary	2 (40)	12 (30)	22 (22)	26 (30.6)		
High school	1 (20)	9 (22.5)	12 (12)	13 (15.3)		
>high school	2 (40)	6 (15)	18 (18)	9 (10.6)		
Residence						
Urban	5 (100)	25 (62.5)	44 (44)	38 (44.7)	9.743	0.021
Peri-urban	0 (0)	15 (37.5)	56 (56)	47 (55.3)		

Table 6: Influence of demographic characteristics on vendors, retailers, users and SDFs. Mcc.=Milk collection centers.

Discussion

A total of 230 respondents from Debre-Birhan town were selected randomly and most of them had low level of milk borne zoonosis awareness. The fact that most (92.2%) respondents had no formal training in milk borne zoonosis was a cause for having the low level of knowledge, attitude and practice concerning milk borne zoonosis. It is obvious that every person do the thing he/she know or believe. So, education changes the knowledge and practice of person. But in this study, most of the respondent was held by traditional believe and attitude; not by scientific reason. This is due to the lack of awareness about the health risks of milk borne diseases. A similar result was recorded in the coastal savannah zone, one of the six agro-ecological zones in Ghana by Addo et al. 83.9% of the respondent did not took formal training [20].

In this study most of respondents from SDFs (Smallholder dairy farms) were female. This may be from the traditional attitude that male most of the time do not participate with milk related issues and tasks. Similar to this finding, Mosalagae et al. he studied in selected smallholder and commercial dairy farms of Zimbabwe reported higher involvement of females.

In this finding, 42.6% of the respondents were illiterate followed by 27% of elementary level, 15.2% of high school and 15.2% of greater than high school. This descending of respondent percentage with increasing education level reflects unwillingness of the educated society to participate in dairy business. This high percentage of illiterate with low level of zoonosis diseases awareness may exposes the public to critical health risks. In contrast to the findings of the present research a study conducted by Juma, in Tanzania revealed no participation of illiterate in SDFs [21].

In this study 80% of milk collection centers are elementary and greater than high school (40% each) while 20% were high school level; however, there was 0% of illiterate in vending business. But 43.5% smallholder dairy farmers are illiterate, followed by 30.6%, 15.3%, and 10.6% of elementary, high school and greater than high school respectively. In contrary to this finding, Juma from Tanzania had reported that 94.3% the sampled smallholder dairy farmers were elementary and 5.7% were secondary level, but there was no respondents from greater than high school education level.

This study indicated that 61.3% of respondents do not know any milk borne diseases. This might be reducing hygienic cares during handling and consumption of raw milk. Tuberculosis and typhoid fever were first and second known diseases of the respondents; 21.3%, 15.2% of the respondent knows tuberculosis and typhoid fever as milk borne zoonosis disease respectively. Brucellosis was the least known diseases, only 2.2% know it. Addo et al. from Ghana reported that TB was known by 88% of the respondents and brucellosis by 76% which is far from the findings of this study [20]. This might be due to the educational status and life experience of the respondents in Ghana. Mihiret-ab also reported that 5.6% of the respondents were aware of the zoonotic importance of brucellosis in and around Dire Dawa, Ethiopia [22]. But Dawit et al. reported in contrary to the present findings being none of the respondents from Jimma knew about zoonotic importance of brucellosis [23].

Even though 63.5% of respondents were aware of diseases might be transmitted through cow milk, but 61.3% of the respondents did not knew the particular names of diseases of milk borne zoonotic diseases. This study indicated that respondents were some extent aware of general milk borne zoonosis but did not know specific names of the diseases. Similar observations were noted in Kenya where dairy farmers were generally aware of zoonosis but lack of knowledge on specific milk-borne zoonosis [24].

In this finding, only 3.5% of the respondents knew that pasteurization as means of prevention of milk born zoonosis. Similarly, 61.3% of the respondents knew boiling as means of prevention of milk

borne zoonosis. The unpasteurized or un-boiled milk have been reported to be associated with brucellosis and bovine tuberculosis [25].

Most of the respondents from the total study population knew diseases can be acquired through cow milk. This result was due to the fact that 100% of high school and greater than high school knew diseases can be acquired from consumption of row cow milk. But 76.5% of illiterate did not know this fact. In this study, even though 63.5% respondents were aware of diseases that are transmitted through the consumption of raw cow milk, although 50.9% of the respondents' forms of milk preference were raw milk. Hundal et al. from Punjab were reported that 69.6% of the respondents drink raw milk and 55.6% of the respondents knew diseases can be transmitted through consumption of contaminated milk [26]. Large amounts of *Escherichia coli*, *Staphylococcus aureus*, *Candida albicans* and other health hazard microbes have been reported in raw milk, cultured pasteurized milk and naturally soured raw milk, and this emphasizes need for improved hygienic practices and precaution at all levels of milk processing value chain [27]. Ingestion of infected raw/unpasteurized milk was cited as the most possible way of contracting milk-borne zoonosis [28].

Study by Kilango et al. reported that boiling of milk prior to consumption is the best approach to prevent milk-borne diseases especially in low income communities [29]. But in this study only 61.3% of respondents know that boiling of milk can prevent milk born zoonosis.

The difference in awareness of milk borne zoonosis is due various circumstances present in the study area. But most of the variation in developing country described by Ameni and Erkihun that remoteness, lack of health facilities, poor extension services, low training status on rearing and handling animals and low literacy rate had been reported as major contributors to low level of awareness among smallholder dairy farmers [30]. Furthermore, many African communities associate diseases shared between livestock and humans with misbehavior or witchcraft, and all these practices are due to little information or lack of knowledge about milk quality at farm level and on different aspects of dairy husbandry issues [18].

Conclusion and Recommendations

In this study survey the respondents knowledge, attitude and practice concerning of milk borne zoonosis was low. This was mostly due to low level of educational status. Without information on milk-borne zoonosis, milk collection centers, retailers, users, and smallholder dairy farmers are neither informed nor motivated to take the simple precautions necessary to protect themselves, their families, workers and the public. Generally, the sampled population had low level of awareness regarding milk borne zoonosis. Based on the above findings the following recommendations are forwarded:

- Awareness creating, trainings on zoonotic risks of milk borne diseases should be given to people working with milk handling and processing.
- The public should be educated and informed on milk borne zoonotic diseases.

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Conflict of Interests

No conflict of interests is declared.

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