



# Assessment on Dairy Farmer's Hygienic Milking Practice and Awareness of Milk Born Zoonosis in and Around Wolaita Sodo Town

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## Abstract

A cross-sectional study was conducted in and around Wolaita Sodo town, Ethiopia, from November, 2019 to April, 2020, to assess smallholder urban and rural dairy farmers' milk hygiene practices and awareness on milk-borne zoonoses. Data were collected from a total of 125 randomly selected dairy farmers; using structured questionnaire and observation. Regarding to farm ownership 99 farms were owned by private farmers, 24 from cooperatives and the rest 2 farms were from governmental. Farm hygiene, animal hygiene, use of towel for drying teats, wash of hands were taken as a components for milking hygiene practice in selected dairy small holder farmers this study. Association of described hygienic practices was made with parameters such as sex, age, level of education and location of farmers, management systems and farm ownership. As revealed from this study, sex was statistically significant association with farm hygiene with P value of 0.002. Level of education of farmers and management systems had significant association with farm hygiene and animal hygiene with P value of 0.001, 0.00, 0.046 and 0.038 respectively. Farmer location had statistical significance association only with farm hygiene (P value=0.045). Most of respondents, 81 (64.8%) had no awareness about milk-borne zoonoses at the same time, 114 (91.2%) of them had custom of raw milk consumption. Therefore, it is imperative to strengthen farmers' awareness, extension services and training programs for smallholders in dairy farmers on milking hygiene practices and post-harvest handling of milk.

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**Keywords:** Awareness; Dairy cattle; Milk hygiene; Smallholder farms; Zoonosis.

**Abbreviations:** FAO: Food and Agricultural Organization; CSA: Central Statistics Authority; CAC: Codex Alimentarius Commission; FSA: Food Standards Agency; NMSA: National Meteorological Services Agency; IMPS: improving productivity and market success; ILCA: International Livestock Centre for Africa; SPSS: Statistical Package for Social Sciences; UNRRA: United Nations Relief and Rehabilitation Administration.

## Introduction

Ethiopia has the largest livestock production in Africa CSA (Central Statistical Agency) [1]. Stated that the total cattle population of the country in 2013 was estimated to be about 55.03 million. Out of this total cattle population, the female cattle

constitute about 55.38% and the remaining 44.62% were male cattle, from this 6,675,466 and 10,731,656 were dairy and milking cows, respectively. On the other hand, the result indicated that 98.71% of the total cattle in the country were local breeds. The remaining were hybrid and exotic breeds that accounted for about 1.15 and 0.14%, respectively.



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Despite its huge population, the livestock subsector in the country is less productive in general, and as compared to its potential, the direct contribution to the national economy is limited. Consequently, the national milk production and overall milk consumption in Ethiopia are very low, when compared with other African countries with lowest livestock population [2].

According to, in the first half of the 20<sup>th</sup> century, dairying in Ethiopia was mostly traditional [3]. Modern dairying started in the early 1950s when Ethiopia received the first batch of dairy cattle from United Nations Relief and Rehabilitation Administration (UNRRA). Milk is considered as nature's single most complete food and is definitely one of the most valuable and regularly consumed foods. Milk is a complex mixture of fats, proteins, carbohydrates, minerals, vitamins and other miscellaneous constituents dispersed in water. Similarly it is a good growth medium for spoilage and pathogenic micro-organisms [4,5].

The ill health of the cow and its environment, improperly cleaned and sanitized milk-handling equipment, and unhygienic workers who milk the cow, and come in contact with milk due to a number of reasons could serve as sources of contamination for the milk [6].

Foods of animal origin are among the favourite and commonly consumed nutrients by most human communities in the world. However, if they are not prepared and handled properly they lead to the cause of many food borne diseases [7]. Once microorganisms can enter into milk, it can multiply and cause changes to milk quality. If pathogenic microorganisms are involved, they can cause harm to consumers by causing human illnesses and disease [2].

Developing countries in Africa often have inadequate infrastructure and limited financial resources to control animal diseases. Furthermore, the level of awareness among farmers of the economic and public health importance of zoonotic diseases in most of these countries is low, and this further stifles efforts to control these diseases [8].

Currently, a large number of smallholder urban and rural dairy productions are operating in the present study area using improved dairy breeds. However, information on milking hygiene practices and farmers' awareness on cattle milk borne zoonoses remains scarce. Thus, lack of information may result in public health risks and economic losses affecting the livelihoods of smallholder dairy producers. Hence, an understanding of farmers' knowledge on milking hygiene and cattle milk-borne zoonoses is very important to reduce risk of cattle milk borne zoonoses transmission. Therefore the objectives of this study were;

- To assess hygienic milking practices and the associated factors.
- To show farmers' awareness on milk borne zoonoses.

## Literatures review

### Traditional milk handling and processing in Ethiopia

In Ethiopia the small holder farmers produce fermented milk by traditional methods. The major fermented milk products produced by smallholder farmers by traditional methods including Ergo (fermented sour milk), Kibe (butter), Ayib (cottage cheese) Arera (sour defatted milk) [9]. Dairy processing in the country is basically limited to smallholder level and dairy farmer

level and hygienic qualities of products are generally poor [10]. In rural areas, dairy processing is generally based on ergo (fermented milk), without any defined starter culture or with natural starter. Milk is either kept at warm temperature or in a warm place to ferment prior to processing [11].

### Practice of hygienic milk production

Hygienic production of milk is important for the safety of consumers. In Ethiopia, there is no standard hygienic condition followed by producers during milk production. The hygienic conditions are different according to the production system, adapted practices, level of awareness, and availability of resources [12].

Primary production occurs on the farm, farm and livestock management can have a significant impact on the productivity of the herd [13]. Because of the important influence of primary production activities on the safety of milk products, potential microbiological contamination from all sources should be minimized to the greatest extent practicable at this phase of production (primary). It is recognized that microbiological hazards can be introduced both from the farm environment and from the milking animals themselves. Appropriate animal husbandry practices should be respected and care should be taken to assure that proper health of the milking animals is maintained. Further, lack of good agricultural, animal feeding and veterinary practices and inadequate general hygiene of milking personnel and equipment and inappropriate milking methods may lead to unacceptable levels of contamination with chemical residues and other contaminants during primary production [14].

Production of milk of good hygienic quality for consumers requires good hygienic practices (clean milking utensils, washing milker's hands, washing the udder and use of individual towels) during milking and handling, before delivery to consumers or processors [15].

Milk from the udder of a healthy cow contains very few bacteria. Poor hygiene introduces additional bacteria that cause the milk to get spoilt very quickly. To ensure that raw milk remains fresh for a longer time, it is needed to practice good hygiene during milking and when handling the milk afterwards [16]. Production of quality milk is a complicated process. It is the concern of so many stockholders, which include dairy farmers, dairy cooperatives, milk and milk product processors, retail distributors (shopkeepers and super markets), consumers of dairy products, state regulatory departments, extension staff and veterinarians [17].

Hygienic milk production is important and should take into account the sanitation of the barn, personnel involved in milking and the utensils used to collect and store milk. Cleaning of the teats before milking contributes to hygienic milk production. However, it is not common practice to sanitize teats before milking in the rural dairy production systems, and the number of farmers sanitizing teats is few in urban dairy production system with the assumption that teats are cleaned when the calf suckles before milking. In fact calves are also allowed to suckle after milking to ensure complete milking [18].

### Milking procedure

A good milking technique is essential for the production of safe, raw milk. The procedure will encompass by cleaning Teats, udder and adjacent parts must be clean before cluster attachment, Teat dips/sprays must be used in accordance with manufacturer's instructions. Milk from each animal must be exam-

ined at each milking, when identified; abnormal milk must be kept separate and not used for human consumption. Animals producing milk that is unfit for human consumption must be clearly identified, milking equipment must be kept clean at all times, hands must be cleaned before milking and kept clean during milking and milk handling, Exposed skin wounds must be hygienically covered [19].

It is important to remember that quality control must begin at the farm. That way, the milk will have fewer bacteria that cause spoilage and diseases. In order to ensure good quality and protect the health of consumers, one must always carry out milking in accordance with good hygienic practice [16].

### Factors affecting milk quality

The bacterial contamination in milk emanates from a number of sources including mastitis, external udder surfaces and from the milking plant [20]. Milk is virtually a sterile fluid when secreted into alveoli of udder. However beyond this stage of production, microbial contamination might generally occur from three main sources; within the udder, exterior to the udder and from the surface of milk handling and storage equipments, but the surrounding air, feed, soil, feces and grass are also possible sources of contamination [21]. Microorganisms are mainly transferred from the farm environment to milk via dirt (e.g. faeces, bedding and soil) attached to the exterior of teats. In addition, microorganisms attached to the exterior of the teats can enter the teat canal and cause mastitis. Finally, contamination can originate from insufficiently cleaned milking equipment when, during milking, microorganisms adhered to surfaces of the milking equipment are released into the milk [22].

Inadequate cooling of the milk, improper udder preparation methods, unclean milking equipment and the water used for cleaning purposes are considered as the main source of milk contamination. In order to produce milk of good bacteriological quality, dairy farmers should be aware of the sources of contamination and importance of proper milk handling, cooling and storage [23].

**The external surface of the udder:** The exterior of the udder can be an important source of contamination. But the exterior of the udder is influenced by the environment of the cows, in which cows are housed and milked. The bacteria which are naturally present on the skin of animal enter into milk from the surface of the udder and teats; these also include the bacteria which are present in milking and housing places of animals [24].

### Housing Conditions

Differences in teat contamination can be found between housing and pasturing. Both total plate and aerobic spore counts are lower when cows are at pasture. When cows are housed, bedding material and feed stuffs can be contamination sources. In both cases (housing and pasturing) feces and dung are also an important contamination sources. Contamination of bedding material can be very high due to absorption of urine and feces [23].

### Teat Contamination

The exterior of cow udder and teat can contribute microorganisms that are naturally associated with the skin of the animal as well as microorganisms that are derived from the environment in which the cow is housed and milked. Microorganisms are mainly transferred from the farm environment to milk

via dirt (e.g. faeces, bedding and soil) attached to the exterior of teats; in addition, microorganisms attached to the exterior of the teats can enter the teat canal and cause mastitis [22].

### Udder Preparation

Careful cleaning of the cow prior to milking significantly reduces contamination. Clipping the flanks, escutcheon, and udder reduces contamination from hair and adhering debris. A maximum reduction of teat contamination of 90 % can be achieved with good udder preparation (washing with disinfectant and drying with paper towel) before milking. This depends on the initial level of contamination and the way of udder preparation. So with high initial contamination levels this 90 % reduction might not be reached [23].

**Milking and storage equipment:** Contamination of milk via the milking equipment occurs when microorganisms adhere to surfaces of the milking equipment and milk residues that remain in the equipment after the cleaning cycle. Under these conditions, growth of adhered microorganisms may occur, especially in cracked and decayed rubber parts that are sensitive to accumulation of microorganisms. During the next milking, adhered microorganisms can be released into the milk [22].

Thorough cleaning of dairy utensils and equipment is essential. Anyone handling milk must also pay great attention to hygiene. Lack of hygiene can contaminate milk with other types of bacteria, which turn it sour and reduce its storage life [25]. The utensils and equipment used during milking should be made of non-absorbent, corrosion-resistant material. The surface should be smooth, have minimal joints or open seams and should be free from dents [17].

## Materials and Methods

### Study Area

The study was conducted in and around Wolaita Sodo town in Southern Nation Nationalities and Peoples Regional State of Ethiopia from October 2019 to May 2020 to study the assessment on dairy farmer's hygienic milking practice and awareness of milk born zoonosis in and around Wolaita sodo town. Wolaita Sodo is located 390Kms south of Addis Ababa and 165Kms west of Hawassa (regional city). The town Sodo located at latitude of 8o50oN and longitude of 37o45oE. Topographically the area is marked by hilly, flat, steep slopes and gorges and a number of streams and mountains, the highest mountain being Damota, 2500m above sea level, which is located near Sodo town. Altitude ranges varies from 1100-2950 m.asl. The area experiences mean annual temperature of about 20oc. The highest average monthly temperature occurs in January when the mean maximum temperature is 26.2oc and the coolest month is August when the average monthly minimum temperature is 11.4oc. The rain fall regimes over much of the area are typically bimodal with the big rainy season extending from June to September and a small rainy season occurring from February to April. The mean annual rain fall of the area ranges from 450-1446 mm with the lowest being in low land and highest in high land [26].

### Study population

The study was conducted in small holder dairy farms in and around Wolaita Sodo town based on the assessment on dairy farmer's hygienic milking practice and awareness of milk born zoonosis. Sex, Age and level of education, location, status and management farm holders were taken for association of hygienic milking practice and awareness of milk related zoonosis.

## Study Design

This study was carried out using cross-sectional study design from October, 2019 to May, 2020 across randomly the small-holder dairy farms in the study area.

## Study Methodology

**Questionnaire:** A single-visit-multiple-subject formal survey technique was used to collect data through interviews, conducted in the local language by the researcher using a pre-tested, structured questionnaire. The questionnaire includes detailed queries pertinent to the following aspects: particulars of the farm owners including the education, farms information and it include location, water and, nature of production and building materials; herd structure and size.

The questionnaire was designed to obtain information on milk production, dairy farmers' knowledge and awareness of zoonoses with particular emphasis on milk-borne zoonoses and farmers' customs that may lead to increased risk of milk-borne zoonoses transmission.

**Observation:** Data observed from dairy farm were be on demographic characteristics, milking system, milking frequency, milking hygienic practices (washing of milker's hand, milk utensils and udder before milking), sources of farm water, housing management.

## Sample Size Determination

The sampling strategy was applied semi structured questionnaire technique to collect all the necessary data from randomly selected respondents in and around wolaita sodo town. the total households included in the study was determined according to the formula given by Simple random sampling techniques were used to select 125 dairy farms from 180 registered that recorded from wolaita sodo livestock and fishery centre.

The sample size for the questionnaire survey was determined using the formula of,

$$n = N / 1 + N (e)^2 \text{ OR } n = N / 1 + N (0.0025)$$

$$180 / 1 + 180(0.0025) = 180 / 1 + 0.45 = 125$$

Where;

N = total number of small holder farms in each Keble

n = number of sample size the research uses x

e = margin of error 5% (0.05).

1 = probability of event occurring

Therefore, a total of 125 farms were selected at 5% standard error with 95% CI.

## Data Management and Analysis.

The computer Excel was used for data management and entry. All the collected ata were coded and entered into the computer with Excel. The Statistical Package for Social Sciences (SPSS) software version 20 computer programme was used for data analysis. Descriptive statistics such as frequencies distribution and percentages was used to summarize the data. Chi square test was used to measure association of factors that affects hygienic milking practice. P value (< 0.05) was considered as statistically significant association.

## Results

### Socio demographic characteristics of the respondents

A total of 125 smallholder dairy farmers were interviewed in this cross sectional study in and around Wolaita sodo town. In the study area, 60.8% of farmers were located in urban area while the remaining 39.2 % in rural area (around town). From those interviewed farmers Females comprised 58.4% of the respondents while the remaining 41.6% were males of different age and educational levels. Most of the respondents, 40.0% belong to the adult age group and remaining 60% was young, this so that the majority of the respondents were in potential productive age. Regarding the educational level, 12.8% were illiterate, while 87.2 were literate. (Table 1).

**Table 1:** Socio demographic characteristics of the respondents.

Parameter	Frequency	Percentage (%)
<b>Sex</b>		
Male	52	41.6
Female	73	58.4
<b>Age</b>		
Young (20-35 year)	75	60.0
Adult(above 35 year)	50	40.0
<b>Level of Education</b>		
Illiterate	16	12.8
literate	109	87.2
<b>Locality</b>		
Rural	49	39.2
Urban	76	60.8

### Dairy cattle housing characteristics

In the study area, farms that located in urban and rural areas are owned 79.2% private, 19.2% cooperative while remaining 1.6% of farms was government. All the respondents (100%) use the farm as main business. The most of the dairy cows in farm 40.8% were housed in concrete type floor barn and 25.6% were in muddy soil floor and only 33.6% are in wooden floor. Regarding barn cleaning, most of the respondents (71.2%) clean the barn daily, 27.2% clean every two days and 1.6% cleans the barn weekly. Most of the smallholder farmers (68.0%) use plastic containers for collecting milk and 32% use stainless steel for collecting and transporting milk (Table 2).

### Routine practice of small holder dairy farmers

Results of this study showed that all respondents milk their animal in barn and milking is done by hand with all respondent's milking frequency of the animals twice per day is 100%. most of the respondents (71.2%) clean their barn daily before milking, while 27.2% and 1.6% clean their barn every two days and weekly before milking respectively and most of the respondent's 60.8 % of the dairy farmers had access to wall water supply and 36% and 3.2% use wall water and river water respectively. In this study, most of the farmers (83.2%) reported that they washed their hands with water only and it was noted that only 16.8% used water and soap for washing their hands. Most of respondents (100%) wash udder and teat before milking. About 84.0% of the respondent's use towel for dry udder and teat after washing while 16.0% was not towel. From those respondent's 46.4% use individual towels and 37.6% use common towels for wiping udder after washing, whereas, the rest



16.0% do not use towels for drying (Table 3).

**Table 2:** Farm characteristics and facilities.

Parameter	category	Frequency	Percentage (%)
Farm management	Intensive	34	27.2
	Extensive	0	0
	Semi intensive	91	78.8
Floor type	Concrete	51	40.8
	Wooden	42	33.6
	Muddy soil	32	25.6
Farm ownership	Cooperative	24	19.2
	Government	2	1.6
	Private	99	79.2
Source of water	Pipe	76	3.2
	Well	45	59.2
	River	4	1.6
Milking containers	Plastic	85	68
	Stainless steel	40	32
Use of farm	as main business	125	100
	As additional income	0	0.0

**Table 3:** Routine practice of farm holders.

Parameter	Category	Frequency	Percentage
Milking frequency	once a day	0	0.0
	Twice a day	125	100.0
Hand wash before Milking	Wash with water	104	83.2
	Wash with water and Soap	21	16.8
	No wash	0	0.0
Washing udder and teats	Before milking	125	100
	After milking	0	0.0
Use towel for dry	Individual based	47	37.6
	Common	58	46.4
	No use	20	16
Barn cleaning	Daily	89	71.2
	Every Two days	34	27.2
	Weekly	2	1.6
Milk utensils cleaning	Cooled water	39	31.2
	Cooled water with soap	16	12.8
	Hot water with soap	70	56

**Table 4:** Hygiene and associated factors.

Factors	Frequency of Routine Hygienic practice								
	Farm hygiene		Animal hygiene		Use of towel			Wash hands before milk	
	Good	Poor	Good	Poor	individual	Common	No use	with water	with soap and water
<b>Age</b>	A1		A2		A3			A4	
Adult	22	28	21	29	21	19	10	43	7
Young	30	45	20	55	26	39	10	61	14
<b>Sex</b>	B1		B2		B3			B4	
Male	30	22	31	21	18	26	8	43	9
Female	22	51	53	20	29	32	12	61	12
<b>Education</b>	C1		C2		C3			C4	
Illiterate	1	15	1	15	6	3	7	13	3
Literate	58	51	40	69	41	55	13	91	18
<b>Management</b>	D1		D2		D3			D4	
Intensive	19	15	16	18	18	14	2	27	7
Semi intensive	33	58	25	33	29	44	18	77	14
<b>Location</b>	E1		E2		E3			E4	
Urban	37	39	29	47	27	41	8	61	15
Rural	15	34	12	37	20	17	12	43	6
<b>Ownership</b>	F1		F2		F3			F4	
Cooperatives	12	12	8	16	12	12	20	22	2
Private	38	12	31	68	33	46	0	80	19
Governmental	2	0	2	0	2	0	0	2	0

All respondents clean milk handling containers; however, 31% wash containers with cold water, 12.8% wash containers with cold water with soap and 56.0% wash containers with hot water and soap. Majority of the respondents (73.6%) milk and discard milk of one or two teat sick animals while 26.4% randomly mix with other milk during milking (Table 3).

**Relationship of Risk factors with hygienic milking practice.**

Hygienic practices such as farm hygiene, animal hygiene , washing of hands while milking and towel usage were taken and the relationship was determined with age, sex, education level and location of farm holders, management system and farm ownership.

A chi square analysis test showed there was no statistically association of age of farmers with determined hygienic practices; P value > 0.05, similarly sex was not statistically significant except with farm hygiene which has P value of 0.002. Level of education of farmers had significant association with farm hygiene and animal hygiene with P value of 0.001 and 0.00 respectively. With regards to management system, it had significant association with farm hygiene and animal's hygiene practices with P value of 0.046 and 0.038 respectively. Farm location has statistical significance association with farm hygiene (P value=0.045) while farm ownership had no significance association with described hygienic practices (Table 4).

**Farmers' awareness of cattle milk-borne zoonosis.**

Most of the respondents (91.2%) consume raw milk as milked and (8.8%) consume milk after boiling it. Most of the respondents (73.6 %) discards milk of sick animals, 26.4% gave milk sick animals to their pets, 1.6% use the milk of sick animals after processing it and 24.0% gave milk of sick animals to their calves. Most of the respondents (48.0%) gave milk of drug treated animals to their pets, 29.6% gave milk of drug treated animals to their calves, 20.6% discards milk of drug treated animals and 1.6% use the milk of drug treated animals after processing it. With regards to farmers' knowledge on milk-borne zoonoses, only the respondents were aware of tuberculosis is (35.2%), and (64.8%) mostly not respond about knowledge on milk-borne zoonosis (Table 5).

**Farmers' awareness and customs with associated factors.**

According to finding in this study with relation of awareness and custom of using milk, sex and education level of farmers had significant association with milk consumption custom P value of 0.00 and 0.010 respectively. Similarly sex, age, level of education of farmers had significant association with awareness of disease transmission from milk P value of 0.00, 0.014 and 0.002. However, location of farmers had no significance association.

**Table 5:** Farmers' awareness and customs.

Parameter	Category	Frequency	Percentage
Milk consumption custom	Raw	114	91.2
	Boiled	11	8.8
Milk of drug treated animals	given to pet	60	48.0
	Given to calves	37	29.6
	Discarded	26	20.8
	for consumption	2	1.6
Know disease transmit from milk	Yes	44	35.2
	No	81	64.8
Handling of milk from sick teats	Discard	92	73.6
	Randomly mix	33	26.4

**Table 6:** Farmers' awareness and customs.

Factors	Farmer awareness and customs					
	Milk consumption custom		Know disease transmit from milk		Handling of milk from sick teats	
	Raw	Boiled	Yes	No	Discard	Randomly mix
<b>Sex</b>	A1		A2		A3	
Male	41	11	31	21	42	10
Female	73	0	13	60	50	23
<b>Age</b>	B1		B2		B3	
Adult	45	5	24	26	37	13
Young	69	6	20	55	55	20
<b>Education</b>	C1		C2		C3	
Illiterate	15	1	1	15	9	7
Literate	99	10	43	66	38	18
<b>Location</b>	D1		D2		D3	
Urban	71	5	29	47	59	17
Rural	43	6	15	34	33	16

**Discussion**

This study aimed to assess the hygienic milking practices and awareness of milk-borne zoonoses among smallholder dairy farmers. The results of the present study showed that majority of the respondents (58.4%) in the study area who were engaged in milk production were females than males which is similar to [2] report, in Bishoftu, that dairying offers more opportunities for females to be closely involved in the daily management than males. it may be because men work in the field than females. In contrast with the present findings, [4,5] reported that in Jimma town, there were more male-headed households.

The present study indicated that most of the respondent's educational levels were found between primary and secondary school means most of respondents are literate. This is in contrast with report from, [2] in Bishoftu, where the educational level attained by majority of the household heads falls between illiterate and primary school. In this study, among hygienic milking practices farm hygiene, and animal hygiene were significantly (p<0.05) associated with educations of the respondents. This indicates that the farmers to be aware, in order to improve their hygienic dairy production and husbandry practices. In this study, most of the respondents (60%) were in the productive ages, which agreed with report in Ilu Aba Bora Zone [27].

The study result showed that, all the respondents house for keeping the animals and most of the cows (40.8%) were housed

in concrete type floor barn, while 33.6%, 25.6% the dairy cows was housed in wooden and muddy soil respectively. In agreement with the present findings, [28] reported that in Addis Ababa, majority of the respondents used barn floor made of concrete. This indicates that the farmers to be easily clean the floor and to enhances the the animals hygiene in the farm.

As observed in the current study, 59.2% of the respondents used well water as main water sources for cleaning the udder or teats washes their hands and milking equipment, and the others 3.2%, and 1.6% use water source for cleaning and washing purpose from pipe and river respectively. The result was lower compared with reported by [28] in Addis Ababa, 98.9% of the respondents use pipe water and the other 1.1% use well water. This difference comes from supply difference and might be awareness differences between cities in animal husbandry.

The present study indicated that most of the respondent's that milking is done by hand with milking frequency of twice (100%), per day. In this study respondents indicated that thrice milking of cows per day was labour and time demanding and provided with adequate nutrition to support the increased milk production. This finding agrees with the findings, of [2].

The production of milk of good hygienic quality for consumers requires good hygienic practices to minimize contamination during milking, effective hygienic practices need to be applied to the udder of the animals, the milking equipment, the handlers, cleaning udder and use of individual towels during milking and handling, before delivery to consumers [15]. In present study, most of respondents (83.2%) washed their hands before milking with water only and 16.8% of them used water and soap for washing their hands. Washing hands without soap may not improve the hygienic conditions of milk and milk products, so the farmer less aware to washing hands with soap In agreement with the present findings reported that majority of the farmers in bishoftu practiced hygienic milking, such as washing of hand, [2].

In present study, most of the respondents (100%) wash udder and teat before milking in the farm and udder washing on milking cows is essential to limit cross contamination and thus microbial load [29]. Reported that pre milking udder preparation and teat sanitation plays important part in the microbial load of milk.

In this study, 37.6 and 46.4 and 16.0% of the farmers used individual and common towels and no use towel for drying udder after washing, respectively. In contrast with [4,5] reported that only 13% of the farmers in Jimma town, used individual towel and this is lower than the present findings (37.6%). This difference may be due to study year difference, probably recent extension creates impact in use of towel for disease prevention in this study area.

In present study, most of the respondents (68.0%) use plastic containers for collecting milk and only 32.0% use stainless steel for collecting and transporting milk. In agreement with this study, [4,5] reported that about 92.6 and 3.7% of the farmers in Jimma collected milk using plastic buckets and stainless steel respectively. All respondents clean milk handling containers before milking. In this study, most of the respondents (91.2%) consume raw milk, 8.8% consume after boiling. Contrary to the results of the present study, [4,5] reported that most (92.6%) of the farmers in Jimma boil milk before consumption, 3.7% also indicated that they consume.

This study also revealed that majority (64%) of the farmers had no awareness on bovine milk-borne zoonoses and some farmers in study area know (35.2%). Sex, age, level of education of farmers had showed significant association with awareness of milk borne disease. This is incomparable with findings by [30] showed that farmers were more knowledgeable about milk borne disease (70.4%). The main reasons for the low level of awareness among dairy farmers are poor extension services, inadequate training and low education level being in developing country.

Finding from this study showed that most of farmers, 114 (91.2%) consumed raw, sex and education level of farmers had significant association. This much higher than the result reported 23.35 % by [31-34] at Bishoftu and 35% by, his difference might be due custom of society and level of understanding about milk borne zoonosis.

### Conclusion and Recommendations

The study showed that most of the farmers followed some standard milking hygiene practices such as washing of milk containers, milkers' hand and udder before milking. However, there were problems of keeping animal's hygiene and use of towels in most of farms. Most of the dairy farmers had not access to clean water supply. The animals in most farms are managed in semi intensively due to lack of space, disposal of manure poses a difficult problem. Generally, dairy farmers' awareness about milk-borne zoonoses was found to be very low well as there was high tendency of raw milk consumption that probably pose milk borne zoonosis in turn.

Thus, the following recommendations are forwarded

- There should be mechanisms for provision of extension facilities.
- There should be training on farmers' hygiene milking practice and
- Awareness should be created through different mechanisms on and milk-borne zoonoses and risks of raw milk consumption.

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