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KAPs on Milk Quality and Associated Factors for Milk Contamination in Selected Districts of East Hararghe Zone, Oromia County, Ethiopia: A Thesis Proposal

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Abbreviations: BMRT: Brucella Milk Ring Test; BTM: Bulk Tank Milk; KAPs: Knowledge, Attitudes and Practices; MBRT: Methylene Blue Reduction Test; NRERGE: National Research Ethics Review Guideline of Ethiopia; OIE: Office International des Epizooties; SDF: Smallholder Dairy Farmers; WHO: World Health Organization.

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Introduction

Nowadays, zoonotic pathogens are major contributors to human food borne diseases in both developed and developing countries, and still a major challenge to human informed as being associated with the persistence of health worldwide [1]. It was reported by [2] that contribution and liability of veterinary medicine promotes a well-being of human health. Ethiopia constitutes both urban and peri-urban dairying as an important subsector of the agricultural production system. For smallholder farmers, dairying will get the opportunity for efficient use of land, labor and feed resources and generates regular income. Milk and milk products are economically important farm commodities and dairy farming is an investment option for smallholder farmers [3].

Having inevitability to human nutrition during different stages of life, milk and its products can also act as a vehicle for spread of various milk-borne diseases [4]. Milk is an example of ideal medium acting as ready-made vehicle for harboring, favoring and enhancing foodborne pathogens, like S.aureus [5]. (El-Leboudy *et al.,* 2016), Streptococcusspp. [6], E. coli [5], Bacillus [6], in milk causing serious health risk on consumption, broadly termed as "milk-borne diseases" [7]. Raw milk can carry dangerous germs, such as Brucella, Campylobacter, Cryptosporidium, E. coli, Listeria, and Salmonella, which can pose serious health risks to humans [8].

Occurrence of zoonotic diseases such as bovine tuberculosis is also high in the cattle population mainly resulted from the consumption of raw milk in Ethiopian dairy farming system [9]. A zoonosis is any infectious disease that can be transmitted from animals, both wild and domestic, to humans [10]. Zoonoses are also considered to be twice as likely to be associated with emerging diseases as non-zoonoses [11]. Unhygienic handling of milk from production to market is not ideal and this is due to poor knowledge on hygienic practices, which lets them use non-potable water for cleaning of milk containers. However, they still consume raw milk and this is a major public health risk [12].

[13] found that peoples with low education have limited consciousness about public health significant diseases which are transmitted from the animals. As we are aware of the importance of milk and dairy products in a balanced diet, it is also true that if consumed unpasteurized, they can also present a health threat due to likely contamination with any pathogenic organism [14] These organisms can also originate from clinically healthy milk animals or from environmental contamination occurring during collection and storage of milk [15]. With the objectives of providing betterment and characteristic improvement of animal and human health [16], biosecurity, chemoprophylaxis, an immune-prophylaxis are the important tools for the prevention and control strategies of diseases of animals. Milk safety standards are critical components to develop in any country's milk commodity that every consumer need to learn how to distinguish which is safe and unsafe, and a single method to attain this is to implement a "quality standard" to help consumers choose safe products [17].

Statement of the problem

In this day and age, microorganisms are chief contributors to foodborne illnesses both in developed and developing countries. Almost all the world community consumes milk so often for its nutritious purpose. However, all those incorporating milk into their daily meal are most likely vulnerable to be infected. Because, milk is an ideal medium acting as convenient vehicle for harboring, favoring and enhancing foodborne pathogens. Poor knowledge on hygienic practices let the community use non-potable water for cleaning milk containers.

Individuals with low education have inadequate understanding about public health significant diseases transmitted from the animals. That is why ingestion of raw milk and unhygienic handling of milk from production to consumption is still accustomed as usual. Even if the lactating cow appeared clinically healthy, it can pose a potential threat to societal health. In Ethiopia, particularly in those selected districts of eastern harerghe zone, a level of community perception has not been yet estimated.

The study objective

General objective

The goal of this coming study is to get acquainted with milk quality assessment along with the knowledge, attitudes, and practices of the community from dairy industries of Haramaya, Kombolcha, and Kersa districts of eastern harerghe zone, Oromia, Ethiopia.

Specific objectives

☞ To assess the level of KAPs of the community about milk quality in the study area

☞ To identify associated factors for milk contamination and

☞ To provide awareness on wrong use of milk and its products in order to build a healthy living status in the community.

Conceptual framework

Conceptual framework is a representation of the relationship you expect to see between your variables, or the characteristics or properties that you want to study. It is written by listing the considered variables and their interrelations before you design a framework, just refer to the study problem stated to help ensure that our framework is relevant theme of the conceptual framework (**Diagram 1**).

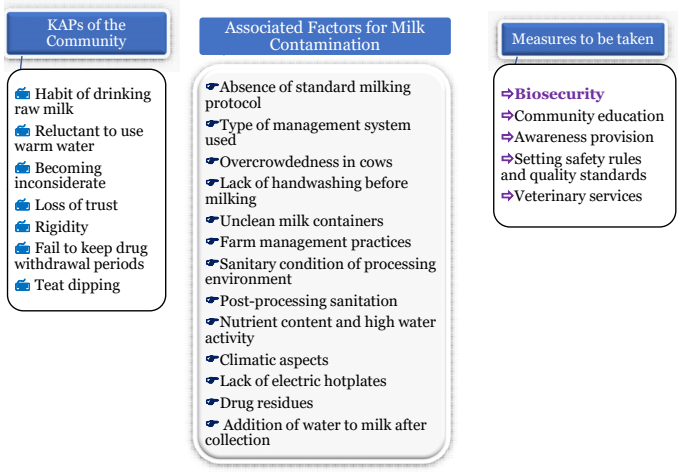

Diagram 1: A flow-diagram showing a conceptual framework on assessment of KAPs of the community about milk quality and associated factors for milk contamination.

Literature review

Associated factors for milk contamination and a community perception

Food obtained from animals, particularly, a milk, provides an ideal condition for germs to grow and can cause high health problems [18]. Absence of standard milking protocol by smallholder dairy farmers is the main factor for milk contamination [19]. Semi-intensive management was a risk factor when compared to extensive system, since overcrowded herds are prone to increased possibilities of environmental and animal contamination [20]. The consumption of raw milk and its byproducts is adapted in Ethiopia, which is risky for consumer health asit may initiate the spread of various diseases [21]. Factors significantly associated with milk contamination were lack of hand washing before milking and unclean milk containers [22].

The habit of drinking raw milk is the main predisposing factor for acquiring milk-borne infections [23]. Even though consumption of contaminated raw milk with *C.burnetii* does not seem to represent an efficient route of disease transmission, however, Bulk Tank Milk (BTM) has been reported an important specimen for epidemiological survey on dairy herds [24]. Brucella contamination of raw whole milk could occur through ways like management style, herd size, abortion rate, hygiene and disease control practices [25]. Numerous factors responsible for occurrence of pathogens in milk and its products are farm size, number of animals on the farm, milking hygiene, farm management practices, sanitary condition of processing environment, post-processing [26,27], transportation, geographical location, and season [28]. High nutrient content and water activity of milk favors the growth of pathogenic organism like salmonella and *E. coli* [29].

Raw milk and its products can be abandoned by Bacillus cereus when exposed directly to the soil, and it produces toxins triggering food borne illness and considered as a significant threat for public health [30]. Brucellosis [31], tuberculosis and streptococcosis are the major camel diseases transmitted through the consumption of the contaminated milk. Climatic aspects are also associated with pre-harvest contamination of Listeria species dairy farm [32]. At large, every bacterial organism gaining access into milk can multiply and give rise to spoilage, making raw or processed milk unsuitable for consumption owing to rancidity, moldy odor, or toxin production [33].

Knowledge and attitudes of the community towards milk contamination

Most often, lack of electric hotplates, and even absence of wood for boiling a water in the surrounding of milk collection centers [34] could make the dairy workers more reluctant to use warm water for washing milk containers and a towel with which they dry the teats [35]. Treating all the milking cows simultaneously can be difficult for money-driven owners running a dairy based business [36]. The occurrence of milk contamination is also directly proportional to how often the dairy managers contact veterinary professionals to keep their cows free from animal diseases of much significance on milk production and quality [37]. When the with drawal period is too long to wait, dairy producers may feel the loss of much amount of milk in spite of the healthier their cows will become after all [38]. Even if an animal health practitioner instructed them to discard the milk from a cow with recent antibiotic treatment history, they may be inconsiderate; and these are all matters that attitude have against milk quality [39].

According to [40], as most of small scale farmers live below the poverty line in that they have no or a little educational qualification, so they lack proper knowledge of raising livestock in a healthy manner and exposed to some potential risk factors associated with zoonosis. The proportion of the farmer who knew that there is involvement of risk factors from which the animals might contract the infection like overcrowding of livestock, irregular grazing places, poor hygienic condition of livestock, faulty farming practices, improper isolation of diseased animal was ridiculous [41]. The knowledge regarding animal husbandry (defined as "production and care of domestic animals"), milk safety, hygiene and environmental responsibility to healthy actions are compromised owing to cultural, geographic and economic constraints of these workers [42].

Even when tuberculin positive cow was brought forth a calf, they milked her and drink raw as they usually accustomed [43]. Pastoralists and small-scale dairy farmers in Cameroon had little knowledge about the transmission of bovine tuberculosis through milk due to inappropriate husbandry measures and dairy practices [44]. Amazingly, some farmers have told that they did not believe animals can cause disease to humans and they did not fear any disease that affected animals, and that they even eat meat of dead animals [45]. As a result, they are more exposed; however, they said that they have been living with these animals for many years and slaughter them when they are about to die [46].

Many African communities think as if diseases shared between livestock and humans with misbehavior or witchcraft [47], and all these practices are due to little information or lack of knowledge about milk quality at farm and on different features of dairy husbandry issues. The low level of attitude obtained regarding the possibility of contracting zoonotic diseases from apparently healthy cattle/animals [48]; drinking raw milk and the likelihood of milk contamination from clinically asymptomatic individuals are also issues requiring urgent intervention [49].

Community practices associated with milk contamination

Methods of milking, absence of detergents and a water used, to wash the udder, their hands, and milk utensils has peculiar effect to contaminate milk [50]. Sameness of water and towel to clean all cows' udders before milking badly affects milk quality. Filtering is mandatory to remove adirt out from your milk. Teat dipping is also essential practice to be considered [51]. Boiling a milk for consumption is a must to be practiced as a duty [52]. Complying with the mandatory withdrawal period is strictly recommended, unless the milk gets contaminated drug residues [53]. The presence of organized body for a service focused on vaccinating cows against zoonotic diseases is what is needed at first hand [54].

Unhygienic ways of handling milk and milk products, consumptions behaviors such as consuming raw milk purchased from markets, and children directly consuming milk from the udder of animals (e.g., goats) [55]. Cleaning the udder before milking is important practice to reduce contamination of the milk [56]. Washing hands before collection, washing utensil before collection, addition of water to milk after collection, and covering milk utensil with lid after collection are some of the wrong practical ways by which zoonotic diseases can spread from infected animals to humans [57]. In developing countries like Ethiopia, a low living standard in both animals and humans plays a considerable role on milk-borne zoonosis [58].

Measures to improve the knowledge, attitudes, and practices of the community

Initiation of global anticipating scheme against a burden of foodborne infection has to be established in order to sustain the associated risk at ease [59]. Biosecurity is a management system employed to minimize the risk of incidence of infectious diseases to a herd, and is a basis for disease control, properly designed, demographically pertinent education programs vital to ensure optimal farmer's involvement in its implementation [60]. A perception against the influence of milk-borne zoonosis is very limited in Ethiopia. Nonetheless, taking the large amount of unregulated milk consumed and the risk associated with it is likely to cause detrimental effect [61]. In the past times, the Ethiopian dairy sector has been progressing at a very fast rate while little courtesy has been implicated to the importance of safety of milk and milk products. With the aim of framing an appropriate intervention on public health significance of milk-borne zoonotic agents, there is a prerequisite to be properly documented as a baseline against zoonosis [49].

Accompanied by training the society on how to improve their perception and practices by avoiding drinking of raw milk by thinking repeatedly and reading labels when shopping "organic", because many organic food stores sell unpasteurized dairy products, being aware of soft cheeses, and keeping dairy products refrigerated within the expiry date marked on the package [62]. Cow's milk can get contaminated in several ways; just as all people do, all animals also carry microorganisms [63].

Sometimes, dairy cows spend much of their time grazing in pastures, where they come in contact with a variety of environmental germs [64]. In other cases, cows are confined to buildings, wherein more crowded conditions the bacteria can grow and spread from cow to cow. In addition, many micro-organisms that are commensal organisms may be considered human pathogens as well [65]. Dairy processing facilities have many routes for the entry of the contaminating microbes. First, as a nutrient-rich liquid, a milk provides an ideal environment for microbial growth. Second, dairy processing plants are full of areas where "foot traffic" from personnel can be accompanied by microbes [66].

Thus, the phenomenon in which bacterial toxins may persist despite reheating even if the bacteria themselves are killed ought to be kept in mind. Being careful when travelling nations, following the recommended sanitary precautions for a given country and avoidance of eating raw dairy products [67]. Milk and unpasteurized dairy products are not the only sources of food poisoning [68]; it is likely much more common than most people think, considering most cases of "stomach flu" in adults which are real food poisoning [69].

Inclusion and exclusion criteria

Those individuals to be taken into consideration for assignment in this coming study are milking animal owners, dairy managers, health workers, veterinarians, and working personnel of dairy production centers in the study area. Individuals with no prior experience, those with incapability of participating in any farm decisions and in milk production centers, those not voluntary to make interview with us would be intentionally excluded.

Linkage with other institutions

The research will be conducted in collaboration with Haramaya University research affairs, and dairy cooperatives from each selected districts (Haramaya, Kombolcha and Kersa) of east harerghe zone, for estimation of the level of KAPs of the community about milk quality and associated factors for milk contamination, facilitating resources needed to conduct a study.

Ethical approval

Rendering to the National Research Ethics Review Guideline of Ethiopia (NRERGE), since it is going to be conducted in questioning form with the respondents out of society about their perception, the study requires a formal ethical approval. Hence, we will make a formal agreement before carrying out a survey with dairy industry managers, and a verbal consent with each study participants for the right of confidentiality of information they are going to provide concerning the enquiry to be investigated at each of the study areas.

Expected outcome

A level of KAPs of the community about milk quality will be assessed through questionnaire in order that every accountable body shall take any necessary decision on. Quality standards will be set so as to operate a hygienic way of keeping milk in the midst of the producers and consumers with a liable boundary line of poor and good quality. Potential associated factors for milk contamination will be identified. Awareness will be given against a wrong use of unsafe milk. The information assessed and evaluated would be used for prioritization of forthcoming public health schemes so as to build a healthy community in a healthy environment.

Benefits and beneficiaries

The result obtained from this study will benefit veterinarians, health-workers, and the community in terms of giving information about the KAPs of the individuals in the study area. It also helps the governmental bodies appealing a nice approach to provide awareness against consumption of raw milk and its products. The last but not the least benefit is that researchers from around the world will get a gap for further studies from this proposed research.

Work plan

Acknowledgements

Amidst numerous encounters that would tempt me to give up and give in, I am standing still with an incredible amount of positive energy—thanks to that!

In essence, I owe my instructor Dr. Dawit Kassaye, a debt of gratitude for his dedication to the Research Methodology and Analytical Epidemiology courses through which I have been equipped with a great aptitude of doing any research activities independently along with its respective analytical approach.

Table 1: Work Plan for the Research to be conducted from March, 2023 to October, 2023.

Serial Number	Activities	September	October	November	December	January	February	March	April	May	June
1	Writing Proposal										
2	Proposal Presentation										
3	Material purchasing										
4	Questionnaire survey, data collection, & laboratory works										
5	Data Processing and Analysis										
6	Evaluation of Results & Discussion										
7	Writing the Thesis										
8	Research Presentation										

Budget Breakdown

Table 2: Laboratory Materials and Chemicals' Costs.

Items and/or Materials (Instruments)	Unit	Quantity	Unit price	Total Price	Remark
A_4 papers for questioning	Packet	3	700	2,100	
Test tubes	Piece	400	10	Contribution	
Glove	Pair	1,000	15	Contribution	
Ice box	Piece	1	450	Borrowing	
BMRT Kits	kit	Full	---	Contribution	
Coliform test kits	”	Full	---	”	
MBRT kits	”	Full	---	”	
Miscellaneous	---	---	---	12,100	
Total (ETB)				12,100	

Table 3: Per-diem and Transports Costs.

Per-diem & Transport	Quantity	Payment/ ETB/day	No. of days	Total	Remark
Aiding personnel	2	200	25	10,000	
Transportation fee	-	200	20	11,000	
Lab. technician	1	100	30	9,000	
Total (ETB)		30,000			

Table 4: Summary of Budgets for the Research.

Costs in Summary	Cost (etb)	Source Statement
Laboratory Materials & Chemicals Costs	12,100	Haramaya University (College of Veterinary Medicine)
Per-diem and Transport Costs	30,000	Self
Grand Total	42,100	

Table 5: (5-10) % Contingency.

Total budget allocated (ETB)	42,100
(5-10) % Contingency (ETB)	3,789 (9% of 42,100)

References

1. Black RE, Cousens S, Johnson HL, Lawn JE, Rudan I, et al. Child Health Epidemiology Reference Group of WHO and UNICEF. Global, regional, and national causes of child mortality in 2008: A systematic analysis. *The lancet*. 2010; 375: 1969-1987.
2. Cosivi O, Meslin FX. Future trends in veterinary public health. *World Veterinary Association Bulletin.* 1999; 16: 2-9.
3. Girma Y. Assessment of Community Knowledge, Attitude and Practice on Milk Born Zoonoses Disease in Debre-Birhan Town, North Shewa, Ethiopia. *J Vet Sci Technol.* 2017; 8: 482.
4. Kumar A, Thapa G, Roy D, Joshi PKK. Adoption of food safety measures on milk production in Nepal: Impact on smallholders' farm-gate prices and profitability. *Food Policy.* 2017; 70: 13–26.
5. El-Leboudy AA, Amer AA, El Aansary M, Sayed HM. Assessment of Microbial Quality of Rural and Urban Raw Milk. *Alexandria Journal for Veterinary Sciences*. 2016; 51.
6. Dhanashekar R, Akkinepalli S, Nellutla A. Milk-borne infections. An analysis of their potential effect on the milk industry. *Germs*. 2012; 2: 101.
7. Omore A, Lore T, Staal S, Kutwa J. Addressing the public health and quality concerns towards marketed milk in Kenya. 2005.
8. Wang X, Rainey JJ, Goryoka GW, Liang Z, Wu S, et al. Using a One Health approach to prioritize zoonotic diseases in China, 2019. *PloS one*. 2021; *16:* e0259706.
9. Duguma B, Janssens GP. Assessment of dairy farmers' hygienic milking practices and awareness of cattle and milk-borne zoonoses in Jimma, Ethiopia. *Assessment*. 2015; 45.
10. World Health Organization. WHO. The control of neglected zoonotic diseases: from advocacy to action: Report of the fourth international meeting held at WHO Headquarters, Geneva, Switzerland. 2015; 19-20.
11. Khadayata V, Aggarwal D. Knowledge, attitude, and practice about hygiene among livestock keepers in peri-urban area of Vadodara district, Gujarat. *Indian Journal of Community Medicine.* 2020; 45: 16-20.
12. Onyango DLA, Guitian J, Musallam I. Brucellosis risk factors and milk hygiene handling practices in pastoral communities in Isiolo county, Kenya. *Veterinary Medicine and Science.* 2021; 7: 1254-1262.
13. Girma S, Zewde G, Tafesse K, Jibat T. Assessment of awareness on food borne zoonosis and its relation with Veterinary Public Health Services in and around Addis Ababa, Ethiopia. *Ethiopian Veterinary Journal,* 2012; 16: 15–22.
14. Sinclair JR. Importance of a One Health approach in advancing global health security and the Sustainable Development Goals. *Revue scientifique et technique (International Office of Epizootics)*. 2019; *38:* 145-154.
15. Angulo FJ, LeJeune JT, Rajala-Schultz PJ. Unpasteurized milk: A continued public health threat. *Clinical Infectious Diseases*. 2009; 48: 93-100.
16. Islam S, Ahmed MS. Knowledge, attitude, and practice toward zoonotic diseases among different professionals at selected coastal areas in Barguna district, Bangladesh. *Journal of Advanced Veterinary and Animal Research*. 2019; *6:* 284.
17. Chisowa DM. Assessment and quantification of levels of microbial contamination in bovine milk from smallholder dairy farmers of Monze district in the Southern Zambia. *World Journal of Advanced Research and Reviews*. 2022; 15: 749-756.
18. Amenu K, Desta H, Alonso S. Guide for training of pastoralists (women) in Borana Zone, Oromia Region, Ethiopia on good milk production, handling and processing practices and prevention of the transmission of milk-borne zoonotic diseases. 2018.
19. Tigabu E, Asrat D, Kassa T, Sinmegn T, Molla B, et al. Assessment of Risk Factors in Milk Contamination with Staphylococcus aureus in Urban and Peri Urban Small Holder Dairy Farming in Central Ethiopia. *Zoonoses and Public Health*. 2015; 62: 637-643.
20. Cerva C, Bremm C, Dos Reis EM, Bezerra AVA, Loiko MR, et al. Food safety in raw milk production: risk factors associated to bacterial DNA contamination. *Tropical Animal Health and Production*. 2014; 46: 877-882.
21. Shunda D, Habtamu T, Endale B. Assessment of bacteriological quality of raw cow milk at different critical points in Mekelle, Ethiopia. *International Journal of Livestock Research*. 2013; 3: 42–48.
22. Aliyo A, Teklemariam Z. Assessment of Milk Contamination, Associated Risk Factors, and Drug Sensitivity Patterns among Isolated Bacteria from Raw Milk of Borena Zone, Ethiopia. *Journal of Tropical Medicine*. 2022.
23. Mahendra P, Mensur S. Major milk borne microbial diseases of camels. *Haryana Veterinarian*. 2015; 54: 93-98.
24. Vicari N, Faccini S, Ricchi M, Garbarino C, Decastelli L, et al. Occurence of Coxiella burnetii in bulk tank milk from northwestern Italy. *The Veterinary Record*. 2013; 1-2.
25. Ning P, Guo M, Guo K, Xu L, Ren M, et al. Identification and effect decomposition of risk factors for Brucella contamination of raw whole milk in China. *PLoS One*. 2013; 8: e68230.
26. Koseki S, Nakamura N, Shiina T. Comparison of Desiccation Tolerance among *Listeria monocytogenes*, *Escherichia coli* O157: H7, *Salmonella enterica*, and *Cronobacter sakazakii* in Powdered Infant Formula. *Journal of Food Protection.* 2015; *78:* 104–110.
27. Davis BI, Siddique A, Mahapatra AK, Park YW. Survivability of *Escherichia coli* in commercial powder goat milk during four months' storage at two different temperatures. *Adv. Dairy Res.* 2018; *6*: 200.
28. Boor KJ, Wiedmann M, Murphy S, Alcaine S. A 100-year review: Microbiology and safety of milk handling. *Journal of Dairy Science*. 2017;*100:* 9933-9951.
29. Paswan R, Park YW. Survivability of Salmonella and Escherichia coli O157: H7 pathogens and food safety concerns on commercial powder milk products. *Dairy*. 2020; 1: 189-201.
30. Abraha A, Bikila T, Alemu S, Muktar Y. Bacillus Cereus isolation and load from raw cow milk sold in Markets of Haramaya District, eastern Ethiopia. *International Journal of Food Contamination*. 2017; 4: 1-6.
31. Mangtani P, Berry I, Beauvais W, Holt HR, Kulashri A, et al. The prevalence and risk factors for human Brucella species infection in a cross-sectional survey of a rural population in Punjab, India. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. 2020; *114:* 255–263.
32. Pang H, McEgan R, Mishra A, Micallef SA, Pradhan AK. Identifying and modeling meteorological risk factors associated with pre-harvest contamination of Listeria species in a mixed produce and dairy farm. *Food Research International*. 2017; 102: 355-363.
33. Karshima NS, Pam VA, Bata SI, Dung PA, Paman ND, et al. Isolation of Salmonella species from milk and locally processed milk products traded for human consumption and associated risk factors in Kanam, Plateau State, Nigeria. *Journal of Animal Pro-*

duction Advances. 2013; 3: 69-74.

34. Tola A, Bekele Y, Kassa T, Grace DR, Beyene F, et al. Butter production, processing and handling practices at smallholders' level in the central highlands and southwest midlands of Ethiopia. *Ethiopian Journal of Applied Science and Technology*. 2020; 11: 1-15.

35. Smith-Howard K. *Pure and modern milk: An environmental history since 1900*. Oxford University Press. 2017.

36. Cardoso CS, Hötzel MJ, Weary DM, Robbins JA, von Keyserlingk MA, et al. Imagining the ideal dairy farm. *Journal of Dairy Science*. 2016; 99: 1663-1671.

37. Fusco V, Chieffi D, Fanelli F, Logrieco AF, Cho GS, Kabisch J, et al. Microbial quality and safety of milk and milk products in the 21st century. *Comprehensive Reviews in Food Science and Food Safety*. 2020; 19: 2013-2049.

38. Duval JE, Bareille N, Fourichon C, Madouasse A, Vaarst M, et al. Perceptions of French private veterinary practitioners on their role in organic dairy farms and opportunities to improve their advisory services for organic dairy farmers. *Preventive Veterinary Medicine*. 2016; 133, 10-21.

39. Odongo NO, Lamuka PO, Matofari JW, Abong GO. Risk factors associated with the post-harvest loss of milk along camel milk value chain in Isiolo County, Kenya. *African Journal of Agricultural Research*. 2016; 11: 674-682.

40. Nato SM, Matofari JW, Bebe BO, Huelsebusch C. Effect of predisposing factors on microbial loads in camel milk along the pastoral dairy value chain in Kenya. Pastoralism. 2018; 8: 16.

41. Nyokabi S, Birner R, Bett B, Isuyi L, Grace D, et al. Informal value chain actors' knowledge and perceptions about zoonotic diseases and biosecurity in Kenya and the importance for food safety and public health. *Tropical Animal Health and Production.* 2018; 50: 509–518.

42. Singh S, Kar S, Mishra A, Pattnaik D. Hygiene practices and awareness regarding Milk borne diseases (MBD) among dairy workers in unorganized urban settings of Bhubaneswar, Odisha, India. *Indian Journal of Community Health*. 2021; *33*.

43. Hodge C, Deneke TT, Endalew MA, Moore HL, Consortium E, et al. Acceptability and feasibility of proposed control and prevention strategies for bovine tuberculosis among Ethiopian dairy farmers and associated professionals. *Preventive Veterinary Medicine*. 2020; 185: 105184.

44. Kelly RF, Hamman SM, Morgan KL, Nkongho EF, Ngwa VN, et al. Knowledge of bovine tuberculosis, cattle husbandry and dairy practices amongst pastoralists and small-scale dairy farmers in Cameroon. *PLoS One*, 2016; *11:* e0146538.

45. Lemma HD, Mengistu A, Kuma T, Kuma B. The potential of milk production and consumption for improving nutrition of smallholder dairy households in Ethiopia. *Milk Science International-Milchwissenschaft*, 2017; *70:* 10-16.

46. Getabalew M, Alemneh T, Zewdie D. The milk processing: Status, challenges and opportunities in Ethiopia. *International Journal of Veterinary Science and Research*. 2020; *6:* 052-057.

47. Buhari HU, Saidu SNA, Mohammed G, Raji MA. Knowledge, attitude and practices of pastoralists on bovine brucellosis in the north senatorial district of Kaduna state, Nigeria. *J. Anim. Health Prod*. 2015; *3*: 28-34.

48. Majalija S, Tumwine G, Kiguli J, Bugeza J, Ssemadaali MA, et al. Pastoral community practices, microbial quality and associated health risks of raw milk in the milk value chain of Nakasongola District, Uganda. *Pastoralism*. 2020; 10: 1-1.

49. Eyasu TS, Tesfu KM, Negatu K, Haile AG, Thomas SM, et al. Knowledge, attitude and practice among small scale dairy farmers on milk-borne zoonotic diseases, North shoa zone, Ethiopia. *J. Food borne Zoonotic Dis.* 2017; 4: 19-28.

50. Franceschi P, Malacarne M, Bortolazzo E, Coloretti F, Formaggioni P, et al. Automatic Milking Systems in the Production of Parmigiano Reggiano Cheese: Effects on the Milk Quality and on Cheese Characteristics. Agriculture. 2022; 12: 104.

51. Augustin JC, Kooh P, Bayeux T, Guillier L, Meyer T, et al. Anses Working Group on Consumer Information on Foodborne Biological Risks. Contribution of foods and poor food-handling practices to the burden of foodborne infectious diseases in France. *Foods*. 2020; 9: 1644.

52. Gandhi MK. 2021; *Key to Health.* Prabhat Prakashan.

53. de Jesus GS, Micheletti AC, Padilha RG, de Paula JDS, Alves FM, et al. Antimicrobial Potential of Essential Oils from *Cerrado* Plants against Multidrug-Resistant Foodborne Microorganisms. *Molecules (Basel, Switzerland)*, 2020; 25: 3296.

54. Djangwani J, Abong' GO, Njue LG, Kaindi DWM. Sero prevalence and risk factors of Brucella presence in farm bulk milk from open and zero grazing cattle production systems in Rwanda. *Veterinary Medicine and Science*, 2021; 7: 1656-1670.

55. Amenu K, Wieland B, Szonyi B, Grace D. Milk handling practices and consumption behavior among Borana pastoralists in southern Ethiopia. *Journal of Health, Population and Nutrition.* 2019; 38: 1-12.

56. Gebremedhin SG, Mequnnent SE, Gichamo AA. Assessment of knowledge, attitudes and practices of people about milk quality and common zoonotic diseases in small holder dairy production chain in selected sites of southern Ethiopia. *Int. J. Adv. Res. Biol. Sci.* 2020; 7: 25-36.

57. Neeta PN, Prashanth N, Shivaswamy MS, Mallapur MD. A study on awareness regarding milk borne diseases in an urban community of Karnataka. *International Journal of Medical Science and Public Health*. 2014; *3:* 1093-1100.

58. Mekonnen GA, Conlan AJ, Berg S, Ayele BT, Alemu A, Guta S, et al. Prevalence of bovine tuberculosis and its associated risk factors in the emerging dairy belts of regional cities in Ethiopia. *Preventive veterinary medicine*. 2019; *168:* 81-89.

59. Rushton J, Bruce M, Bellet C, Torgerson P, Shaw A, et al. Initiation of global burden of animal diseases programme. *The Lancet*. 2018; *392:* 538-540.

60. Sayers R, Sayers G, Mee JF, Good M, Bermingham ML, et al. Implementing biosecurity measures on dairy farms in Ireland. *TheVeterinary Journal.* 2013; 197: 259-267.

61. Office International des Epizooties (OIE). Bovine brucellosis: *Manual of diagnostic tests and vaccines for terrestrial animals OIE*, *Paris*. 2013; 409-435.

62. Abunna F, Tasew N, Ragassa F, Ayana D, Amenu K, et al. Handling Practices, Quality and Safety of Milk along the Dairy Value Chains in Selected Sub Cites of Addis Ababa, Ethiopia. *Biomed J Sci Tech Res*. 2019; 13.

63. Ayele Y, Gutema FD, Edao BM, Girma R, Tufa TB, et al. Assessment of Staphylococcus aureus along milk value chain and its public health importance in Sebeta, central Oromia, Ethiopia. *BMC microbiology*. 2017; 17: 1-7.

64. Gemechu T, Amene T. Dairy cattle milk production, handling, processing, utilization and marketing system in Bench Maji Zone, Southwest Ethiopia. *International Journal of Livestock Production.* 2017; 8: 158-167.

65. Manyi Loh CE, Mamphweli SN, Meyer EL, Makaka G, Simon M, et al. An overview of the control of bacterial pathogens in cattle manure. *International journal of environmental research and public health*. 2016; *13:* 843.

66. Tebug S. Factors associated with milk producer's awareness and practices in relation to zoonoses in northern Malawi. *Veterinary World*. 2013; *6.*

67. Garcia SN, Osburn BI, Cullor JS. A One-health Perspective on Dairy Production and Dairy Food Safety. *One Health.* 2019; *7: 100086.*

68. Kuma T, Deressa B, Alem F, Tigre W. Farmer's awareness and practices on rabies, bovine tuberculosis, taeniasis, hydatidosis and brucellosis in Mana and Limmukosa districts of Jimma zone, south west Ethiopia. *World Applied Science Journal*. 2013; 23: 782–787.

69. Millogo V, Sissao M, Sidibé AG, Ouédraogo GA. Effect of storage time and temperature on raw milk composition of dairy cattle in tropical conditions. *African Journal of Dairy Farming and Milk Production*. 2015; *2*: 104-108.

Annex-1: Participant Information Sheet With Consent Form

Please read this consent letter before you decide to allow us take an information from you by making interview.

The Study Title: "KAPs of the Community About Milk Quality and Associated Factors for Milk Contamination at Selected Districts of Eastern Harerghe Zone, Oroma: A Thesis Proposal"

The purpose of this study: this study has been built on the aim of assessing the level of knowledge, attitudes and practices of the community about milk quality in the study area, to identify associated factors for milk contamination and for provision of awareness on wrong use of milk and its products in order to shape a healthy living status in the community.

The risks likely to occur during the study: in the midst of the interview/survey process, the questions raised might deviate from your margin of interest. If there is a case in which the thought of the investigator doesn't suit you, you can quit the interview…just feel free to participate, it depends on your sole preference.

Potential benefits for participating in this study: this study will be about to assess the levels of knowledge of the community about milk quality and associated factors for milk contamination, in order to set "a quality standard" as a baseline for whenever integrating the milk into everyday routine. There will also be an incentive for the participant for his/her contribution in giving us the information queried.

Contact Address of the Investigator

Name: Dr. Bekiyad Shasho

Phone Number: +251 917 30 1006

E-mail: ssbecky2014@gmail.com

Agreement: I have read the above information and decided to accept it voluntarily.

Participant's name Signature Date

___________________________________ _____________ ____/____/_______

Name of the investigator Signature Date

___________________________________ _____________ ____/____/_______

Annex-2: Knowledge About Milk Quality and the Risk-factors for Milk Contamination

Respondent's profile:

N a m e _ Zone__________________District______________

Kebele____________Village_____________________ Telephone No._____________________

Date ___/___/______

Questioning for Respondent's Knowledge:

1) What is a daily meal for the society of this area? _______ _________________________

2) Do you use a milk for consumption? Yes ☐ No☐

↘If yes, which one is more preferable to consume?

a) Cow's milk b) Camel milk c) Goat milk

Why? ____ ____________________

3) Do you know that contamination could occur to the milk you consume? Yes ☐ No☐

↘If yes, can you list down the major factors causing milk contamination?

____ __________________

____ ___________________↘Are you aware of all the factors you listed down? Yes☐ Not-sure☐ No☐

4) By which group of individuals do you think is the contamination occurred many times?

a) SDFs b) Milk collection centers c) Retailers d) Consumers

5) Who is the most exposed group of individuals to contaminated milk do you think?

a) SDFs b) Milk collection centers c) Retailers d) Consumers

6) Have you ever given anything type training by someone about milk quality? Yes☐ No☐

↘If yes, what notions have you obtained from the train that which you hadn't known before about milk quality and factors affecting it? Please, don't mind telling me a list:

____ ______________________________

7) Do you know the diseases caused due to consumption of contaminated milk? Yes☐ No☐

↘If yes, what are they?

____ _____________________.

8) Is there any control measure you take whenever diseases occurred in your dairy industry?

Yes☐ No☐

↘If yes, I need the list:

____ ____________________

____ ____________________

9) Can you tell me the most common factors giving rise to milk contamination?

____ __________________

____ __________________

Annex-3: Attitude on Milk Quality and Risk-factors for Milk Contamination

1) Let's say: There exists a lack of stove, and even no wood for boiling a water around your

milk collection center. Are you willing to boil the water by any means? Yes □ No□↘If yes, how can you apply that? _____ _____.

2) When the cost of metallic container becomes far greater than the plastic one, which do you

prefer to buy? The metallic container □ The plastic one□

3) Do you treat all the milking cows simultaneously or you leave some for home consumption

whenever needed? Yes □ No□

4) How often do you contact veterinary professionals to keep your cow from animal diseases because of their impact on milk production and quality? Yes □ No□

5) Do you feel the loss that occurred when the withdrawal period is too long to wait? Yes □

No□

6) What do you do if an animal health practitioner instructed you to discard the milk from a cow with recent antibiotic treatment history? Discard □ Don't discard□↘If you accepted the instruction, why?

_____ _____ and ↘If not, why? _____ _____ _____.

Annex-4: Practices of the Community related to dairy environment

1) Do you milk using milker's machine or with hands? Hand milking □ Machine milking□

2) What do you use to wash the udder, your hands, and milk utensils before milking?

Normal water (not heated)□ Warm water□

3) Do you use the same water and towel to clean all cows' udders? Yes □ No□

4) By what means do you wash milking containers and hand towels?

Without detergents□ With detergents□

5) Do you use a sieve to remove a dirt out from your milk? Yes □ No□

6) Do you use teat dipping for your cows? Yes □ No□

7) Is there any government-subsidized service focused on vaccinating cows against zoonotic

diseases? Yes □ No□

8) Do you boil a milk for drink in order to prevent milk-borne sicknesses? Yes □ No□

9) Do you strictly comply with the mandatory withdrawal period for drug residues, such as discarding milk from sick or treated cows after admitting your milking cows to the clinic?

Yes □ No□