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ASSESSMENT OF PERSISTENCE INFORMAL BACKYARD SLAUGHTERING PRACTICES OF DOMESTIC RUMINANTS FOR HOME CONSUMPTION, LOCAL BUTCHER SHOPS AND MINI CAFETERIAS IN EAST SHEWA, OROMIA REGION, ETHIOPIA

MSc THESIS

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DEPARTMENT OF VETERINARY EPIDEMIOLOGYAND PUBLIC HEALTH

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ASSESSMENT OF PERSISTENCE INFORMAL BACKYARD SLAUGHTERING PRACTICES OF DOMESTIC RUMINANTS FOR HOME CONSUMPTION, LOCAL BUTCHER SHOPS AND MINI CAFETERIAS IN EAST SHEWA, OROMIA REGION, ETHIOPIA

A Thesis Submitted to the College of Veterinary Medicine and Agriculture of Addis Ababa University in partial fulfillment of the requirements for the degree of Master of Veterinary Science in Veterinary Public Health

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June, 2025

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As MSc research advisor, I hereby certify that i have read and evaluated this thesis prepared under my guidance by Teshome Demissie, entitled: "*Assessment of persistence informal backyard slaughtering practices of domestic ruminants for home consumption, local butcher shops and mini cafeterias in east Shewa, Oromia Region, Ethiopia.";* I recommend that it can be accepted as fulfilling the thesis requirement for the Degree of Master of Veterinary Science in Veterinary Public Health.

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DECLARATION

This is to declare that this thesis entitled: *Assessment of persistence informal backyard slaughtering practices of domestic ruminants for home consumption, local butcher shops and mini cafeterias in east Shewa, Oromia Region, Ethiopia.";* submitted in partial fulfillment of the requirements for the award of Master in Veterinary Public Health (MVPH) to the Graduate Program of the College of Veterinary Medicine and Agriculture, Addis Ababa University by Teshome Demissie (ID No. GSR/7295/16) is authentic work carried out by him under our guidance. The matter embodied in this thesis work has not been submitted earlier for award of any degree or diploma to the best of our knowledge

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STATEMENT OF AUTHOR

First, I declare that this thesis is my genuine work and that all sources of materials used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for the award of Master of Veterinary Science degree at Addis Ababa University, College of Veterinary Medicine and Agriculture is deposited at the University/College library to be made available to borrowers under rules of the Library. I solemnly declare that thesis this thesis not submitted to any other institution anywhere for the award of any academic degree, diploma or certificate. Brief quotations from this thesis are allowable without special permission provided that accurate acknowledgement of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or part may be granted by the head of department or the Dean of the College when in his or her judgment the proposed use of the material is in the interests of scholarship. In all other instances, however permission must be obtained from the author.

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BIOGRAPHICAL SKETCH

The author was born on July 23, 1978, in Addis Ababa. I attended my Elementary and Secondary school education at Kera Alo and Dejach Wonderade Secondary School respectively. Then I joined Addis Ababa University, School of Veterinary Laboratory Technology and graduate with Bachelor of Veterinary Science degree in Veterinary Medicine in July 2013.

TABLE OF CONTENTS

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LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXES

LIST OF ABBREVIATIONS

ASF	Animal Source Foods
BYS	Backyard Slaughtering System
DALYs	Disability Adjusted Life Years
DFD	Dark, Firm and Dry
ESS	Ethiopian Statistics Services
FAO	Food and Agricultural Organization
GDP	Gross Domestic Products
LMICs	Low and Middle Income Countries
NGDP	National Gross Domestic Products
OIE	Office International des Epizooties
PSE	Pale, Soft and Exudates
QGIS	Quantum Geographic Information System
SPSS	Statistical Package for Social Science
WHO	World Health Organization

ABSTRACT

Ethiopia, with one of the largest livestock populations in Africa, but faces persistent challenges in ensuring food safety and public health due to widespread backyard slaughtering practices. From the previous studies, informal slaughtering practice for home consumption, local butcher shops, and mini cafeterias remains prevalent in Bishoftu, Adama, and Mojo towns. Therefore, the study aimed to investigate the persistence of hidden backyard slaughtering practices in selected study areas. A cross-sectional study design was employed, involving semi-structured questionnaires administered to 288 participants, including households, butcher shop, and mini cafeteria owners across Bishoftu, Adama, and Mojo. Data on slaughtering practices, persistency, motivators, waste disposal, and regulatory compliance were collected and analyzed. The result showed that 92.36% (266) respondents were participated in backyard slaughtering practices. Among across the three towns of eastern Shewa zone, the highest practice was recorded in Bishoftu 41.73%, followed by Adama 34.59% and Mojo 23.18%. The socio demographic determinants of the respondents for practice were recorded. Among these, households 46.64% and those age with category of 35-45 years 49.63% were highly participated and significantly associated with practices of the hidden backyard slaughtering with P-value (P=0.000). Motivating forces for practice was also investigated across the three towns. Accordingly, income, convenience and cultural events are major reasons for practice at high level with 38.01% in Adama, Bishoftu 63.16%, and Mojo 26.45% respectively with non-significant difference with p-value (P=0.356). The result showed that sheep and goat have associations with the practice due to size their size and being suitable for hidden practice of backyard slaughtering in Bishoftu, Adama, and Mojo respectively with very significant difference value (P=0.027). These findings showed unsafe handling of diseased organs, improper waste disposal, systemic gaps in infrastructure, community awareness and these would increase the risk of food borne and zoonotic disease. Therefore, to safeguard the public health and strengthening regulatory enforcement, inspection mechanisms, and community education programs are very important in Ethiopia.

Keywords*: Backyard slaughtering, Food safety, Zoonotic diseases, Public health*

1. INTRODUCTION

Agricultural development in Ethiopia is considered an important issue dealt with first by the government for stimulating an overall increase in economic activity, suppressing poverty, and achieving food security. Ethiopia ranks first by livestock population in Africa and tenth in the world. Numerically the country had about 66.26 million cattle, 38 million sheep, 45.71 million goats, 41.35 million poultry, 2.14 million horses, 10 million donkeys, 0.36 million mules, 7 million camels and 5.98 million hive bee colonies Ethiopian Statistics Services (ESS, 2021/22). Its contribution to agricultural gross domestic products (GDP) and national gross domestic products was about 49% and 25.3%, respectively, (Shapiro *et al*., 2017). Meat is a necessary component of the human diet because of its unique chemical composition, nutritional value, and complete protein content with favorable proportion of amino acids. Increase in the consumption of meat and its products arise from reasons including high protein contents, vitamins, minerals, lipids, and savory sensation (Danuta and Anna, 2024).

Food safety is an important issue that impacts all of the world's people. Many countries throughout the world are increasingly interdependent on the availability of their food supply and on its safety (Gizaw, 2019).The primary motivations for food consumption in the past were physiological and caloric requirements, but the prevalence of food fraud and other forms of global food malpractice has raised public awareness of food safety issues (Mphaga *et al*., 2024). Since meat production and retail systems provide serious hazards for the spread of zoonotic and food borne diseases, food safety continues to be a fundamental aspect of worldwide public health. Every year, more than 600 million people worldwide contract food borne diseases, with meat exposure accounting for 30% of deaths (Teferi, 2022); (Hasan *et al*., 2024). Food borne illness outbreaks, which can have catastrophic health and financial repercussions, are avoided by following food safety standards, which guarantee that food products are safe for consumption. Informal slaughtering methods and poor hygiene in meat retail settings increase these risks in low- and middle-income countries (Agu *et al*., 2021; Beal *et al*., 2023). Unauthorized killing of livestock outside of institutions under regulation and poorly run butcher shops are known

as backyard slaughtering, and they are important hubs for the spread of pathogens like *Salmonella, E. coli, and Campylobacter*. These practices persist despite international food safety standards, underscoring systemic gaps in infrastructure, education, and governance (Govender, 2023).

In Sub-Saharan Africa and South Asia, where meat demand is rising alongside urbanization, 40–60% of meat is sourced from backyard slaughtering. Ethiopia, for example, reports that 80% of livestock slaughtering occurs informally, often on bare ground with shared, unsanitized tools. Concurrently, butcher shops in these regions frequently lack refrigeration, hand washing stations, and waste disposal systems, creating environments where microbial contamination thrives (Kebede and Terefe, 2021). This dual burden of unregulated production and retail practices perpetuates cycles of disease, disproportionately affecting vulnerable populations. Food borne pathogens linked to meat contamination account for $110 billion in annual productivity losses and healthcare costs in low- and middle-income countries. Children under five are particularly susceptible, with diarrheal diseases causing 9% of deaths in this demographic. Beyond health impacts, poor hygiene practices erode consumer trust, limit market access for small-scale producers, and hinder progress toward human good health and well-being (Gizaw, 2019) Addressing these challenges requires a nuanced understanding of the socioeconomic, cultural, and structural drivers sustaining risky practices(Beal *et al*., 2023).

Backyard slaughtering is often rooted in economic necessity and cultural preferences. In rural Ethiopia, 68% of households slaughter livestock at home due to limited access to abattoirs, high fees at licensed facilities, and cultural rituals requiring immediate meat consumption(Teferi, 2022). Similarly, in Ghana, 30% of meat sellers engage in backyard practices to avoid transport costs and meet demand for "freshly slaughtered" meat(Mphaga *et al*., 2024). These practices are further normalized by weak regulatory enforcement; in Hawassa, Ethiopia, only 12% of slaughters had permits, citing a lack of inspections and penalties. Due to fact that socioeconomic and cultural drivers of backyard slaughtering, the emerging and existing infectious diseases at the animal-human ecosystem interface have been of growing concern because of their epidemic and endemic potential as well as their adverse socioeconomic consequences (Agu *et al*., 2021). A study in Addis Ababa found

that 70% of slaughterhouses lacked chilling facilities, running water, or veterinary inspectors. Butcher shops face parallel challenges: Regulatory frameworks often prioritize large-scale exporters over informal sectors, leaving backyard and small-scale operators without guidance or incentives to improve standards. The study is based on hypothesis that the presence of hidden backyard slaughtering practices for home consumption, local butcher shops, and mini cafeterias in Bishoftu, Adama and Mojo towns in eastern Shewa zone. Even though more studies have been done on meat handling facilities of the meat product and producers with unknown reason, the practice of backyard slaughtering is still persistent hidden in the study areas (Gutema *et al*., 2021). Therefore, this study was conducted to assess the persistence of hidden backyard slaughtering practices of domestic ruminants for home consumption, local butcher shops, and mini cafeterias in Bishoftu, Adama and Mojo in eastern Shewa zone. The practices of the participants such as home consumption, retail shops and mini cafeterias were interviewed and assessed for the reasons why they persistently practicing backyards slaughter in town and aimed to tackle to the backyard slaughtering and forward valuable finding for policy makers for strictly implementing to protect the communities from public health important zoonotic disease and meat contamination. Based on this, the objectives of this study were:

General objective

- To assesses persistence informal backyard slaughtering practices of domestic ruminants for home consumption, local butcher shops and mini cafeterias in east Shewa, Oromia Region, Ethiopia.

Specific objectives

- To identify the reason why the backyard slaughtering practices is still persistently practiced and its implication for policy makers
- To evaluate the implementation of the guidelines of regulatory body for meat producers for home consumption, local butcher shops, and mini cafeterias in the study areas.

2. LITERATURE REVIEW

2.1. Common Practice of Backyard Slaughtering

In developing countries, slaughter tends to occur across numerous smaller abattoirs, which contrasts with industrialized countries that have a more integrated and centralized approach to slaughter. With the exception of the first category, the levels of hygiene, worker safety, animal welfare, and environmental pollution applied in these facilities can be highly variable. This is due to facility design, but also to regulation, and operator knowledge and skill levels, which can also be highly variable and frequently are insufficient for addressing key risks associated with slaughter (Thomas *et al*., 2017). Although controversy over backyard slaughter has arisen locally in recent years, the practice of slaughtering animals in cities is not new. Since the earliest civilizations, ‘‘farm’’ animals have been integral to the urban metabolism, providing transportation and waste management as well as food for humans. Tens of thousands of horses, cows, pigs, and poultry lived and died in cities including New York, London, and Perth well into the mid-19th and 20th centuries (McNeur, 2011). Productive animals such as poultry, goats, cows, rabbits, honeybees, and guinea pigs still produce food and income for human residents in many world cities (Hovorka, 2012).

2.2. Challenges Related with Backyard Slaughtering

2.2.1. Food borne Health Hazards

Sickness and death associated with food borne diseases is significant at a global level, particularly in developing countries (Acosta, 2018). Globally, food borne diseases are responsible for approximately 600 million illnesses and 420,000 deaths per year, equating to 33 million disability adjusted life years (DALYs) and 54% are due to diarrheal-related diseases alone. Due to diagnostic and reporting limitations in many developing countries, these figures are underestimates (WHO, 2020d). Beyond food borne diseases, zoonotic transmission associated with direct contact with animals and their immediate surroundings poses a significant health threat to smallholder households in developing countries (FAO,

OIE and WHO, 2019). Similarly, some elements of smallholder production and slaughter practices have the capacity to place animal populations at greater risk of trans-boundary diseases, as exemplified by recent avian influenza and African swine fever incursions (Otte*et al*., 2007; FAO, 2007; Thompson, 2019).

2.2.2. Religious, Ethical and Legal Considerations of Backyard Slaughtering

There are peaks in the consumption of Animal source foods (ASF) during Ethiopian holidays (Christmas, Timket, Easter, Ethiopian New Year, and the Meskel). These consumption peaks associated with major religious events are preceded by troughs, which are linked with fasting periods that come before these festivals. No such seasonality is seen for the "Muslim Hall" during the Muslim major fasting season of Ramadan, and there is no evidence of higher activity at the end of Ramadan or for the Eid festivities (Bachewe, *et al*., 2017). Despite its apparent advantages, on-farm slaughter has numerous practical and ethical implications due to its consequences for animal welfare, food safety, environment and sustainability (Hultgren *et al*., 2018).

2.2.3. Why People Prefer Backyard Slaughtering

The number of slaughterhouses in the country is very limited. So slaughters are carried out in the backyard, which results in poor-quality raw hide and skins in the domestic market. Backyard slaughtering is a common practice in many rural areas of Ethiopia, where it is primarily used for household consumption and local markets. However, this practice can pose significant food safety and public health risks if not carried out hygienically. Some people believe that backyard slaughtering is more humane than factory farming, as it allows animals to live a more natural life and be killed in a familiar environment. Backyard slaughtering can be more economical than buying meat from the store, especially for people who raise their own animals and seen as a way to maintain traditional farming practices and be more self-sufficient. This article examines the status of backyard slaughtering in Ethiopia, its implications for food safety, and potential interventions to improve practices. Backyard slaughtering is widely practiced in Ethiopia; particularly in rural and peri-urban areas a study found that 80% of households in the Sidama Zone of

Southern Ethiopia slaughtered animals in their backyards. The most commonly slaughtered animals are cattle, sheep and goats (Ahmed *et al.*, 2017).

2.2.4. Backyard Slaughtering and Animal Welfare

The food-producing animals, prior to slaughter, are subject to poor welfare conditions. Such meat defects pose detrimental effects to the quality indices, which impedes profitability and sustainability of any meat production enterprise. Therefore, cruel practices like dragging, dropping, throwing or hoisting during the slaughter process should be prohibited, as it is not part of the humane handling practices. Notably, poor animal welfare together with stress factors can increase disease susceptibility of slaughter-cattle, especially the pregnant ones. Such disease conditions may be zoonotic, and hence transmissible to humans via the food chain (Ugochinyer, 2021).

2.3. Good Hygienic Practice

Good Hygiene Practices aim to implement the essential principles of food hygiene applicable throughout the food chain (including primary production through to the final consumer), to achieve the goal of ensuring that food is safe and suitable for human consumption (Banjul, 2017). A well-planned, well-executed, and controlled cleaning and sanitation program for rooms, machines, and equipment are very important to achieve a hygienic standard. Cleaning and sanitation alone, however, will not assure a hygienic standard in production where process hygiene, as well as personal hygiene is important factors. Well-planned working routines may assure a better cleaning standard during processing. For example, cleaning during processing, removal of solid waste and sufficient space in processing rooms are factors that facilitate cleaning. Adequate personal hygiene assures the overall cleaning process. Deterioration of the cleaning standard may occur if microorganisms are transmitted to well-cleaned surfaces from unwashed hands before processing starts. Neither process hygiene, personal hygiene nor cleaning and sanitation alone can assure a sufficient hygienic standard but together, if carried out optimally, they will guarantee a complete hygienic standard (Malik *et al., 2018*).

2.3.1. Equipment Hygiene

The main principle for equipment such as tables, hooks, and machines, etc. should be that it is easy to dismantle or remove to facilitate cleaning and that it should be made of non-corrosive materials. Essential for the hygienic handling of carcasses and meat is equipment for hoisting the carcasses when slaughtered. Hoists, when possible, should be preferred to working tables. Procedures assuring a periodical or continuous cleaning of hoists are recommended. Cleaning and disinfection will often be complicated or impossible because of the complex construction of machines and when choosing and buying machines, hygienic production and possibilities for cleaning and disinfection must be considered. Knives, wooden boards, and weighing scales from retail shops are sources of bacterial contamination, particularly *Staphylococcus aurous* and *Shigella* species (Ali *et al.*, 2010).

2.3.2. Meat Processing and Sanitary Facilities

Water points, hoses, sterilizers for hand tools, etc., and cleaning equipment must be provided in sufficient numbers. Sanitary facilities must also include a sufficient number of toilets/latrines and arrangements for hand-washing or even possibilities for bathing (showering). These facilities must be kept clean and well maintained. To avoid back-flow from toilets in case of flooding the toilet outlets must be separated from common wastewater outlets. Areas/rooms for resting and eating may be required assuring that food for the personnel and the carcasses/meat cannot be mixed. The elements of hygiene will differ depending on the type of processing. There will be significant differences between the hygiene standard required in a plant manufacturing meat product, which is sold as sliced, prepackaged meat products, and the hygienic standard required in a place where the animals are slaughtered. The main hygiene principle in processing is that clean and unclean operations are efficiently separated. This requires a well-planned plant layout, where the purpose of any structure should be to protect the products against unintended contamination (G/Egziabher, 2010).

2.3.3. Environmental and economic impacts

Food borne diseases are a risk for smallholder farmers and other people directly consuming locally slaughtered livestock. However, there is a bigger picture, in terms of food security and safety, as well as economic loss for the region's population (APEC, 2020). Livestock are fed opportunistically, often on waste products on unowned land, typically with low levels of waste output. Similarly, where animal-derived foods are consumed locally, they are associated with lower greenhouse gas emissions per capita through reductions in commodity transport, storage, as compared to developed countries. Significant pollution issues are associated with slaughter operations, particularly in unregulated environments such as low-middle income countries (Caro *et al.*, 2014; World Bank, 2009).

2.3.4. Waste Management

Waste products produced during animal slaughter are significant with respect to food hygiene, zoonotic disease transmission, and environmental contamination (World Bank, 2009; Grace, 2015).The livestock sector and meat processing industries are the highest contributors to environmental degradation and their by-products amount to nearly 150 million tonnes per year (Huang,2013; Bustillo-Lecompt *et al*.,2017).The increasing demand for animal protein has led to the global livestock revolution, with significant implications for the environment and our health (Toldrá *et al.*,2016; Meeker,2009). The annual slaughter capacity in Ethiopia reaches 4.6 million tonnes of beef, 1.5 million tonnes of poultry and 0.105 tonnes of fish and its by-product percentages vary from 40– 60%, 10–45% and 25–70%, respectively (Saeed *et al*.,2011; Meeker,2009).

The quality and shelf-life of meat and meat products can be affected as result of faulty practices committed during pre-slaughter processes, transportation of animals to the abattoir, and handling of the carcasses (Chulayo and Muchenje, 2013). Due to improper handling conditions, meat quality defects like carcass damage (bruising, hemorrhages, skin blemishes, blood splash, and broken bones) are common occurrences found on carcasses. This poor carcass quality is reflected in poorer meat quality (Adzitey *et al*., 2011; Warriss, 2000). The poor facility, lack of workers' skills, and less sanitation of carcass transport are the main causes of the poor quality of meat (Ismail, 2006). The Office International Des

Epizooties(OIE) legislation under the Welfare of Animals (slaughter or killing) regulation, states that all animals suggest for slaughtering are required to undergo stunning, unless and otherwise religious slaughter. This organization also stated that if stunning is not carried out properly, this too can also contribute the carcass or meat quality causing conditions 6 such as PSE (pale, soft and exudates) or DFD (dark, firm and dry). The defect happens as non-stunned chicken are involved in high muscular activity while struggling to death which accelerates glycolysis, causing the accumulation of lactic acid in the muscle tissue and thus lowering pH and increasing toughness of the meat (Wong and Ashton, 2015). Traditionally household producer slaughter their animals at backyard system with improper flaying and by unskilled person. This has a significant negative effect on the quality of the hides or skins produced from poor flaying and preservation effect. Hides and skins are meat by-products and there is still little consideration given to the care required for the handling, collection and processing of the hides and skins in to high quality leather (Adugna, 2004).

Cutting, deboning and evisceration: If cutting and/or deboning is carried out care must be taken to minimize contamination of the meat. The carcasses must be cut, preferably hanging or on surfaces (tables, cutting planks, chopping blocks), which are regularly cleaned. A sufficient number of sterilizers must be available for the cleaning of hand tools and knives. The meat must be removed and/or stored in clean containers, which solely are used for meat. Disposable containers will assure hygienic transport and storage but will be costly. During the evisceration, process care should be taken to minimize contamination. Special care must be taken to avoid damaging the intestines. Edible organs must be handled in a hygienic way stored or removed in separate containers. Waste must be removed rapidly from the floor in the evisceration room/area (McEvoy *et al*., 2000).

A sufficient number of sterilizers for hand tools, knives, etc. must also be available in the evisceration area. This is due to evisceration constituting a critical slaughtering stage where microbial contamination of carcasses is most likely to occur. The gastrointestinal tract of cattle is naturally colonized by microorganisms that may be transferred to carcasses during the evisceration process. Additionally, bacterial pathogens such as Salmonella and E. coli are also frequently isolated in the feces of cattle destined to slaughter highlighting their probable presence in the digestive tract of the same animals (Rhoades *et al*., 2009). During

the evisceration process, carcass contamination occurs by direct contact between the carcass and the gastro-intestinal contents or indirectly through soiled slaughtering pieces of equipment and staff. Contaminations may also occur during the removal of the pharynx, tonsil, and tongue as they are reported to be heavily contaminated by various microbial contaminants (Niyonzima, *et al*., 2015).

Hand washing and working clothes: Careful and frequent hand-washing will do much to reduce contamination. Therefore hand-washing facilities must be sufficient if the water supply is adequate. There should be two sites where the staff can wash their hands - the restroom and the working area where sufficient hand washing facilities must be placed close to the working places. If the hand-washing facilities are situated in particular areas away from working places, there is a great risk that will not be used. It must be impressed on the staff that hand-washing must be done: before work starts, after using the toilets, after touching dirty objects and materials, after smoking and eating. It must be impressed on the staff that hands will be contaminated if used for scratching the skin or the hair, correcting clothes, and picking the nose. Bacteria may be transmitted to the hands by these acts and thereafter transmitted to meat (food) which is handled by hand. Special guidelines concerning hand-washing must be followed.

The management of slaughterhouse/slaughter facilities or the authorities may require the use of special bacteriostatic soap or dipping of the hands after washing in a germicidal rinse etc. Use of a nail brush is recommended because bacteria often hide along and under the nails (G/Egziabher, 2010). The clothing of backyard slaughtering workers must be clean. The purpose is not to protect the worker against contamination but to protect the meat/food against contamination. Working routines should be planned in a way that the worker works either in the clean area or in the unclean area. The staff may eventually be allowed to go from clean to unclean work but never in the opposite direction, except when they have changed working clothes and washed hands. Working clothes should be comfortable and easy to wash. Everyone in the food chain has a responsibility to ensure that meat is healthful. Abattoir workers, butchers, meat producers, suppliers, handlers, and the general public all require extensive education and training in food-borne disease prevention in order to rectify the mistakes made from farm to table (Ebuete *et al*., 2020). It is crucial to

wear an apron or gown when handling meat in order to shield the meat and the person handling it from food-borne viruses (Sulleyman *et al*., 2018).

Gloves and hair covering: If the use of gloves is indicated they must be kept in the same good hygienic conditions as hands, otherwise, it is better to avoid their use. Gloves may be of rubber or plastic and they are used to protect the meat against contamination. They may also be used to protect the hands against knife cuts and will then be made of steel. Great care should be taken to keep a certain hygienic standard of these gloves. In countries where the frequent change of gloves is economically not feasible like in Ethiopia, frequent hand washing is an effective measure to prevent cross contamination of meat. Human hair and beards are normally heavily contaminated with bacteria and to prevent contamination of food a hair or beard covering in the process area is a necessary part of the working clothes. Many different types of hair coverings are seen in the food industry. It is important that the hair is completely covered and that the covering is clean. Disposable or washable hair and beard coverings are recommended (Gutema *et al*., 2021).

Health: Good health is important for workers in the meat industry. Ill persons will often be carriers of more microorganisms (pathogenic microorganisms) than is usually the case. These microorganisms may then be transmitted to the meat/food with the risk of causing the disease to the consumers. The illness must always be reported to the manager and/or the meat inspector of the slaughterhouse who will decide if the worker can stay or has to leave (G/Egziabher, 2010).

3.3. Motivating Factors for Practices of Hidden Backyard Slaughtering

3.1.1. Economic Factors

Backyard slaughtering eliminates the need to pay for professional services, transportation, and regulatory fees associated with abattoirs or licensed facilities. Small-scale farmers and rural households often resort to this practice to reduce expenses and has gained attention among small-scale farmers and rural households as a viable method for reducing costs. One of the primary advantages of this practice is the avoidance of fees associated with commercial processing facilities, which include inspection fees, transportation costs, and

processing expenses. Given the economic constraints that many small-scale farmers face, this alternative provides a means to enhance profitability and food security (FAO, 2023).

Backyard slaughtering can be more economical than buying meat from the store, especially for people who raise their own animals and seen as a way to maintain traditional farming practices and be more self-sufficient. This article examines the status of backyard slaughtering in Ethiopia, its implications for food safety, and potential interventions to improve practices. Backyard slaughtering is widely practiced in Ethiopia, particularly in rural and peri-urban areas. A study found that 80% of households in the Sidama Zone of Southern Ethiopia slaughtered animals in their backyards.

The most commonly slaughtered animals are cattle, sheep, and goats (Ahmed *et al*., 2017). Backyard slaughtering can be significantly cheaper than purchasing meat from stores or butchers. The cost savings can be especially significant for larger animals such as cattle and hogs .Commonly, a group of 10 to 20 people buy a live animal, slaughter and divide the meat among them. Kircha is a form of people's organization and sharing meat among themselves butchering live animal and sharing the meat in group. Kircha is considered by Ethiopians as their social capital. The style is also common in some of Ethiopia towns' people by which the elders especially enjoy being involved in the activity. On holidays, neighbors join together into kircha to buy a large ox and equally divide it then draw lots to decide which pile they get. It is cheaper than going to the butcher (Janet *et al*., 2013).

3.1.2. Livelihoods

Many rural households raise animals primarily for personal consumption, integrating backyard slaughtering into their food security strategies.Families and communities can source meat at significantly reduced costs compared to purchasing from markets.In low-income regions, and backyard slaughtering provides a critical income source. Backyard slaughtering has emerged as a significant income source for households in low-income regions, particularly in Sub-Saharan Africa. A 2022 study published in World Development explores the crucial role of this practice in alleviating poverty within these communities. As many households face considerable economic challenges, engaging in backyard poultry production and slaughtering not only provides food security but also

opens avenues for generating vital income. Many rural households engage in backyard slaughtering to meet their own food needs, particularly in areas facing economic challenges such as unemployment and inflation (González-Félix *et al*., 2021).

3.1.3. Infrastructure Limitations

The number of slaughterhouses in the country is very limited. So slaughters are carried out in the backyard, which results in poor-quality raw hide and skins in the domestic market. Backyard slaughtering is a common practice in many rural areas of Ethiopia, where it is primarily used for household consumption and local markets. Some regions lack sufficient licensed slaughter facilities to meet demand, pushing communities toward informal options. During festive seasons or large gatherings, formal slaughtering facilities may be overbooked, prompting communities to handle the process themselves. However, this practice can pose significant food safety and public health risks if not carried out hygienically. Some people believe that backyard slaughtering is more humane than factory farming, as it allows animals to live a more natural life and be killed in a familiar environment (Ahmed *et al*., 2019). The number of slaughterhouses in pastoral areas is very limited. Thus, the majority of cattle, sheep and goat slaughter are carried out in the backyard, resulting in poor quality raw hides and skins (Kagunyu *et al*., 2011).

3.1.4. Transportation Challenges

Abattoirs may be far from rural communities, making transportation of animals and meat logistically challenging and expensive for low-income households, slaughtering animals at home reduces dependency on external markets. High costs and logistical barriers to transporting livestock to distant facilities Transportation plays a critical role in the livestock industry, particularly in enhancing food security and economic stability in various regions. However, high costs and logistical barriers significantly hinder the transportation of livestock to distant facilities, as noted by Otte *et al*. (2021).

3.1. 5. Cultural and Religious Practices

Certain religions and cultures have specific slaughtering rituals that are easier to observe in a backyard setting. Shared slaughter events during festivals or ceremonies foster community cohesion and uphold traditions. Families often believe backyard slaughtered

meat is fresher and of better quality. The study exemplifies how religiously driven requirements facilitate this practice, reinforcing communal bonds and individual faith there are peaks in the consumption of animal source food (ASF) during Ethiopian holidays (Christmas, Timket, Easter, Ethiopian New Year, and the Meskel).

These consumption peaks associated with major religious events are preceded by troughs, which are linked with fasting periods that come before these festivals. No such seasonality is seen for the "Muslim Hall" during the Muslim major fasting season of Ramadan, and there is no evidence of higher activity at the end of Ramadan or for the Eid festivities (Bachewe, *et al*., 2017). Despite its apparent advantages, on-farm slaughter has numerous practical and ethical implications due to its consequences for animal welfare, food safety, environment and sustainability (Hultgren *et al*., 2018). The festival is characterized by the sacrifice of animals, which is performed as an act of obedience to religious tenets and is vital for communal bonding, enhancing cultural identity, and preserving traditions (Akhtar, 2023).

3.1.6. Regulatory and Legal Context

Backyard slaughtering ensures transparency and adherence to personal or cultural standards. In countries like Nigeria, tax enforcement of meat safety laws allows backyard slaughtering to thrive (Ojo *et al*., 2023) One of the key regulations governing backyard slaughtering of cattle in Ethiopia is the Proclamation No. 980/2016 on Animal Health. This proclamation outlines the responsibilities of livestock owners in ensuring the health and welfare of their animals, including proper slaughtering practices. It also mandates that all slaughtering facilities, including backyard slaughterhouses, must be registered and comply with hygiene and sanitation standards to prevent the spread of diseases. Complex compliance processes push smallholders toward informal methods (World Bank, 2022).

3. MATERIALS AND METHODS

3.1 Description of the Study Area

This study was conducted from November 2024 to June 2025 in three selected districts/town of the eastern Shewa Zone (Bishoftu, Mojo and Adama) in the Eastern Shewa of Oromia Region. Adama is a town located 99 kilometers to the southeast of Addis Ababa. The town is placed at a latitude and longitude of 8.54oN 39.27oE, at a height of 1,712 meters above sea level. The settlement is on the road that connects Addis Ababa with Dire Dawa-Djibouti. Bishoftu is a large town in the east Shewa zone of the Oromia regional state. It far 45 kilometers to the south-east of Addis Ababa, the capital city of the country, at 9°N latitude and 40°E longitude. It is at a height of 1, 850 meters above sea level. The average annual temperature is 20.2°C, with 1, 800mm of rainfall on average (Abebe, 2017). A substantial number of privately owned intensive and extensive dairy, poultry, and swine farms are also present. This highly populated town is the principal supply of livestock, poultry, and swine meat for Addis Ababa stores, as well as related things like milk, eggs, and other dairy products. Bishoftu is noted for its natural attractions, including lakes, which draw tourists and are frequently visited by national and international visitors.

Mojo town is located 70 kilometers from Addis Ababa and 25 kilometers from Adama town. Mojo town is located between 1730 and 1890 meters above sea level, with an average annual temperature of 16-17 ° C, and an average annual rainfall of 896 mm. It is located at a latitude of 08° 37' North and a longitude of 39° 07' East. The zone is bordered on the west by Addis Ababa on the southwest by West Shewa, on the north by the Amhara Region, and on the southeast by East Shewa. Based on the Central Statistical Agency of Ethiopia projection in 2017, this zone has a total population of 1,870,687 of which 933,273 are males and 937,414 are females, with an area of 10,322.48 square kilometers. A total of 314,089 households were counted in this zone, which results in an average of 4.56 persons to household and 303,609 housing units. The main economic activity of the zone is agriculture; the zone is gifted with livestock. Under the study area the number of licensed municipal abattoirs for Bishoftu town two, Mojo one and Adama one. Types of animals

slaughtered in each town municipal abattoirs were only cattle and number of butcher houses in Adama town 180, Bishoftu town 250, and Mojo 59.

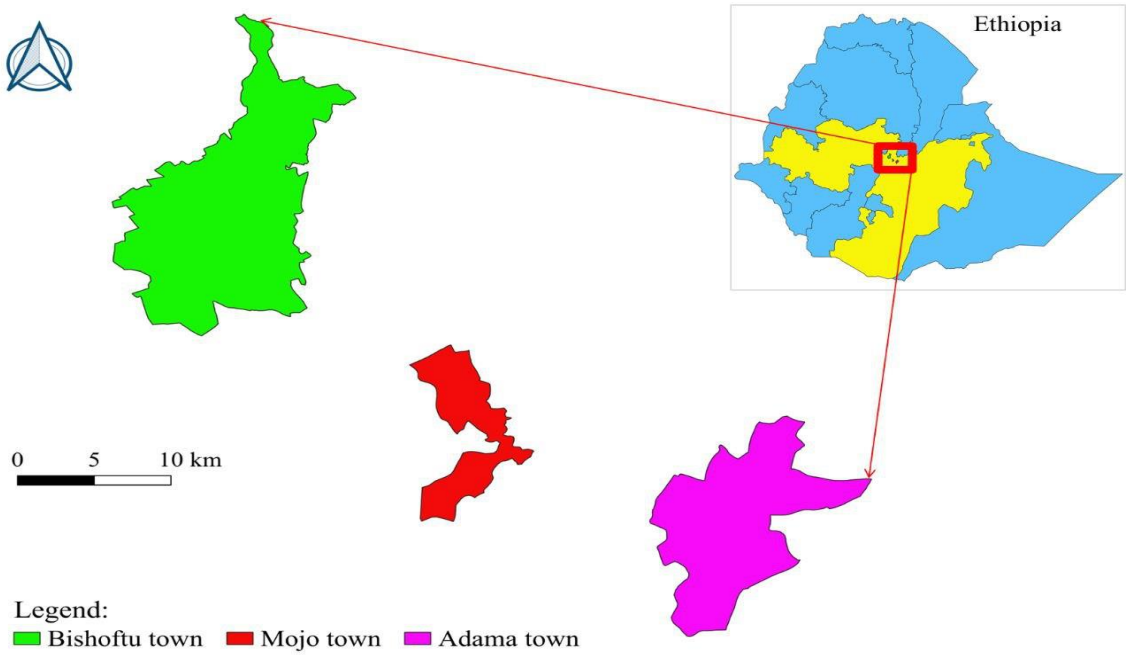

Figure 1: Map of the study area generated by quantum geographic information system (QGIS)

3.2 Study Design and Population

A cross-sectional study was conducted from November 2024 to June 2025, using semi-structured questionnaires and simple random sampling techniques for selection of the sub cities to assess persistence of informal backyard slaughtering practices of cattle, sheep and goats for home consumption, local butcher shops, and mini cafeterias along with an observational checklist to evaluate their conditions and contributions as risk factors for transmission of public health important diseases and zoonosis. Backyard slaughtering sites of users for home consumption, butcher shops and cafeteria owners in the study area was randomly selected. The town has numerous backyard slaughtering locations, and the butcher shops sourcing meat from these sites were included in the study. The observation

of the backyard slaughtering process in this study time captured to assess their practices for documentation (Annex 2).

The questionnaires were cover three main areas: 1) general characteristics of individuals working in backyard slaughtering areas for home consumption, butcher shops and cafeteria owners, 2) driving reason and motivation for practices and risk factors for persistence of the backyard slaughtering and 3) Implementation and use of guidelines at selected butcher shops and cafeterias owner. The individuals as resident, working at butcher shops, and cafeteria owners in the selected study sites has participated in interviews. Data collection has implemented using face-to-face interviews and personal observations using pre-tested structured questionnaires and checklists to assess the reasons of presence of persistent hidden backyard slaughtering practices of domestic animals for home consumption, butcher shops and cafeteria owners as indicated in (Annex 1). Participants have informed of the study's purpose, and data has collected only after obtaining their consent by keeping their privacy and confidentiality. In addition to interviews, personal observation has conducted during slaughter activities from the backyard butcheries and butcher shops of the selected sub cities in the towns.

3.3 Sample Size Determination

The sample size for this study was calculated using the single population proportion formula, which is commonly applied in prevalence studies (Mohammed et al., 2013). The calculation considered a 95% confidence level (Z = 1.96), a 5% margin of error, and an anticipated prevalence rate of 80% for informal backyard slaughtering practices in Ethiopia, based on previous findings (Asseffa, 2022) in Sidama town reported 75% of backyard slaughtering practice were accepted as expected prevalence. This yielded an initial sample size of 288 participants. According to the formula described by (Cochran, 1977).

To accommodate a potential non-response rate of 10%, the adjusted sample size was increased to 316. However, due to logistical constraints during data collection, interviews were ultimately conducted with 288 respondents. Alternatively, assuming a conservative

expected prevalence of 50%, a 95% confidence level, and a 5% margin of error, the sample size could have been determined based on the estimated population size of the Eastern Shewa Zone, following the method described by Mohammed et al. (2013).

$$. n = \frac{Z^2 \times P \times (1-P)}{d^2}$$

Where: n = required sample size

Z = Z-score corresponding to the desired confidence level (e.g., 1.96 for 95% confidence)

P = expected prevalence (proportion) of the attribute in the population (can be from previous studies or pilot data)

d = margin of error (precision), often set at 0.05 (5%)

For the purpose of balanced representation, the final sample was evenly distributed across the three selected towns Bishoftu, Adama, and Mojo taking into consideration the number of butcher shops, mini-cafeterias, and individuals suspected to be involved in unregulated backyard slaughtering activities.

3.4 Data Collection Tools and Techniques

Semi-structured questionnaires were prepared in English and translated to Amharic language for both study sites to collect information used for gathering driving causes for backyard slaughtering. Besides to these, knowledge, attitude and practice of the users or practitioners were included. In due to this, interview was conducted through using questioner based on basic information of respondents such as socio demographic characteristics of the respondents and the main reasons enabling us for using backyard slaughtering practices. For this data collection, Adama, Bishoftu and Mojo towns were selected and then sub-cities and clusters grouped in each city were identified. Therefore, any information related with reason of persistent use of hidden backyard slaughtering such as presence of backyard in the town, service placement, reason for practices, accountability for regulatory guidelines, and presence of awareness on tackling backyard slaughtering use of animals for home consumption, local butcher shops, and mini cafeterias in the community in the town, were recorded.

Then, the questionnaire addresses about respondent's knowledge, attitudes, and practices towards abattoir and backyard slaughtering. The knowledge level of respondents was assessed about backyard slaughtering, zoonosis, health problems, animal origin, food borne diseases, abattoir uses and legality of meat when purchasing from butcher's shop. The questionnaires were also translated into local language of "Amharic" and pre-tested for clarity and cultural acceptability in the sub-city. During pre-testing, additional information was gathered and some of the questionnaires were modified. The questioner survey was particularly aimed to investigate the main drivers encouraging use of backyard slaughtering practice in hidden way in the town.

3.5 Ethical Considerations

Prior to interviewing the respondents, the first and foremost are greeting the individuals and asking their willingness/ voluntary to respond the interview by introducing the aim of the study. Then, these were conducted by respecting their cultures, religions, traditions, beliefs and perspectives.

3.6 Data Management and Analysis

The collected data were entered in to Microsoft excel spreadsheet and then the data were transported to statistical software for analysis using SPSS version 26. Descriptive statistics and analytical methods were applied depending on the nature of data sets. Chi-Square testes were used to calculate significant differences among proportions of variables and associations between dependent and independent variables. In all calculation, 95% CI were computed and the 95% confidence level was used and results were considered significant at $p < 0.05$.

3.7 Scope and Limitations of this Study

Meat handlers, the backyard butcheries and butcher shops of the selected towns, three towns agricultural offices, meat inspectors and from the other stake holders who have direct contact with meat and meat handling surfaces with one-year experience were considered as study population. Those meat handlers who are not well communicated due to any disability or illness and seriously ill workers were excluded from the study.

3.8 Significance of this Study

The output of this research used as input for researchers and academicians of the field they can use the findings of this study as reference materials. Besides, it will be used as a source of information to ensure the safety of meat for human consumption as well as to safeguard the health of the consumers by increasing knowledge and awareness of microbial contamination. Furthermore, the output used as a corner stone for further studies undertaken in this particular area. Generally, the result of this study contributes to strengthen the development of food safety in Ethiopia.

4. RESULT

4.1. Socio-demographic Characteristics of Practices of Hidden Backyard Slaughtering

All consenting individuals engaged on formal or informal animal slaughtering for the purpose of meat consumption, selling and business ideas in the study area were recruited. Out of 288 individuals interviewed, 92.36% (266/288) respondents were participated in backyard animal slaughtering as illustrated in (Table 1). In analysis of the data, the presence, motivating forces, and public health implications of the practice of the respondents were investigated. The result showed that 92.36% (266/288) respondents were participated in backyard slaughtering practices. Among across the three towns of eastern Shewa zone, the highest practice was recorded in Bishoftu (41.73%), followed by Adama (34.59%) and Mojo (23.18%).

The socio demographic determinants of the respondents for practice were recorded. Among these, households (46.64%). However, P-value of (0.283) indicated that no significant difference between three study areas. The variation may be due to non-proportional sample size. The other socio-demographic determinants were also assessed in terms of age, gender, educational level and occupation in the engagement of the respondents by hidden backyard slaughtering practices. Among these, (39.49%) of the respondents were primary, (35.76%) secondary, tertiary (12.78%) and (11.97%) none educated with non-significant difference with P-value of (0.886). The P-value indicates that educational status of respondents were not found be to significant in practices. However, the educational status of the respondents, those with primary education have highly practiced on hidden backyard slaughtering as indicated in graph illustrated in (Figure 2).

In terms of occupations, among 266 participants in backyard slaughtering (28.90%) of the respondents were engaged on slaughtering work being butcher, (24.46%) of the respondents were engaged on minicafterias, and (46.64%) were residents who engaged on slaughtering practices informally. The occupation of the respondents has showed the significant difference with chi-square value of 21.334a and (P value =0.000) on practice of hidden slaughtering in this study findings as indicated in (Table 1). In age categories, 43.98% of the participants were in between 24-34 age category, 49.63% between 35- 45

years in age category; 6.39% of the respondents were with greater than or equal 46 years old. The P-value (P= 0.000) indicates that a significant difference to persist the hidden practices of backyard slaughters among the age groups. In terms of gender, high number of the respondents were male respondents with chi-square value of (96.62%).

Table 1: Socio demographic characteristics of respondents

Description		Percentage of respondents (Yes) for BYS	Chi-square (X^2)	P-Value
Town	Adama	34.59%		
	Bishoftu	41.73%	4.522a	0.283
	Mojo	23.68%		
Occupation	Butcher	28.90%		
	Cafeteria owner	24.46%	23.334a	0.000
	Resident	46.64%		
Education	Primary	39.49%		
level	Secondary	35.76%	0.634a	0.886
	Tertiary	12.78%		
	None educated	11.97%		
Age	24-34 years	43.98%	17.854a	0.000
	35-45 years	49.63%		
	>46 years old	6.39%		
Gender	Female	3.38%	0.082a	0.554
	Male	96.62%		

However, the p-value of 0.554 indicates that gender is not determinant factor of persistent backyard slaughtering practices. Accordingly, this study was comprehensively addressed the persistence, patterns, and determinants of hidden backyard slaughtering practices in the study area as indicated in (Table.1) and (Figures 1-3).

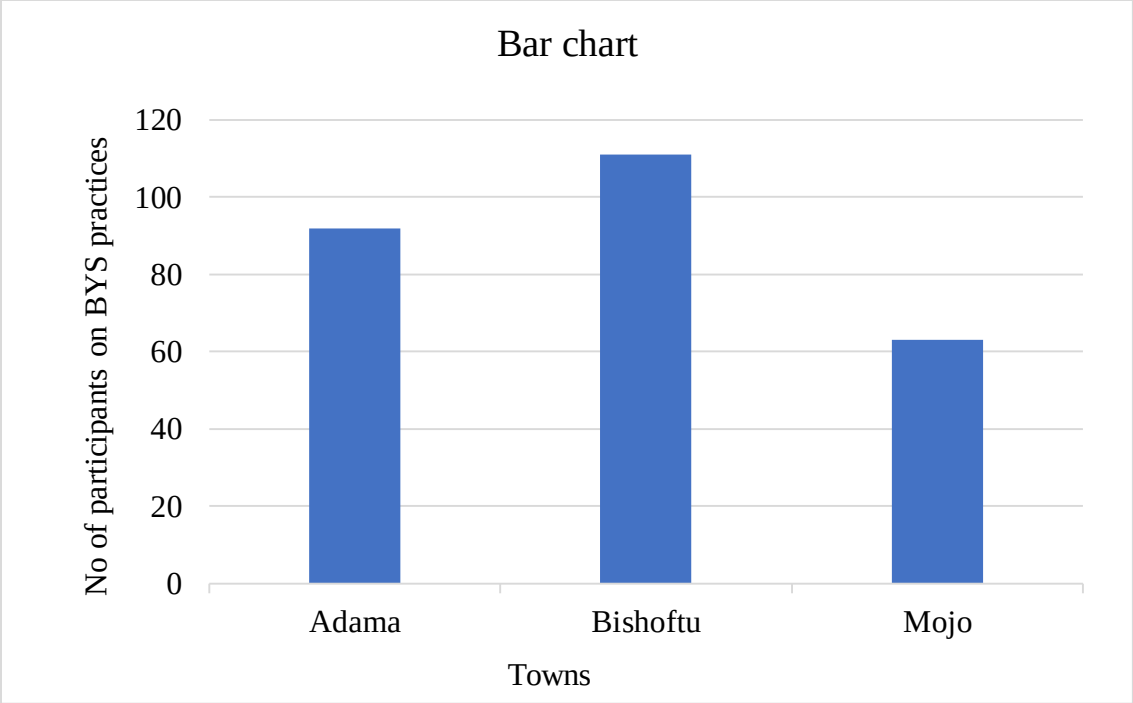

Figure 2: Prevalence of persistent hidden BYS practices in the three study areas.

The finding illustrated in (figure 2) most likely showed the distribution of back yard slaughtering practices by occupation. For example, residents were highly practiced in practices of hidden backyard slaughtering of animals and such findings strengthen the link between economic activity and the persistence of the practices. This finding would support the hypothesis that, despite formal meat handling improvements, still the economic or occupational incentives are found to be driving factors for the continuation of hidden slaughtering animals in backyard system.

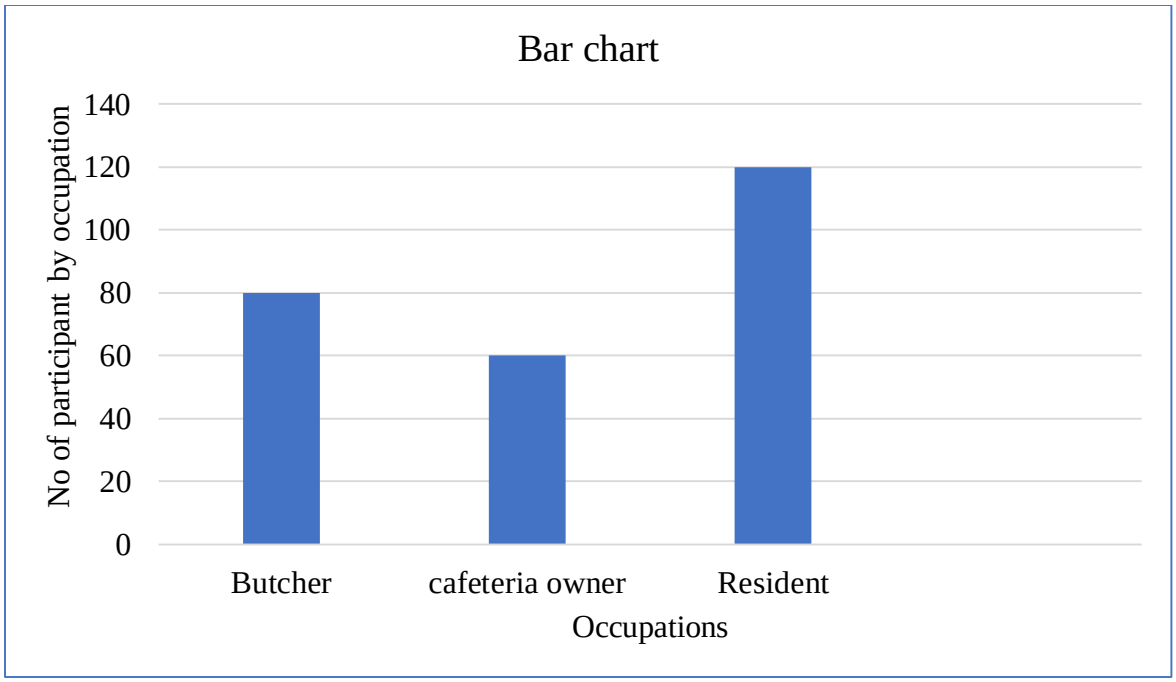

Figure 3: Prevalence of persistent hidden BYS practices in occupation level of participants

Therefore, despite increased attention to formal meat handling facilities, infrastructures, former regulatory framework and rules, hidden backyard slaughtering (BYS) practice is still persistent for home consumption, local butcher shops, and mini cafeterias in Bishoftu, Adama, and Mojo towns. However, the persistence of these hidden practices is unexplained and remains a public health and regulatory concern. Accordingly, specific Sociodemographic groups such as age and occupations are more likely to be involved in significant values and however, highlighted that the persistence is not due to a lack of studies on formal meat handling, but rather to factors embedded within local communities and economic structures.

4.2. Motivating Forces for Practice of Hidden Backyard Slaughtering

4.2.1. Purpose for Slaughtering of Animals at Backyard System

The result illustrated in (Table2) has showed the reasons why the participants of this study were engaged in hidden backyard slaughtering. Whereas, the majority of backyard slaughtering is highly done for the purpose of convenience, cultural events and income

generations. Accordingly, the majority of peoples engaged in backyard slaughtering for the reason of convenience (63.16%) in Bishoftu, followed by Adama (31.57%), and Mojo (5.30%) respectively. When investigated the reason why people use this practice approach; majority of respondents were identified of due to cultural events a t high level (42.15%) in Bishoftu, followed by Adama (31.40%), and in Mojo (26.45%) respectively. The other reason is due to economic or income generation which is very high also in Bishoftu as indicated in table Table 2. The significant value (P=0.356) indicates reasons for slaughter is non-significant difference across the towns indicated in (Table 2).Therefore, this study finding implied that many households continue backyard slaughtering due to deep rooted cultural or traditional norms and economic incentives. In contradiction to formal and modern slaughtering practices, these practices are often passed down generations and are seen as part of family or community rituals.

Besides to these, backyard slaughtering practice of the respondent is not a casual or sporadic activity but is deeply embedded in cultural practices and economic needs. Its persistence is thus tied to strong social and financial motivations, explaining why formal facility improvements have not eradicated the practice. Based on the finding for reasons for backyard slaughtering activities, this study has supported that certain religious or cultural festivals may require home-based slaughter as part of the observance, making backyard slaughtering a preferred or necessary option.

4.2.2. The Type of Animal Slaughtered as a Preference

The type of animal slaughtered was assessed as motivating forces due to size of animals, preference of users and availability of the animals in continuing the practices. Accordingly, this study finding indicted that cattle (51.39%) and goats (45.41%) are the most commonly preferred animals in Bishoftu, followed by Adama, and Mojo respectively. Whereas, sheep are the most commonly slaughtered animals with prevalence of (52.17%) in Adama followed by Bishoftu (34.78%) with (P- value=0.027) and showed significant difference across the towns.

The significant variation suggests that local preferences or livestock availability influence the persistence of hidden backyard slaughtering in which it aligns with the research

hypothesis by demonstrating that the practice is adaptable and persists in various forms, depending on local context. This finding showed that despite the improvements and studies focusing on formal meat handling facilities are more than enough, due to size, preference, and availability of the animals the backyard slaughtering practice is still hidden persistent across the towns to supply for home consumption, local butcher shops, and mini cafeterias.

4.2.3. The Supply of Participants

The findings showed that backyard slaughterers supply meat mostly for house consumption Bishoftu (41.29%), Adama(34.84%), Mojo (23.87%) and in the same way, they supply for local butchers in (45%) in Bishoftu town, and local food sellers (40.85% respectively. Whereas backyard slaughterers supply meat for home with a smaller portion supplied to butcher shops or vendors (18%) in Bishoftu, (15%) in Adama and (07%) in Mojo. When we compare the supply chain of the meat across the towns, the butchers shop and home consumptions are highly common as motivating factors for practicing backyards both in Adama, and Bishoftu followed by local consumers with high number in Mojo as indicated in (Table 2).

Table 2: Motivating Forces for Practice of Hidden Backyard Slaughtering

Description	Category of the description	Percentage of respondent for motivation in backyard slaughtering			Chi.squ (x2)	P-value
		Adama	Bishoftu	Mojo		
Reasons for practice	For convenience	31.57%	63.16%	5.30%	6.632a	0.356
	For cultural events	31.40%	42.15%	26.45%		
	For income	38.01%	39.68%	22.22%		
Type of animals	Cattle	31.94%	51.39%	16.67%		
	Goat	30.61%	45.41%	23.98%	14.281a	0.027
	Sheep	52.17%	34.78%	13.04%		
Supply to whom	Butcher shops/vendors	37.50%	45%	17.5%	3.758a	0.709
	House consumption	34.84%	41.29%	23.89%		
	Local consumer/food	32.39%	40.85%	26.76%		

The local consumers or food sellers were supply meat from backyard slaughters with (40.85%) for Bishoftu, (32.39%) for Adama, (26.76%) for Mojo. There is no significant difference among towns for this category (p = 0.709). However, according to this study finding, due to the fact that backyard slaughtered meat enters both private and public food channels (homes, eateries, vendors) it actualizes the assumption that the practice is not only for personal use but also supports local businesses, making it harder to eliminate the transmission of meat borne diseases

The only statistically significant difference among towns is in the type of animals slaughtered (P = 0.027). This suggests that while the overall practice of BYS is persistent across towns, the details (such as animal type) are shaped by local factors. The purposes for slaughter and the supply channels do not differ significantly between towns, indicating uniformity in the underlying drivers and destinations of back yard slaughtering system (BYS) meat. In general, this part of analysis implies that efforts to address persistence of hidden backyard slaughtering practices must consider deep rooted cultural and economic factors, not just improvements in formal meat handling facilities. Tailored interventions that address local preferences and economic realities are necessary to reduce the prevalence of hidden BYS.

4.3. Public Health Implications of Practicing Hidden Backyard Slaughtering Practices

Table 3 shows that how the respondents aware and manage the diseased organ, waste disposal, the knowledge, and presence of accountability for regulatory bodies and frameworks and indicated that how they are playing role in transmission of zoonotic diseases. Accordingly, the study finding showed that fed to dogs is common practice with the percentage of (80.91%), while burying and thrown into river also reported by (12.17%, and 6.92%) respectively, with very significant difference with P value (P=0.000). Then visual inspection of the environment was conducted and confirmed the occurrence of diseased organ of the animals lost in the surrounding areas as indicated in (Figure 4). This indicated that there are poor handling practices of diseased organ which can be influential

factors for transmission of the zoonotic diseases from animal to human and vice versa in practice of the backyard slaughtering.

The waste disposal method of the participants was also assessed; whereas burial is the common waste disposal method reported by the participants (44.30%), while open dumping is, and burning and were reported by (30.45%), and (25.25%)respectively. The P-value indicates method of waste disposal were highly significant different among the groups as indicated in (Table 3). The awareness of the respondents was assessed and the 75.44 % of the respondents has no aware about its impact or disadvantage of backyard slaughtering practices but still engaged on practices due to different reasons indicated in Table 3. While 24.56% of the respondents had aware about the disadvantage and impact of backyard persistence either on environment of zoonotic diseases transmission with non-significant value (P=0.203). The commonest food safety measures particularly, the accountability of the respondents were assessed and (77.44%) of respondents were practiced without the accountability to regulatory body's rules, and guidelines. This indicates that poor enforcement for formal meat handling practices and linked with poor awareness of the communities.

Table 3: Public health implications of practicing hidden backyard slaughtering

Category of the description		No of respondent in practice of BYS.	Chi-squ (x2)	P-value
Handling of Diseased Organ	Buried	12.17%		
	Fed to dogs	80.91%	147.681a	0.000
	Thrown in river	6.92%		
Waste disposal method	Burial	44.30%		
	Burning	25.25%	147.681	0.000
	Open dumping	30.45%		
Presence of awareness	No	75.44 %		
	Yes	24.56%	3.189a	0.203

Presence of accountability	No	77.44%	0.771a	0.299
	Yes	22.56%		

While number of respondents with (22.56%) were accountable to formal meat handling processes in informal ways linked with cultural and economic rituals in the towns. The significant value of (P=0.299) illustrated in (Table 3) indicated that this parameter is not significantly different by practices of hidden backyard slaughtering in the towns

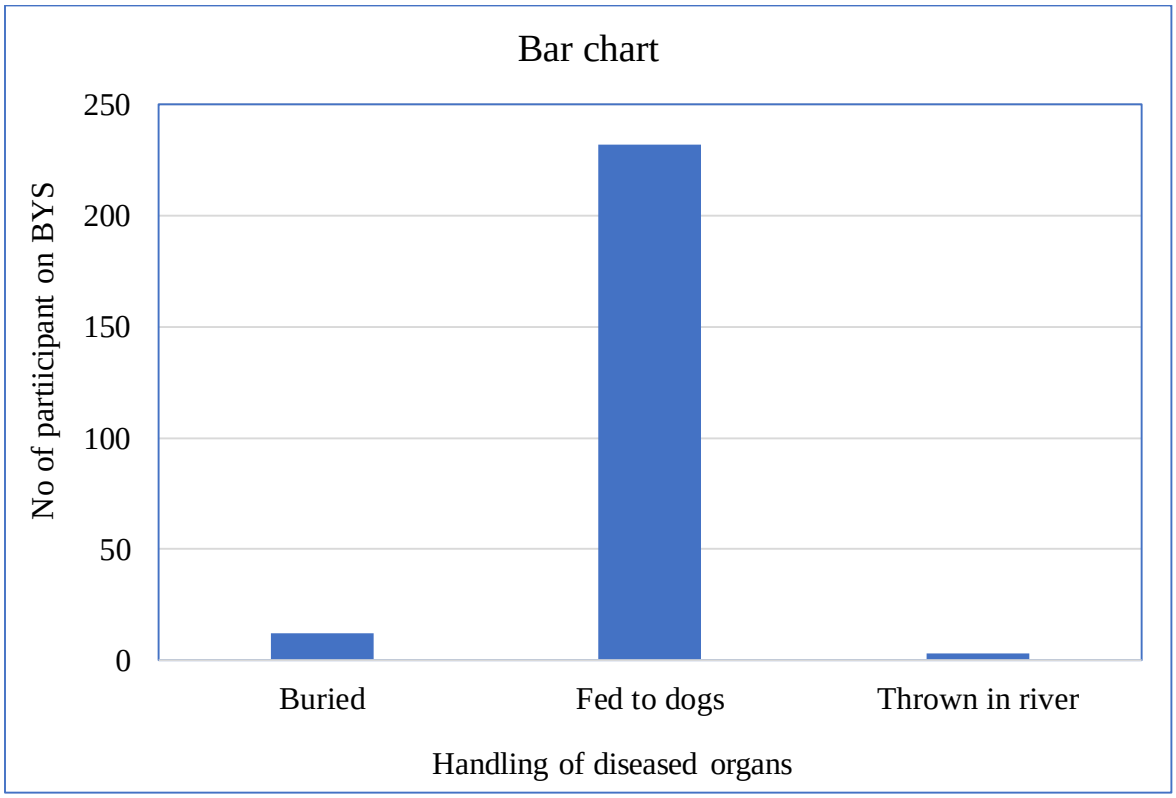

Figure 4: Handling of diseased organs in hidden back yard slaughtering

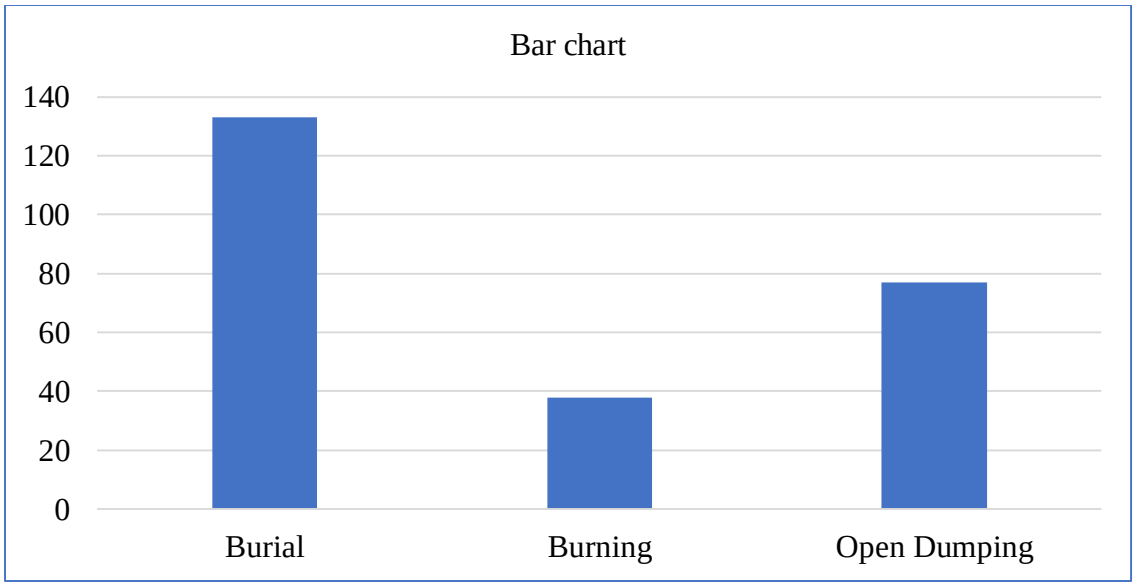

Figure 5: Waste disposal method

Figure 6: Backyard slaughtering practice in Bishoftu town. (When flying in poultry house)

Figure 7: Environmental waste handling on open place

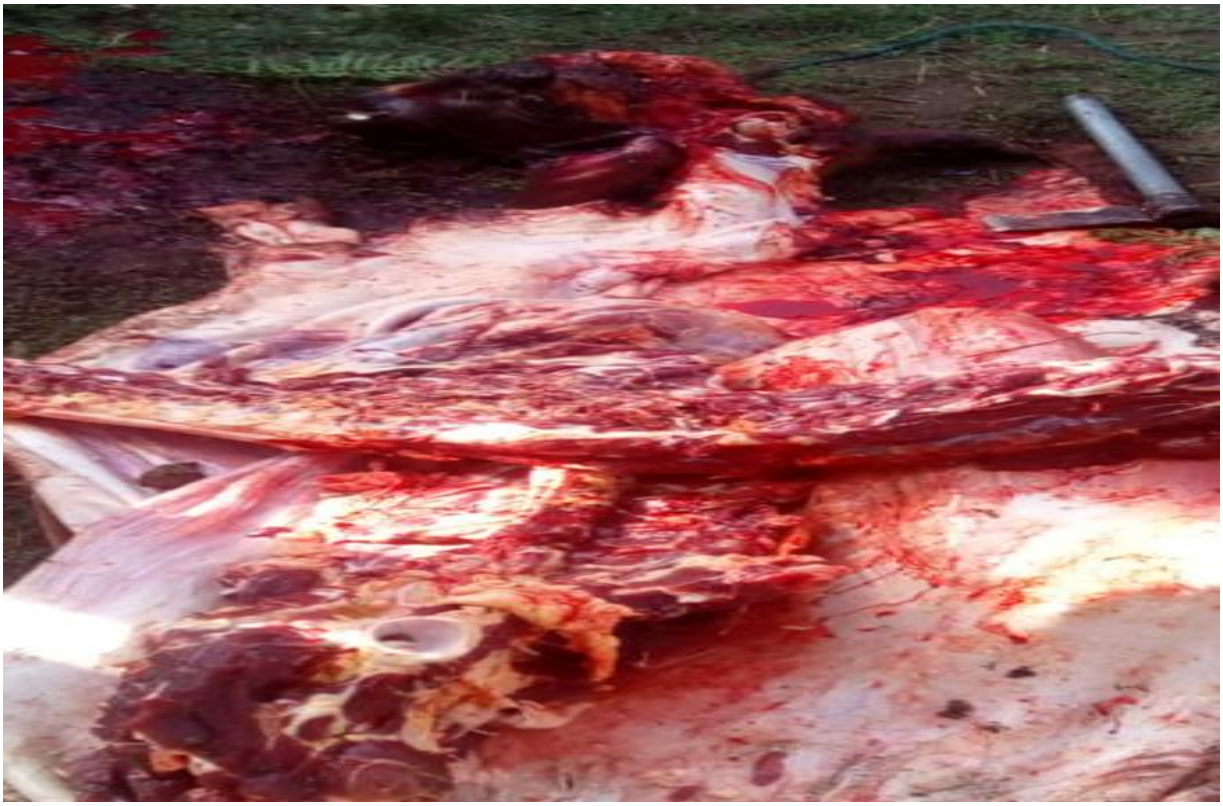

Figure 8: Handling of the materials and meat when slaughtering which is very traditional

Figure 9: When people use for cultural rituals and events (Kircha)

Figure 10: The backyard slaughtering practices of cattle in Adama town in compound (Hidden)

5. DISCUSSION

Backyard slaughtering, defined as the informal and often unregulated slaughter of domestic animals outside formal abattoir systems, is a phenomenon observed globally, especially in low- and middle-income countries (LMICs) including Ethiopia. This persistence is driven by a convergence of economic, cultural, and infrastructural factors. In Latin America and Southeast Asia, studies have shown that informal slaughtering is prevalent in peri-urban and rural communities where regulatory oversight is weak, and formal abattoirs are either inaccessible or unaffordable (Govender, 2023; Beal *et al*., 2023).

In these regions, informal slaughtering is often normalized by tradition and necessity, with little awareness of the public health risks involved. Ethiopia stands out with an estimated 80% of livestock slaughtering occurring informally (ESS, 2021/22). The study findings in Bishoftu, Adama, and Mojo towns are consistent with national trends, where backyard slaughtering is deeply entrenched. Ahmed *et al*. (2017) found that in Sidama Zone, 80% of households practiced backyard slaughtering, primarily for household consumption and local markets. This is corroborated by Teferi (2022), who reported that 68% of rural Ethiopian household's slaughter animals at home due to limited access to abattoirs and high fees at licensed facilities. While the prevalence of backyard slaughtering is a shared characteristic across many low middle income countries (LMICs), the Ethiopian context is unique in the scale and normalization of the practice. In contrast, higher-income countries have largely eliminated informal slaughtering through strict regulation, centralized abattoir systems, and consumer preference for certified meat products (Thomas *et al*., 2017).

However, even in developed countries, historical accounts (McNeur, 2011; Hovorka, 2012) remind us that backyard slaughtering was once common, highlighting the role of modernization and regulation in its decline. This study identified economic necessity, limited abattoir access, and high formal slaughter fees as primary drivers for backyard slaughtering. This aligns with findings from Ghana, where 30% of meat sellers use backyard slaughtering to avoid transport costs and meet demand for fresh meat (Mphaga *et al*., 2024). Similarly, in Ethiopia, formal slaughterhouses are often overcrowded, underfunded, or geographically inaccessible (Teferi, 2022). Cultural and religious practices

also play a significant role. In Ethiopia, major holidays such as Christmas, Timket, Easter, and Meskel are associated with peaks in meat consumption and backyard slaughtering (Bachewe *et al*., 2017). These practices are seen as integral to community identity and religious observance, making regulatory interventions challenging.

Weak regulatory enforcement and lack of inspection further perpetuate backyard slaughtering. In Hawassa, only 12% of slaughters had permits, and inspections were rare (Agu *et al*., 2021). Regulatory frameworks in Ethiopia and other LMICs often prioritize large-scale exporters, leaving small-scale and informal operators without guidance or incentives to improve standards. Globally, the drivers of backyard slaughtering are remarkably consistent: economic constraints, cultural traditions, and regulatory weaknesses. However, the Ethiopian case is distinguished by the scale of informal slaughtering and the deep integration of these practices into daily life and religious observance. In contrast, countries with robust regulatory frameworks and consumer awareness have largely curtailed backyard slaughtering. According to this finding of this study the significant food safety risks is highly associated with backyard slaughtering in terms of handling waste and diseased organ. Informal slaughtering and poor hygiene in meat retail settings are major contributors to foodborne disease outbreaks in LMICs (Agu *et al*., 2021; Beal *et al*., 2023). Globally, more than 600 million people contract foodborne diseases annually, with meat exposure accounting for 30% of deaths (Teferi, 2022; Hasan *et al*., 2024).

In Ethiopia, microbial analyses have detected unsafe levels of E. coli (10^5–10^7 CFU/g) and Staphylococcus (10^3–10^5 CFU/g) in butcher shops, exceeding WHO safety thresholds by up to 1,000-fold within negligence of backyard slaughtering activities. Children under five are particularly vulnerable; with diarrheal diseases causing 9% of deaths in this group. This study finding indicates that there is a limited awareness among slaughterers regarding food borne disease risks. Only 24% of Ethiopian slaughterers understood these risks, compared to 75% who recognized zoonoses (Gazu, 2023). This knowledge gap is a common theme in related studies and is a barrier to improving practices. Globally, consumer and producer education has been a key strategy in reducing food borne disease risks. In countries where awareness campaigns have been implemented, there has been a measurable decline in

informal slaughtering and an improvement in meat safety (Safe and Food, 2022). Beyond the health impacts of such practices, poor hygiene practices erode consumer trust, limit market access for small-scale producers, and hinder progress toward public health goals. Environmental pollution from improper waste disposal is another significant concern, as highlighted by Hultgren *et al.* (2018)

6. CONCLUSIONS AND RECOMMENDATIONS

In conclusion, according to this study, hidden backyard slaughtering of domestic ruminants for home consumption, local butcher shops, and mini cafeterias is highly persistent in Bishoftu, Adama, and Mojo towns, reflecting the needed improvements of regulatory enforcements in control of zoonotic diseases sourced from informal food channels. The drivers of this persistence are multifaceted, including economic necessity, cultural and religious practices, and weak regulatory enforcement and, limited access to formal abattoirs. These practices pose significant public health risks, particularly through the transmission of food borne and zoonotic diseases, with children and other vulnerable populations disproportionately affected. Hygiene and infrastructure deficits, combined with limited awareness and education, exacerbate the risks associated with backyard slaughtering. Animal welfare and environmental concerns are often overlooked, further compounding the negative impacts of informal slaughtering. Addressing these challenges requires coordinated action at the policy, community, and individual levels, with a focus on education, infrastructure, and regulatory reform. Based on the above conclusions, the following recommendations will be forwarded within context of Ethiopian situations and study areas.

- ✓ Strengthen enforcement for slaughter regulations, including regular inspections and meaningful penalties for non-compliance in both urban and peri-urban areas.
- ✓ Incorporate regulatory frameworks with clear guidelines and enforcement mechanisms considering the negative impact of hidden backyard slaughtering.
- ✓ Launch targeted awareness campaigns to educate communities, backyard slaughterers, and small retailers about the health risks associated with informal slaughter and the benefits of improved hygiene practices.
- ✓ Provide training programs for meat handlers, focusing on good hygiene practices, safe equipment use, and the importance of personal hygiene.
- ✓ Engage community and religious leaders to promote the adoption of modern in abattoirs slaughtering practices, particularly during periods of high demand linked to cultural or religious events.

- ✓ Conduct further research to better understand the socioeconomic and cultural factors influencing backyard slaughtering, informing more effective and locally appropriate interventions.
- ✓ Promote environmentally sustainable waste disposal practices in both formal and informal slaughter settings.
- ✓ Raise awareness of animal welfare issues and provide training on humane handling and slaughter techniques.

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8. ANNEXES

Annex 1: Questioner provided for participants

Demographic and Background Information

1. Can you describe your role and experience in meat production or retail?

A. Household slaughterer

B. Butcher shop worker/owner

C. Mini cafeteria operator

D. Livestock owner/farmer

E. Other (please specify): _____

2. How long have you been involved in this activity?

A. Less than 1 year

B. 1–3 years

C. 4–6 years

D. More than 6 years

3. What is your educational background?

A. No formal education

B. Primary school

C. Secondary school

D. Technical/vocational training (related to food/meat)

E. College/university degree

B. Prevalence and Practices of Backyard Slaughtering

4. How common is backyard slaughtering in your community?

A. Very common

B. Somewhat common

C. Rare

D. Not practiced

E. Not sure

5. Can you describe the typical process of backyard slaughtering as practiced here?

A. Slaughtering at home/backyard

B. Slaughtering in open fields

C. Slaughtering in hidden/indoor locations

D. Other (please specify): _____

6. What types of animals are most frequently slaughtered in backyards?

A. Cattle

B. Sheep

C. Goats

D. Poultry

E. Other (please specify): _____

7. Are there specific times when backyard slaughtering increases?

A. Yes, during holidays/festivals

B. Yes, during family events (weddings, funerals)

C. No, it is consistent throughout the year

D. Not sure

8. Where does backyard slaughtering usually take place?

A. At home/backyard

B. Neighbor's yard

C. Open field

D. Other (please specify): _____

C. Motivations and Drivers for Backyard Slaughtering

9. What are the main reasons people choose backyard slaughtering?

A. Lower cost

B. Convenience

C. Tradition/cultural reasons

D. Lack of access to abattoirs

E. Preference for fresh meat

F. Religious reasons

G. Other (please specify): _____

10. How do economic factors influence this decision?

A. Strong influence

B. Some influence

C. Little influence

D. No influence

11. Are there cultural or religious reasons for backyard slaughtering?

A. Yes, cultural

B. Yes, religious

C. Both cultural and religious

D. No

E. Not sure

12. How does accessibility to formal slaughter facilities affect your choice?

A. No access, so backyard is necessary

B. Difficult access, so backyard is preferred

C. Easy access, but still prefer backyard

D. Always use formal facilities when possible

13. Are there perceptions about the quality, taste, or freshness of backyard meat?

A. Backyard meat is fresher

B. Backyard meat tastes better

C. No difference

D. Prefer abattoir meat

E. Not sure

D. Hygiene and Sanitation Practices

14. What hygiene measures are taken during backyard slaughtering?

A. Washing hands before/after slaughter

B. Cleaning tools before use

C. Using clean water

D. No specific hygiene measures

E. Other (please specify): _____

15. What challenges do you face in maintaining hygiene?

- Lack of clean water
- Lack of cleaning materials
- Lack of knowledge/training
- Time constraints
- No challenges
- Other (please specify): _____

16. Are there specific steps taken to prevent contamination or spoilage?

A. Yes, always

B. Sometimes

C. Rarely

D. Never

E. Not sure

17. How is waste managed after slaughter?

A. Buried in ground

B. Thrown in open field

C. Collected by municipality

D. Used for animal feed

E. Other (please specify): _____

18. Are there practices to protect against zoonotic or foodborne diseases?

A. Yes, regular cleaning/disinfection

B. Yes, using gloves/protective gear

C. No specific practices

D. Not sure

19. How do you ensure meat is safe for consumption?

A. Inspecting meat visually

B. Smelling meat

C. Cooking thoroughly

D. No specific method

E. Other (please specify): _____

E. Knowledge and Awareness of Food Safety

20. What do you know about health risks from improper meat handling?

A. Very aware

B. Somewhat aware

C. Heard of risks but not sure

D. Not aware

21. Have you or anyone you know experienced illness linked to meat consumption?

A. Yes, personally

B. Yes, someone I know

C. No

D. Not sure

22. Are you aware of guidelines for safe meat handling and slaughtering?

A. Yes, very familiar

B. Heard about them

C. Not aware

23. Where do you get information about food safety?

A. Government/health authorities

B. Community leaders

C. Media (radio, TV, newspapers)

D. Friends/family

E. No source

F. Other (please specify): _____

F. Regulatory Compliance and Enforcement

24. Are you aware of regulations or permits required for slaughtering?

A. Yes, fully aware

B. Heard about them

C. Not aware

25. Have you ever been inspected by regulatory authorities?

A. Yes, regularly

B. Yes, once or twice

C. No, never

D. Not sure

26. What challenges do you face in complying with guidelines?

A. Lack of information

B. High cost of compliance

C. Lack of enforcement

D. No challenges

E. Other (please specify): _____

27. How effective are local authorities in monitoring meat production and sales?

A. Very effective

B. Somewhat effective

C. Not effective

D. Not sure

28. What would make it easier to comply with regulations?

A. More information/training

B. Lower costs/fees

C. Easier access to facilities

D. Regular inspections

E. Nothing would help

F. Other (please specify): _____

G. Animal Welfare Considerations

29. How are animals handled before and during slaughter?

A. Handled gently

B. Restrained with ropes

C. Dragged or forced

D. No special handling

30. Are there practices to minimize animal stress or suffering?

A. Yes, always B. Sometimes C. Rarely D. Never E. Not sure

31. Do you have any understanding about humane slaughter?

A. Yes, Animals should be killed quickly and painlessly

B. No, I have no understanding

C. Not sure what it means

32. Have you received training on animal welfare?

A. Yes, formal training

B. Yes, informal training

C. No training

H. Socioeconomic and Cultural Implications

33. How important is backyard slaughtering for your household's income or food security?

A. Very important

B. Somewhat important

C. Not important

D. Not sure

34. What role does tradition or community expectation play?

A. Strong influence

B. Some influence

C. Little influence

D. No influence

36. Are there social/community pressures regarding slaughtering practices?

A. Yes, strong pressure

B. Some pressure

C. No pressure

D. Not sure

I. Perceptions of Formal Abattoirs and Butcher Shops

37. What are your perceptions of meat from formal abattoirs vs. backyard slaughtering?

A. Abattoir meat is safer and preferable

B. Backyard meat is fresher and preferable

C. No difference

D. Not sure

38. Have you ever used a formal abattoir?

A. Yes, regularly

B. Yes, sometimes

C. No, never

39. What improvements would encourage you to use formal facilities?

A. Lower fees

B. Closer location

C. Better hygiene

D. Faster service

E. No improvements needed

F. Other (please specify): _____

40. How do local butcher shops source their meat?

A. From abattoirs

B. From backyard slaughter

C. Both

D. Not sure

Annex 2: Photo captured during backyard slaughtering

(a) (b)

Figure 1: Backyard slaughtering practice in Bishoftu town (a), the carcass in contamination exposed environment with knife (b).

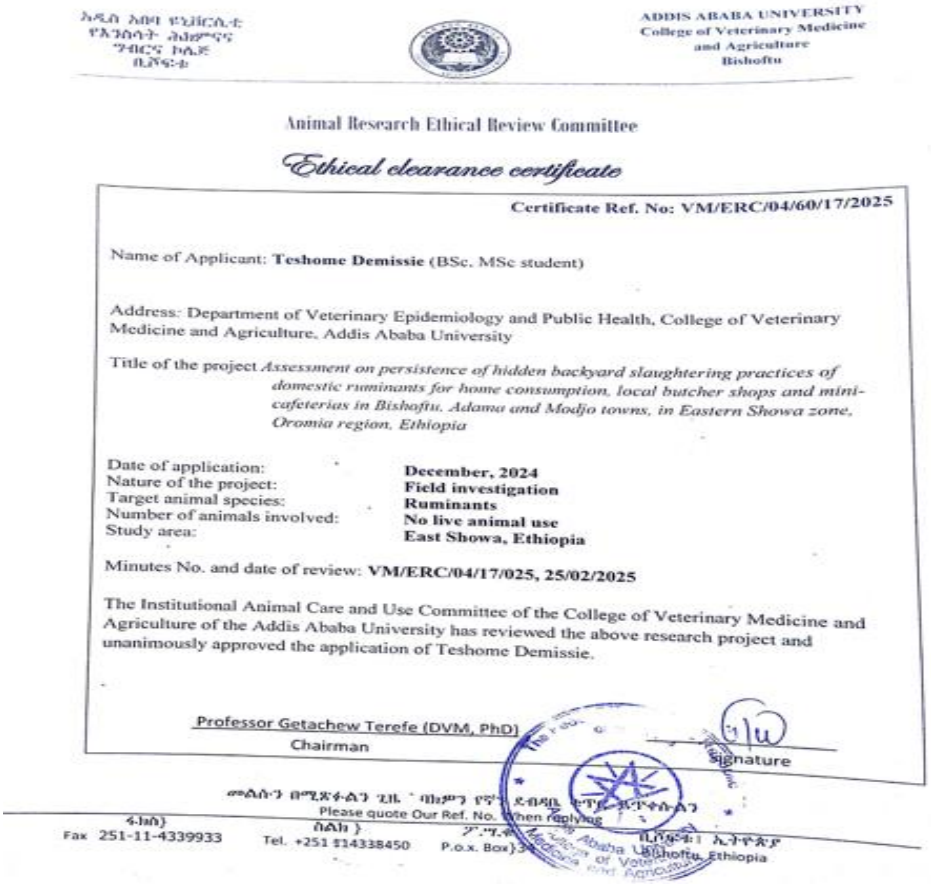
(c) (d)

Figure 2: The carcass with dirty meat cutting axe (c), the Kircha practices in Mojo town (d).

(e) (f)

Figure 3: The hanging system of meat to reduce contamination (e), the backyard slaughtering practices of cattle in Adama town (f).

Annex 3: Animal research ethical clearance



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ADDIS ABABA UNIVERSITY
College of Veterinary Medicine
and Agriculture
Bishoftu

Animal Research Ethical Review Committee

Ethical clearance certificate

Certificate Ref. No: VM/ERC/04/60/17/2025

Name of Applicant: **Teshome Demissie** (BSc. MSc student)

Address: Department of Veterinary Epidemiology and Public Health, College of Veterinary Medicine and Agriculture, Addis Ababa University

Title of the project *Assessment on persistence of hidden backyard slaughtering practices of domestic ruminants for home consumption, local butcher shops and mini-cafeterias in Bishoftu, Adama and Modjo towns, in Eastern Showa zone, Oromia region, Ethiopia*

Date of application:	**December, 2024**
Nature of the project:	**Field investigation**
Target animal species:	**Ruminants**
Number of animals involved:	**No live animal use**
Study area:	**East Showa, Ethiopia**

Minutes No. and date of review: **VM/ERC/04/17/025, 25/02/2025**

The Institutional Animal Care and Use Committee of the College of Veterinary Medicine and Agriculture of the Addis Ababa University has reviewed the above research project and unanimously approved the application of Teshome Demissie.

Professor Getachew Terefe (DVM, PhD)
Chairman

Signature

Please quote Our Ref. No. When replying

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