**UNIVERSITY FOR DEVELOPMENT STUDIES, TAMALE**


# KNOWLEDGE, ATTITUDES AND PRACTICES TOWARDS ZOONOTIC DISEASES AMONG CATTLE FARMERS IN RURAL COMMUNITIES IN TAMALE, NORTHERN REGION OF GHANA

**JEMILATU ADAM**

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**A THESIS SUBMITTED TO THE DEPARTMENT OF COMMUNITY HEALTH AND FAMILY MEDICINE, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF PUBLIC HEALTH DEGREE IN THE UNIVERSITY FOR DEVELOPMENT STUDIES, TAMALE**

**FEBRUARY, 2021**

## DECLARATION

**Student**

I hereby declare that this thesis is my own work towards the award of a Master of Public Health degree and that, to the best of my knowledge it does not contain any material previously published by another person nor material which has been presented for the award of any degree in this university or elsewhere, except for references to other people's which have been appropriately acknowledged.

| Name of Student | Signature | Date |
|---|---|---|
| JEMILATU ADAM | ..... | 26/02/2021 |

**Supervisor**

I hereby declare that the preparation and presentation of this dissertation was supervised in accordance with the guidelines on submission of dissertation/ thesis laid down by the University for Development Studies.

| Name of Supervisor | Signature | Date |
|---|---|---|
| Dr. SHAMSU-DEEN ZIBLIM | ..... | 26/2/21. |

## DEDICATION

This work is dedicated to my lovely husband, Mr. Achel John, my late mother, Victoria Fianyo and Ms. Ramatu Adam and my beloved children.



## ACKNOWLEDGEMENTS

Thanks be to the almighty God for making it possible for me to undertake and complete this MPH course successfully. It would be impossible to acknowledge name-by-name of all those who contributed in various ways to the success of this study. However, it is again impossible not to notice the contributions of the following people. I would like to begin by acknowledging the guidance and supervision of Dr. Shamsu-Deen Ziblim my hard working supervisor. He gave me not only the academic skills to survive MPH research but also considerable insight on how to approach life after completion of this course. Throughout my studies I also benefitted from the intellectual support and Mentorship of Dr. Adadow Yidana, the Head of Community, Dr. Benson Konlaan, Dr. Sam Bugri, and all the esteemed lecturers of the Community Health and Family Medicine Department of UDS-SMHS.

I am thankful to the cattle farming communities for the permission to carry out my study in their communities. To many other friends who became companions in this journey of this work, I express my sense of gratitude. I am grateful to all the respondents within the communities who spent time with me to share their views and thoughts and relevant information, for being indispensable in this work. Finally, to my colleagues at the Department of Community Health and Family Medicine, 2018/2019 academic year group, who shared in my responsibilities, I say thank you all for the friendship and support.


## ABSTRACT

Cattle farming remain one of the lucrative agricultural ventures among rural settlers in the Northern parts of Ghana and are kept for both commercial and subsistence purposes. However, the emergences of cattle associated infections remain a threat to cattle production and the human population. This study aimed at assessing the knowledge, attitudes, and practices towards zoonotic diseases among cattle farmers in rural communities in Tamale. The study was descriptive cross-sectional study, involving a mixed method. The quantitative approach involved the use of semi-structured questionnaire, which included both closed and open-ended questions and the qualitative approach involved the use of focused group discussions using focus group guide. A total of 100 cattle farmers were selected using purposive sampling method, from March, to July 2020. A chi-square test analysis was performed to identify the factors that are associated with the knowledge, attitudes, and practices towards cattle-related zoonotic diseases. A 95% confidence level and statistical significance of $p<0.05$ was used. The qualitative data was analyzed using thematic content analysis. The study revealed that the mean age was 47.46 (SD: 10.84) with age range of 25 to 70 years. Males were the most represented (98%). The overall knowledge, attitude and practices towards cattle related zoonotic diseases good scores was 52%, 67% and 16% respectively. Age ($p= 0.022$), ethnicity ($p=0.039$) and educational background ($p=0.042$) of the study participants showed significant association with the knowledge, attitudes, and practices towards cattle-related zoonotic diseases. The study revealed an appreciable knowledge of cattle-related zoonotic diseases among the farmers, however, proportionally; most of respondents did not have adequate knowledge on zoonotic diseases. Additionally, respondents exhibited a good attitude but their practices of good animal husbandry was extremely poor. The study therefore recommends that the Ministry of Agriculture, the Tamale Metropolis and other stakeholders should organize periodic training to cattle farmers on Zoonosis.

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| FOA | Food and Agricultural Organization |
| GSS | Ghana Statistical Service |
| LMICs | Low- and Middle-Income Countries |
| MoFA | Ministry of Food and Agriculture |
| RVF | Rift Valley Fever |
| SPSS | Statistical Package for Social Sciences |
| UDS | University for Development Studies |
| WFP | World Food Programme |
| WHO | World Health Organization |
| ZD | Zoonotic Diseases |

# CHAPTER ONE

## BACKGROUND TO THE STUDY



### 1.0 **Introduction**

This section gives a background to the study by considering related literature on the knowledge attitudes and practices on zoonotic diseases among cattle farmers from the global perspective to the local perspective. This section also clearly defines the research problem, together with the research questions and objectives.

### 1.1 Study Background

Zoonotic diseases possess a significant burden on animal and human health, particularly in developing countries (Halliday et al., 2015). In spite of the acknowledgement of this fact, zoonotic diseases frequently remain undiagnosed among individuals in the society and are often mistaken for other diseases such as malaria. The interaction of humans with livestock exposes them to several infectious diseases and other potential pathogens. Livestock such as cattle may become intermediate or amplifier host in which several pathogens can evolve and spread to humans (Childs et al., 2007). Cattle farming remain one of the lucrative agricultural ventures among rural settlers in the Northern parts of Ghana and are kept for both commercial and subsistence purposes (Ghana Statistical Service, 2010). Cattle farming play a significant role in sustaining rural livelihoods by providing a source of income, food, manure and draught power (Adzitey, 2013). However, the emergences of cattle associated infections would remain a threat to cattle production and the human population. Common infectious diseases that are naturally transmissible from vertebrate animals like cattle to humans and vice-versa are classified as

Zoonotic Diseases (ZD) (WHO, 2009). Zoonotic Diseases (ZD) are recognized as major public health concern and are known to account for approximately 61%-75% of emerging infections that affect the human population over the past decades (WHO, 2019; Taylor et al., 2000). Contemporary studies have revealed that nearly 20% of all human morbidity and mortality especially in developing countries are strongly associated with endemic zoonosis (Grace et al., 2011; Grace et al., 2012; Rist et al., 2014). As suggested by Jones et al., (2013) and co-workers, the amassed ecological modifications significantly facilitate the growth and development of some vectors of ZDs including cattle related infections. Correspondingly, the increasingly human populations have significantly increased interaction with wildlife, which is well-known to be a reservoir of zoonotic infectious agents Jones et al., (2013). Other human activities including socio-cultural behaviours, farming activities, game hunting and tourism promotes the emergence and re-emergence of these ZDs Jones et al., (2013).

Contemporary studies have also implicated the lack of knowledge, coupled with poor attitudes and practices towards good animal husbandry in cattle farming as a source of ZDs in the human population (Rajkumar et al., 2016; Asbjer, 2009; Jhon et al., 2007). Knowledge, attitude, and practices on ZDs in relation to the transmission, prevention, and related control measures to ZDs should be of concern to all, especially among cattle farmers to curb the re-emergence of ZDs. Knowledge has often been recognized as "facts, information and skills acquired through experience or education as well as the theoretical or practical understanding of a subject" (Oxford Dictionary). This highlights the importance of cattle farmers getting and appreciating the right information and skills on ZDs to aide in the prevention and control of ZDs. However, there appears to be a gap in knowledge on ZDs among several livestock farmers including cattle farmers. As reported by Asokan et al., (2011), as the lack of awareness amongst livestock

holders is a major cause of ZDs and constitute a significant obstacle in the control of ZDs. This is supported by observations made by Rajkumar et al., (2016) in a study among 250 livestock holders, with about 16.4% of livestock farmers indicating that animals are a source of infections to humans. Similarly, it also observed that only 18% of the livestock farmers were aware about cattle related infections. This portrays a huge gap in knowledge among livestock holders, including cattle farmers at a statistical difference of about 82% among these farmers. This observation made might not be somewhat different in Ghana, coupled with the challenge of paucity of literature on the knowledge of ZDs among cattle farmers in Ghana.

Correspondingly, the attitudes and practices amongst most cattle farmers play an important role in the spread of ZDs. As asserted by Babu et al., (2015), the hygienic management attitudes and practices livestock farmers, including cattle farmers is very poor which increases the risks of most cattle related infections. Equally, Girma et al., (n.d) mentioned that cattle farmers with little education have narrow awareness on public health significant ailments which are spread by the animals including cattle. Majority of cattle related infections are recognised to have impact on poor populations, especially farmers and others who usually dwell in close immediacy to domestic or wild animals. Most of these poor populations are often characterized with poor healthcare systems to detect early zoonotic infections combined with unsanitary environments and practices (WHO, 2019 Facts on Zoonosis). The WHO has often referred to most the cattle related infection as Neglected Zoonotic Diseases (NZD) and mentions diseases including diseases anthrax, bovine tuberculosis, brucellosis, cysticercosis, echinococcosis, leishmaniasis, rabies and human African trypanosomiasis as NZD (Elelu et al., 2019; WHO, 2006). As maintained by the US Institute of Medicine (2011), NZD's exhibits a double burden of diseases as the NZD's have implications on both public health and the animal health with millions of poor

livestock farmers internationally are noted to be most vulnerable. Studies have acknowledged that in the livestock farming, various farm animals naturally serve as carriers of a wide range of zoonotic pathogens (ZP). For instance, Zinsstag et al., (2007) mentioned that in the dairy farming, ZP are usually existent in dairy animals, raw milk, milk products, meat and the farm environment however are these pathogens are often challenging to detect. Zinsstag et al., (2007) again mentioned that ZP is often transferred to humans through the consumption of infected raw milk, contact with infected dairy animals and products as well as infected farm environments.

Cattle related infections are noted to pose economic challenges to both livestock farmers and a nation as whole. For example, the economic loss estimate of zoonotic epidemics between 1995 and 2008 was noted to have exceeded 120 billion dollars (Cascio et al., 2011; MARSH, 2011; Budke et al., 2006).In addition to causing serious economic losses in dairy cattle production, ZD's pose a major barrier for trade of animals and animal products and this could seriously impair socio-economic progress especially in developing countries in Africa like Ghana.

Emerging studies on ZD's have recognized that to effectively succeed in curbing the problem of zoonotic infections transcends the medical and the public health professions. Arguments have been made to increasingly consider the understanding of veterinary and environmental factors, the human socio-behaviours as well as the political changes of a country (Murphy, 2008). In addition, the fundamental science-related characteristics of the ZP life cycles and evolution as well as the vector life cycles and behaviour should be given attention (Murphy, 2008).

The recognition of cattle related infections as a multifactorial problem is key, primarily for the prevention of the spread in terms of geographical and social prevalence (Cascio, Bosilkovski, & Pappas, 2011). Likewise, studies have shown enough evidence that, the level of awareness on ZD's amongst livestock farmers are nothing to write home about. As illustrated by Ekuttan,

(2005) and Munyeme et al., (2010), the knowledge of the economic and public health importance of ZD's were observed to be relatively inadequate among some livestock farmers and reflects the struggles in the control and prevention of ZD's. As observed by Swai et al., (2010) and co-workers, the awareness on zoonosis was higher amongst smallholder dairy farmers (92%) than traditional livestock keepers (P<0.05). Contrastingly, in the same study Swai et al., (2010) asserted that the apparent threat of getting zoonosis was considerably greater amongst traditional livestock farmers (86%) compared to smallholder dairy farmers (P<0.05). Analysis of the farm location exhibited that rural farms (85%) were measured statistically at a greater threat when paralleled with peri or urban situated farms (P<0.05) Swai et al., (2010).

Equally, Abdi et al., (2015), observed in a study on Rift Valley Fever (RVF), a mosquito-borne viral zoonosis that the knowledge of the disease (RVF) amongst livestock farmers was statistically high with a encouraging attitude towards the vaccination of the animals (77%). Conversely, few farmers were familiar with the clinical presentations such as abortion (11%) and high mortality of young animals (10%). Additionally Abdi et al., (2015) maintained that just a few (4%) of the farmers employed any method of protection for the management and handling of diseased animals to escape any possible zoonotic infection. Relatedly, Arif et al., (2017) observed in another study amongst cattle farmers on brucellosis that about 97% of the farmers had no knowledge of the means of spread of brucellosis. Linking the risk of contraction of brucellosis amongst these farmers, Arif et al., (2017) maintained that a significant proportion (66%) of the farmers' relations were recognized to take raw milk and its products with about 49% also existed in shared accommodation with their cattle as well as about 74% disregarded the use of protective clothing when attending to their cattle. Studies have acknowledged that

brucellosis is caused by varied species of the genus Brucella and B. abortus responsible for human infections transmitted by cattle (Yagupsky et al., 2005).

In Ghana, there has been extensive call to increase livestock production including cattle with the launch of government's "Rearing for Jobs" (www.ghanaweb.com). This is likely to commensurate in the rise and emergence of cattle related infections. Combined with the paucity of information regarding the knowledge, attitudes, and practices of good animal husbandry amongst cattle farmers and ZDs, can affect the proper implementation, sustainability and success of the 'Rearing for Jobs." The current study therefore is aimed at assessing the knowledge, attitudes and practices towards ZDs among cattle farmers in rural communities in Tamale, which are noted to have majority of the rural inhabitants (50.2%) engaged in livestock farming including cattle farming (Ghana Statistical Service, 2010).

### 1.2 Problem Statement

The Government of Ghana launched the Rearing for Food and Jobs (RFBs) initiative on 25th June, 2019 with the ultimate goal of improving and increase national livestock (cattle) production. This has the potential to increase cattle and livestock associated infections often regarded as Zoonotic Diseases (ZDs) which constitute about 61% of human microbial infections and 13% emerging and reemerging infections (Islam & Ahmed, 2019) that have significant association with morbidity and mortality especially in Sub-Saharan African countries including Ghana. ZDs are acknowledged to be accountable for an estimated 2.4 billion cases of human infections and 2.2 million mortalities annually in the developing countries (Gilbert, 2012 & Grace et al., 2012).

Currently, the knowledge, attitudes and practices towards ZDs among livestock farmers including cattle farmers is not well understood in the Northern Region of Ghana with majority of

the inhabitants engaged in one form of livestock farming including cattle farming with rural and urban proportions of 50.2% and 49.8% respectively (Ghana Statistical Service, 2010). The few studies that have attempted to look at ZDs in Ghana has largely been limited to the Ashanti region and among slaughter houses (Otupiri et al., 2000), Bat-Borne Zoonosis through Bush-meat (Kamins et al., 2015). Equally, the extensive cattle farming system (Adzitey, 2013) employed by cattle farmers in the region increases the risk of exposures to cattle related ZDs among the farmers and community members at large. This will make targeted interventions to ZDs prevention and control almost unattainable combined with the challenge of limited human and financial resources to prioritize ZDs in Ghana. This study is therefore aimed at providing the preliminary data, fill the knowledge gap and expand our understanding on the knowledge, attitudes, and practices of ZDs among cattle farmers in rural communities in Tamale.

### 1.3 Research Questions

1. What is the level of level of knowledge towards cattle related zoonotic diseases among cattle farmers in rural communities in Tamale?
2. What are the attitudes of cattle farmers towards cattle related zoonotic diseases in rural communities in Tamale?
3. What are the cattle rearing practices employed by cattle farmers in rural communities in Tamale?

### 1.4 Main Research Objective

The main objective of the study was to assess the cattle-related sanitary practices among the cattle farmers and the relationship with the spread of zoonotic diseases.

### *1.4.1 Specific Research Objectives:*

1. To examine the level of knowledge on cattle related zoonotic diseases among cattle farmers in rural communities in Tamale.
2. To assess the attitudes of cattle farmers towards cattle related zoonotic diseases in rural communities in Tamale.
3. To examine the cattle rearing practices employed by cattle farmers in rural communities in Tamale.

## 1.5 Justification

Zoonotic diseases have both direct and indirect effects on livestock health and production. Indirect effects occur because of the risk of human disease, the economic impact on livestock producers through barriers to trade, the costs associated with control Programmes, the increased cost of marketing produce to ensure it is safe for human consumption and the loss of markets because of decreased consumer confidence. Lack of awareness about the zoonotic diseases is one of the most important reasons for the outbreak of zoonotic diseases in people. As agriculture and Animal Husbandry are the two important occupations of lives stock farmers, which make them to exposed to several dangerous zoonotic diseases (Munisamy et al., 2017). Hence this study will expose the lapses in the knowledge of zoonotic diseases as guide for government and other stakeholders to help address the problem. Findings from the study will also serve as literature for future studies by student and researchers in the academia and government.

## 1.6 Significance of the Study

Zoonotic diseases continue to pose a major risk to the health of human population. The emergence new infections and re-emerging infections have been described to have zoonotic connection. Though some studies have been done in the past on zoonotic diseases, there still

exist knowledge gap in my study settings, as several of the past literature investigated zoonotic diseases elsewhere. The findings observed in past literature cannot be wholly adopted to address zoonotic diseases in Tamale metropolis, partly due to the differences in the environmental settings, some cultural practices, religious beliefs, and other factors. Therefore, this study was aimed at targeting cattle farmers in major rural communities in the Tamale Metropolis where cattle are reared to collect data that could be used as a baseline to design public health interventions for farmers in these areas.



### 1.7 Scope of the Study

The study focused on cattle farmers Knowledge, Attitudes and Practices on cattle related zoonotic diseases.

### 1.8 Study Conceptual Framework

To this study, the conceptual framework considered four key factors that are needed in reducing the risk of cattle related zoonotic diseases among the farmers in the Tamale Metropolis and beyond. These factors included,

1. **Socio-demographic characteristics of the study participants.**

- Age
- Sex
- Educational status
- Religion
- Ethnicity
- Marital Status

2. **Cattle-related characteristics**

- Years of experience
- Ownership
- Number of cattle
- Housing system

- Monthly income

3. **Additional characteristics**

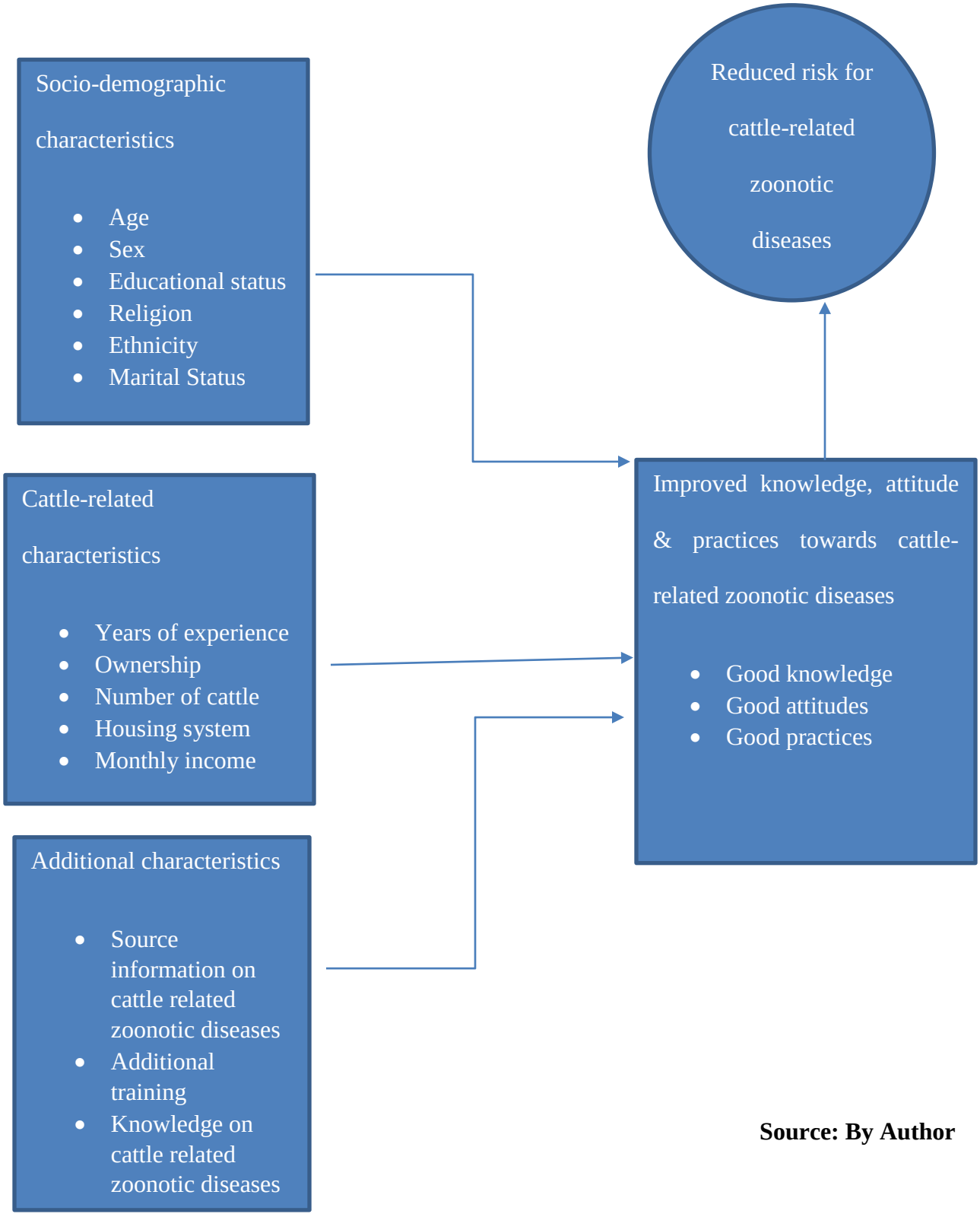
- Source information on cattle related zoonotic diseases
- Additional training
- Knowledge on cattle related zoonotic diseases
- Animal husbandry practices

4. **Improved knowledge, attitude & practices towards cattle-related zoonotic diseases**

- Good knowledge
- Good attitudes
- Good practices

This framework offered the best fit to explain both the explanatory variables and outcome variables as the framework was expressly conceptualized to consider the link between an individual and his or her environmental determinants towards cattle-related zoonotic diseases. As mentioned, this framework consisted of four linked factors that may interact to influence positive knowledge, attitudes, and practices to reduce the risk of cattle-related zoonotic diseases. For example, those cattle farmers who started rearing cattle at early stages of their lives and have reared cattle for more than a decade (experience) are expected to have good knowledge, attitudes, and practices towards cattle-related zoonotic diseases. As it is a common knowledge that one tends to become a master of what he or she does repeatedly over a long period of years. Nonetheless, this assertion can be misleading, as experience can also facilitate uncompliant to standards. Therefore, the use of this conceptual framework allows the researcher to explain the main factors that were likely to affect the knowledge, attitudes, and practices towards cattle-related zoonotic diseases.

**Conceptual Framework for improved knowledge, attitudes, and practices towards cattle-related zoonotic diseases.**

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### 1.8 Study Organization

This section of the thesis provides an outline of the presentation of the thesis in chapter one, chapter two, chapter three, chapter four, chapter five and chapter six.

**Chapter One**

This section of the thesis gives the background accounts to the study, including the knowledge, attitudes and practices of ZDs in addition to the burden and risk factors of Zoonotic Diseases from the global perspective to the local (Ghana and Northern Region) perspectives. It also considered the problem statement, study questions, study objectives, the study's conceptual model, justification, and the study organization.

**Chapter Two**

This section of the study systematically reviewed related literature on the theme of this study. The review was carefully done in line with the research questions and or objectives.

**Chapter Three**

Chapter 3 focused on the study area and the study methodology applied. The chapter discussed sub-themes like; Study Area, Study Setting, Study Design, Study Population, Sample Size, Sampling Method, Study Variables, Data Collection Tools, Data Analysis and Presentation Methods, Data Quality Control Measures, Ethical Considerations, Study Limitations and Dissemination of Study Outcome.

**Chapter Four**

This section was devoted to the presentation of the study results.

**Chapter Five**

The Chapter Five was considered the discussion of the implication(s) of the outcome of the study. The discussions of the results were in line with other studies on the topic to confirm or to reject the assertions of such studies.

**Chapter Six**

This chapter presents the summary of the study outcome, conclusion, key recommendations, and further research opportunities.



# CHAPTER TWO

# LITERATURE REVIEW

## 2.0 Introduction

This section of the study systematically reviewed related literature on the theme of this study. The review was carefully done in line with the research questions and or objectives. The chapter is discussed in the following subtitles: The Transtheoretical Model of Behaviour Change, The Role/Importance of Cattle Farming, Livestock/Cattle Farming in Ghana, The Global Burden of Zoonotic Diseases, Knowledge, and Attitudes Towards Zoonotic Diseases, Housing and sanitary practices and Handling of Animal Health and Diseases.

The literature was searched by going through databases and journals including Pubmed, Google Scholar, Cochcrane, Researchgate, BiomedCent ral, and Nature. First, the search was made generally and narrowed to include peer-reviewed articles from the global, regional (national) and local (Ghana) perspectives. The key search terms for this study included Knowledge, Attitudes, Practices and towards Zoonotic Diseases, Animal Husbandry Practices, Cattle-related Zoonotic Diseases and Livestock Production.

## 2.1 Transtheoretical Model of Behaviour Change

For effective behaviour change, several studies and researchers have acknowledged the use of theoretical frameworks to inform, develop and evaluate interventions designed to influence behaviour. The Transtheoretical Model of behaviour change model explains that individuals may change via a chronological process, moving from having no or little commitment to change, to being highly active in maintaining change (Kolbert et al., 2017). The model is designed to explain the changes in thoughts, feelings, and behaviors that individuals experience as they seek out to change a behavior, such as adopting better practices in cattle

rearing. It is known that the model consists of six (6) main phases including; precontemplation, contemplation, preparation, action, maintenance, and termination (Prochaska et al., 2007).



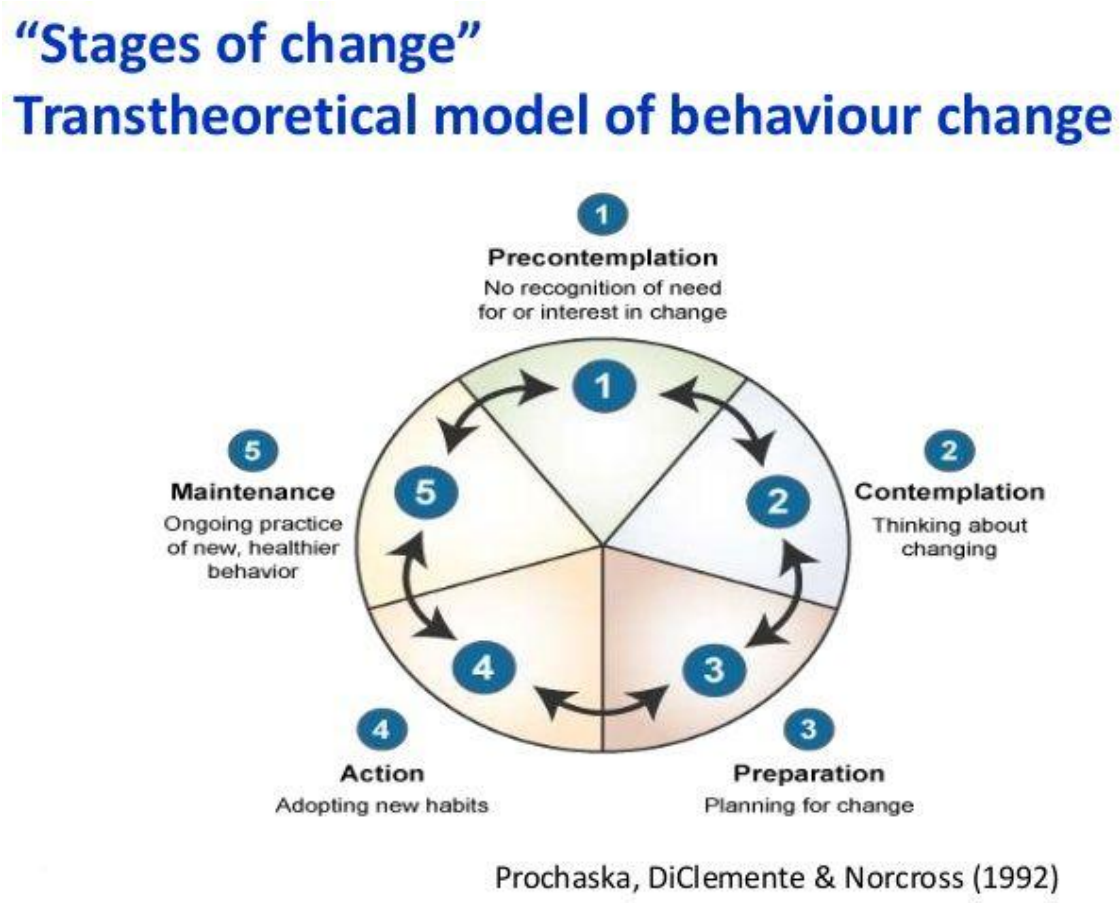


Figure 2.1 Transtheoretical Model of Change (Prochaska, et al. 1992).

The Precontemplation Stage

In this stage of the change model, individuals (cattle farmers) may not have the intention of altering or take the required actions to effect a desired change now or in the future. This may be because of not been aware of the threats zoonotic diseases may pose to their health and source of livelihood as cattle farmers. In this instance, cattle farmers may not have a full understanding of the effects of how some cattle husbandry practices such nonuse of safety

clothing in can affect their health and others in the community. It is therefore critical to appreciate their level of awareness and knowledge, which can be used as a basis for policy formulation on zoonotic diseases.

Contemplation Stage

In the contemplation stage, individuals (cattle farmers) may become conscious or aware on some potential threats or benefits to take an action such as practicing good sanitation to effect a change. However, certain factors such acquiring the needed materials to ensure good sanitation may result in cost which could create conflict and a subsequent sense of ambivalence about changing.

Preparation Stage

In the preparation stage, cattle farmers may initiate the process of change. This might be after recognizing the need to adopt new practices to ensure the prevention of cattle related zoonotic diseases. Such practices may involve hand hygiene practices, good animal husbandry practices and safe housing systems for the cattle.

Action

This stage of the change process starts when cattle farmers take direct actions to avoid and prevent any possibility of zoonotic infections in their cattle and among themselves. Such action may involve the consistent use of hand gloves, regular practice of hand hygiene, the use of veterinary officers to diagnose cattle related diseases and others.

Maintenance Stage

The maintenance phase involves avoiding former bad animal husbandry and personal practices or attitudes and keeping up new attitudes and behaviors to avoid cattle related

zoonotic diseases. The role of stakeholders such as the veterinary officers cannot be overlooked in the maintenance of the good personal and animal husbandry practices, through continues education and training on the prevention of zoonotic diseases among cattle farmers.

The Relapse Stage

Emphasis must be made that that there is a tendency of relapse in any behavior change (Brady, 1977). It is therefore important to examine the motivating factors and demotivating factors that would allow cattle farmers to continue to adopt practices to prevent cattle related zoonotic diseases.



## 2.2 The Role/Importance of Cattle Farming

Cattle farming has several functions in most countries and communities. The critical role of cattle farming transcends into social, cultural and economic importance as well as the provision of food and income for families(Maria et al., n.d.). Cattle play a critical role in the food supply chain, aides in fighting malnutrition, provides household income, asset savings, employment opportunities, enhancement of soil fertility, and socio-cultural purposes (Moyo et al., 2010). The role of cattle in contemporary times can have several classifications. The two main classification according to FAO (ILRI, 1995), comprise of the output produced and the uses from the outputs. From the classification, the output produced may reflect the food, raw materials, and some inputs to cropping. Similarly, the output uses may involve the subsistence consumption of the cattle, income through sales from cattle and its products, savings and investment as well as the socio-cultural importance including the paying of bride price among some tribes and the use of the cattle for merry-making or for sacrifices (Suit-b et al., n.d.).

Explaining further, the role of the cattle farming in contemporary times can be discussed on the economic function such as a source of income, a means for household savings, food for

household sustenance, manure for agriculture activities and the use of the animal for farming activities (Malafaia et al., 2016). Some studies have shown that cattle play an especially important role in the food supply chain among several rural and peri-urban areas through the contributions to household nutrition, especially in meeting the protein needs of households and individuals (Berge & Vertenten, 2018). Some authors have suggested that an increase in household income directly increases the rate of protein consumption of these households, mostly from animal source, permitting the replacement of vegetal by animal protein (Maria et al., n.d.). Aside cattle products such as milk and beef, which are mainly used as food for households, other cattle products including skins, hides and horns, are sold to generate income for households. Likewise, cattle can be viewed as a "living saving" which can be exchanged into physical cash as and when the household needs it (Maria et al., n.d.).. It can also be said that cattle serve as a security asset, which are often relied on to access credit facilities informally. Studies have shown that, especially in rural areas with limited or no financial markets, the cattle have become a source of asset accumulation and an indicator for prosperity among the rural folks (Maria et al., n.d.). Cattle as an asset to farmers can be harnessed at any time to meet the expenditure need of households including school fees, medical bills, and others. As some authors describe cattle as an asset as "bank account" to households. Cattle serve as an important source of household savings and can be relied on during the period of low animal and crop production, therefore, reducing the risk of household income insecurity and vulnerability to health issues. Cattle farming has a close relation with crop farming. Cattle manure has been used predominantly in crop farming. The cattle equally provide energy in the form of draught animal power to plough farmlands. Emphasis must be made that the use of cattle manure and draught animal power are environmentally friendly, thereby enhancing energy and nutrient recycling. In most

communities, the cattle also serve as a means of conveyance for most cattle farmers to carry their farm products to market centers and to their farms, respectively.

The cattle production serves, as an important means of exchange amongst rural communities, the sales from the cattle tends to enhance rural markets. Most economists have explained that rural markets constitute an essential component of the activities of rural societies and contributes significantly towards the households' wellbeing and wealth creation. Additionally, the cattle social importance reflects the cultural values uses of the cattle, including the use to pay bride price, feast making and sacrifices. In most of the communities to, the number of cattle available to the farmer earns him or her a degree of social status. This is because the number of cattle is an indicator of the farmer's wealth. Another economic status provided by the cattle to farmer is the easy access to credit facilities.

In the typical African traditional communities, including Ghana, cattle are known to be used to perform traditional rituals, festival activities as well been offered as gift in worships. As an illustration, some ethnic groups sacrifice the cattle to invoke ancestral deities and perform other rituals. Again, some societies in India consider cattle as sacred. Most often than not, the socio-cultural importance of cattle livestock is overlooked when assessing the total impact of cattle production to the development and well-being of rural societies. This is because it is a bit challenging to quantify these functions in monetary values and therefore much emphasis is placed on the physical marketed cattle production. According to Ouma et al. (2003) a critical factor in cattle farming is the ability of the farmer to have some degree of non-market benefits, however this aspect is yet to be well estimated.

Despite the importance of cattle farming in recent times, the health the cattle may have effect of their functions as it the health of the cattle may directly or indirectly affect the production, human health, economic impact, and socio-cultural impacts (Otte et al., 2000). To emphasize

much on the productivity impact of the cattle health, it may result from mortality, decrease in productive parameters of the cattle, including the weight-gain, milk production, as well as decrease in quality of animal products (Perry & Grace, 2009). Likewise, there are several reported parasitic and microbial infections of combined with other metabolic diseases, recognized to impact the fertility of the cattle.

The production and consumption of cattle have some associated health risks, predominantly called zoonosis (Maria et al., n.d.). Thus, the transmission of diseases from animals to humans (Malafaia et al., 2016). Studies have acknowledged that, the nonexistence of a very resilience animal health control policies especially in developing countries exacerbates the risks of zoonosis. Nonetheless, the existence of extensive animal health control policies that may take into accounts restrictions on movement of the cattle and surveillance would be indispensable to the production of the cattle (Adzitey, 2013). This makes it essential to understand the current trends in cattle farming especially in zoonotic diseases.



### 2.2 Livestock production in Ghana

In Ghana, the agricultural sector plays an important role in many households as it represent the major source sustenance for majority of the poor, especially in rural communities ( Sena, n.d.). Livestock, including cattle farming constitute some major occupational activities of communities, especially in the Northern parts of Ghana (FAO, IFAD, UNICEF, WFP, WHO. (2018). Reports on livestock production in Ghana indicates a stunted growth as at 2009 with a decline from 32% to 22% in the year 2013 (FAO, 2015). It is also acknowledged that more than 40% of Ghanaian households are engaged in livestock farming (Ghana Statistical Service, 2010). The Ministry of Agriculture estimated that cattle production increased by about 7.6% between 2000 and 2010 (. MoFA, 2011). Interestingly, between 2000 to 2010, reports on Ghana's population indicated a growth rate of about 30% (Ghana Statistical Service, 2010). This creates a discrepancy and would result in high meat imports, increased

meat prices, in addition to loss of foreign exchange for the county. According to MoFA (2011) the livestock production discrepancy is mirrored in the total beef imports into Ghana. The beef import has been reported to be increasing exponentially by 1,876.4 %, from a little over 600 metric tons in 2000 to approximately 12,500 metric tons in 2010 (MoFA. (2011). similarly, the Food and Agriculture Organization explains that there will be an increase in the demand for livestock by 2050 (FAO. (2017). In attendance, it is important to identify the to address the factors that accounts for the loss of livestock, including cattle to increase production. If the livestock production sector in Ghana is not well developed, the tendency of food insecurity will increase significantly.



### 2.3 Zoonotic Diseases Defined

The Joint Expert Committee of WHO and FAO (1959) defined Zoonoses as "those diseases and infections, which are naturally transmitted between vertebrate animals and man." Zoonotic diseases comprise of infections that are transmissible between animals and man. It is acknowledged that livestock, including cattle constitutes an imp ortant population of the farming community and therefore increases the risk of zoonotic infections (Dubal et al., 2014). Zoonotic diseases are acknowledged to be transmitted to humans either directly, through exposure to infected animals, or indirectly, through exposure to animal waste or the consumption of contaminated food (Adesokan et al., 2013). Dearth awareness amongst cattle farmers about the significance of avoiding cattle related zoonotic diseases are not limited to lower- and middle-income countries, as the same problem concerning health education is also noted in developed countries (Viana et al., 2012). Cattle farmers' decisions concerning their herd can affect the health and safety of the community (Ellis-Iversen et al., 2010). Additionally, poverty and inadequate knowledge about cattle related zoonotic diseases among many persons, particularly in rural areas, who take high-risk cattle products including unpasteurised milk, uninspected meat, gotten from the casual food markets poses a great

danger to the health of the public (Gadaga et al., 2016). Contemporary studies acknowledge that in many LMICs including Ghana, a greater number of the rural settlers are engaged in livestock production, including the rearing of cattle. This create and promote a high level of contact with animals and potential risk of contracting cattle-related zoonotic diseases (Ruano et al., 2017). Consequently, satisfactory knowledge regarding the epidemiology of cattle-related diseases would of boundless significance to the health of farming communities and the public health of the larger communities (Adesokan et al., 2013). As suggested by García et al. (2013), preventing and controlling of cattle-related zoonotic diseases ought not to consider only programmes such as investigation, vaccination and killing of affected cattle, however, improved results are accomplished when cattle farmers also comply and implement effective biosecurity protocols.

There exists enough evidence that, the lower the level of knowledge on cattle-related zoonotic diseases, the more the number of cattle are infected with one kind of zoonotic infection as well as the farmer (García et al., 2013). This highlights the importance of accomplishing a satisfactory level of knowledge among cattle farmers and other livestock farmers across the globe including consumers and the cattle supply chain (Ruano et al., 2017). It is important to stress that many factors may influence the effective reduction and eradication of cattle-related zoonotic diseases and therefore, a attempts to address the increasing rates of cattle-related zoonotic diseases should be holistic; including the health management of infected herds, satisfactory training for cattle farmers, and adherence to infection prevention protocols (Ruano et al., 2017; García et al., 2013).

### 2.2 The Global Burden of Zoonotic Diseases

The global burden of zoonotic diseases is known to include morbidity, mortality and financial burden on society (Cascio, Bosilkovski, Rodriguez-Morales, et al., 2011). The effect of zoonotic diseases pertained to the several issues of human life according to Budke et al.

(2006) can be measured by assessing the economic impact of zoonotic epidemics which is recognized that between 1995 to 2008, accounted for about $ 120 billion. As indicated by the MARSH Report (2020), that the financial consequence of zoonotic outbreak in a country comprise of the impact of the plague outbreak in Surat, India in 1994, negatively affecting trade and tourism activities which resulted in about $2 billion loses. Additional classical examples of the impact of zoonotic diseases can be seen on the economic influence of cystic echinococcosis in humans, which is acknowledged to have exceeded about $1.2 billion yearly (Upper Midwest Agricultural Safety and Health (UMASH), 2012). Again, the economic impact of zoonotic diseases was negatively felt during the outbreak of bovine spongiform encephalopathy on the UK economy, resulting in about $5 billion financial loss (Kulkarni et al., 2018).

Contemporary studies have suggested that majority of the emerging and re-emerging infectious diseases are mostly of zoonotic in nature (WHO, 2006). The degree of zoonotic disease impact on human health has been described in other studies and recognized to reach hundreds of thousands of annual deaths and tens of millions of annual infectious episodes. Similarly, these zoonotic diseases are recognized to be made of novel cases, and for certain widespread zoonoses, chronicity of infection with severe sequelae has been documented, which further adds to the morbidity/mortality burden. It has been widely recognized that dealing with the challenge of zoonotic diseases is a task that is yonder medical and public health specialists alone. It necessitates the understanding of veterinary and environmental parameters together with issues regarding human social behavior and political changes (Singh et al., 2017). Therefore, recognizing a need for multi-approach in fighting zoonotic diseases is critical, largely for preventing the spread, in terms of geographical and social prevalence.

**2.2 knowledge and attitudes towards zoonotic diseases among cattle farmers**

It is important to acknowledge that a substantial knowledge on cattle-related zoonotic diseases in relation to its prevention, control and the spread should be a priority for cattle farmers, as it will go a long way is necessary for livestock farmers. It will help prevent and control zoonotic diseases as an occupational hazard and reduce the incidence of zoonotic diseases in human as well as livestock populations.

As maintained by Zinsstag et al. (2007), most developing countries especially in Sub-Saharan African countries are challenged with little or nonexistence of information on the spread of zoonotic diseases among farmers. As was observed by Mandefero et al. (2018) in a study among 230 cattle farmers in Ethiopia to examine the knowledge, attitude and practice on milk borne zoonoses disease that about 63.5% of the study participants had substantial knowledge on diseases transmissible via the consumptions of unpasteurized cow milk, however, about 61.3% of the respondents could not mention a name of the these diseases that are transmissible via unpasteurized cow milk. This observation creates a disturbing scenario, though most are aware that a disease can be transmitted through the consumption of raw milk however the legitimate question worth asking is that how would these farmers know that they have contracted a milk-borne zoonotic disease and seek appropriate treatment at the right healthcare facility. As Halliday et al. (2015) explained that zoonotic diseases remains a significant burden on animal health and human health with a lot of the zoonotic diseases often go undiagnosed in individuals and often recognized as febrile diseases including malaria. Some studies in zoonotic diseases have continually argued that non-zoonotic diseases including malaria, typhoid fever and a host of others do present shared signs and symptoms of zoonotic diseases, leading to misdiagnosis of zoonotic diseases (Crump, 2014; Crump 2012). This may in turn create vicious cycle of zoonotic diseases among animals and the human population.

Similarly, Mandefero et al. (2018) added that another 35.2% of the study participants were not knowledgeable on the preventive measures of milk-borne zoonotic diseases, nonetheless, raw cow milk constituted about 50.9% of preference for the participants. This observation equally increases the potential of the contraction of milk-borne zoonotic diseases among these farmers as well as endangering the health of the public at large. Acknowledging further, Mandefero et al. (2018) noted that majority of the participants (92.2%) had not received any formal or proper organized training on zoonotic diseases. It is worth stressing that how would these farmers act to prevent the contraction and further spread of zoonotic diseases, should a member of the cattle farming community be infected with milk-borne zoonotic disease. There equally existed a statistical association between the educational level and knowledge, attitudes and practices among participants on milk-borne zoonotic disease ($p<0.05$) as well as a significant difference ($p<0.05$) on knowledge, attitudes and practices of milk-borne zoonotic diseases of the participants between urban and peri-urban areas (Mandefero et al., 2018).

To emphasize more on educational status and knowledge, attitudes, and practices of milk-borne zoonotic diseases in Mandefero et al. (2018) findings, about 64.3% of participants with no education indicated no knowledge of preventive measures for milk-born zoonotic diseases combined with another 25% and 0% of participants with educational high school and above high school education equally indicated no knowledge of the preventive measures of milk-borne zoonotic diseases. This further demonstrates the effect of education on the prevention of cattle-related zoonotic diseases.

Similarly, another study in India that assessed the awareness and risk factors for zoonotic diseases among 250 livestock farmers, Hundal et al. (2016) indicated that the knowledge score of the farmers were low (69.2%), medium (40.8%) , and high-level (30.8%). Hundal et al. (2016) equally added that the awareness of certain zoonotic diseases noted among the

farmers included rabies (84.8%), brucellosis (46.0%), tuberculosis (32.8%), anthrax (4.61%), and bird flu (92.4%) as well as all participants indicated that they were not aware of any disease called cysticercosis (0%) and echinococcosis (0%) respectively. On the mode of transmission of the zoonotic diseases to humans, Hundal et al. (2016) reported that farmers indicated the following; contaminated milk (55.6%), meat (67.2%), air (52.0%), feed (64.0%), and via contact with infected animals (51.2%). Hundal et al. (2016) findings further showed that nearly 69.2% of the farmers recognized the importance of the use of soap in washing of the hands, however only 30.8% did not apply the soap. These observations indicate that there is still much work to be done among livestock farmers in relation to education and training on zoonotic diseases. Hundal et al. (2016) findings did not show any significant statistical associations between factors such as age, education, and number of herd and knowledge level of farmers regarding zoonotic diseases. However, this is inconsistent with Mandefero et al. (2018) finding that educational level was positively associated with the level of knowledge among livestock farmers towards zoonotic diseases.

In Ghana, where several studies in veterinary medicine have reported several infections of zoonotic nature including brucellosis, avian influenza (HPAI) virus subtype H5N1, Newcastle disease, Salmonellosis, and Coccidiosis, tuberculosis (Amissah-Reynolds, 2020; Asante et al., 20016; Andoh et al., 2016; Otupiri et al., 2000). There exist differences in the knowledge level of zoonotic diseases among both poultry farmers and livestock farmers. For example, in a study among 152 poultry farmers Ayim-Akonor et al. (2020) reported that about 86.8% of the farmers are able to tell when a bird is sick with common clinical signs and symptoms such as greenish diarrhoea, weakness, loss of appetite, cough, sneeze, and bloody spots in faces. Among farmers who could identify the sick birds quite a significant number (22.0%) of them were not name the actual disease (Ayim-Akonor et al., 2020).

Comparatively, the knowledge, attitudes, and practices towards zoonotic diseases (including cattle-related zoonosis) do not seem somewhat different even in some developed countries. As an illustration Çakmur et al. (2015) reported in a study involving 151 livestock farmers in Italy, including cattle farmers that the ratio of farmers that had adequate knowledge on how zoonotic diseases infect as well as it prevention was 21.9%. Even though Çakmur et al. (2015) reported higher proportion (96.7%) of farmers who indicated that they were aware that humans can contract certain diseases from animals still leaves room for global concern with enough evidence that livestock farmers in developing countries have poor knowledge and practices towards zoonotic diseases. Considering the knowledge some zoonotic specific diseases among the 151 livestock farmers in Italy, Çakmur et al. (2015) reported the following findings; Brucellosis (88.1%), Anthrax (80.8%) Rabies (46.4%), Crimean-Congo Hemorrhagic Fever (27.8%), Hydatid Disease (23.2%), Tuberculosis (20.5%), Toxoplasmosis and Giardiasis (0.7%). Admittedly, some farmers even though indicated knowledge on some of the zoonotic diseases, however, it can also be noted that there exist huge significant variations about the zoonotic specific diseases and highlights the need to address these observations.

Importantly, does having knowledge about zoonotic diseases among livestock farmers, including cattle farmers translate into positive attitudes and practices? According to the findings of Çakmur et al. (2015), about 87.8% of farmers exhibited positive attitude, and 51.9% also exhibited positive practice. Contrastingly, Çakmur et al. (2015) indicated that the farmers acknowledged that it was important to have veterinarians check their livestock (including cattle) against animal-borne diseases, nevertheless, just about 35.8% of the farmers actually practiced this. Çakmur et al. (2015) reported a high recognition of handwashing by the farmers (98.7%), however approximately 91.4% of the farmers indicated that they practice handwashing.

Contemporary studies have continued to suggest that livestock farmers, often exposed to zoonotic diseases should use personal protective equipment (PPE) (Odo et al., 2015). According to Çakmur et al. (2015) findings, about 92.1% of the farmers recognized that hand gloves should be employed when attending to livestock, however, about 35.8% of the farmers indicated they use the hand gloves. Additionally, 84.1% also recognized the importance of the use of face masks, however, only 6.6% of the farmers indicated the use of the face masks. Concerning the use of boots when attending to livestock about 89.4% of the farmers recognized the need, however only 42.4% of the livestock farmers used the boots. Similarly, Çakmur et al. (2015), observed that about 88.1% of the participants acknowledged that having a scar or wounds increases the potential of zoonotic diseases however, 46.4% indicated they do attend to their livestock with wounds or scars on their hands as well as about 80.1% of the farmers recognized that sick animal corpse should needed to be buried deep, however only 22.5% of the farmers indicated destroying the sick animal corpse by burying deep.

Other studies conducted to examine the usage of PPE by livestock farmers (including cattle farmers) explained that when farmers are exposed to occupational hazards, use of PPE is suboptimal (Odo et al., 2015). According to the findings by Carpenter et al. (2002) it was observed that only a few of the livestock farmers stated using PPE for protection from injury especially when they are handling large animals or using chainsaws. Carpenter et al. (2002) added that the employment of PPE including respiratory protection, eye protection, heavy gloves, and protective footwear was also uncommon inside animal containment buildings, and farmers rarely used PPE when mixing and applying pesticides (Carpenter et al., 2002). Schenker et al. (2002) also reported in a study in California (USA) that about 93% of farmers indicated that they put on PPE when using pesticides, nonetheless, about 33% of the farmers employed PPE for other tasks. In other vein barely 24.4% of the livestock, farmers used

respiratory protection. Costa et al. (2007) also maintained that younger livestock farmers are more likely to use respiratory protection than older farmers are.

**2.3 Housing and sanitary practices among the cattle farmers and the relationship with the spread of zoonotic diseases.**

Studies have acknowledged that several animals are kept in societies for several reasons such as pets, subsistence purposes or for commercial purposes. The purpose for keeping an animal including cattle greatly influences the housing and to a larger extent, the sanitary practices employed by the farmers. According to Amissah-Reynolds (2020), there exist three kinds of housing systems employed by livestock farmers and include intensive, semi-intensive, and extensive housing systems. Among the three housing systems, it is acknowledged that the intensive housing system warrants the confinement of livestock, nonetheless, the intensive housing system is the least used because is awfully expensive (Amissah-Reynolds, 2020). This would in a way explain why most livestock farmers, including cattle farmers allow their herd/cattle to be roaming and grazing in the communities and contaminating the environment through undiscriminating defecation, urination, and salivation. As maintained elsewhere (Tu et al., 2019; Oo 2010; Henning et al. 2007; Devendra et al., 2002) that livestock including cattle are mainly raised on through backyard farms, and characterized with traditional ways of feeding such as grazing, scavenging in a community's environment and utilizing standing crop residues and by-products.

According to Dodua et al. (2019), as a results of the cost involved in the intensive housing systems, livestock farmers especially in developing countries including Ghana keep their livestock under improvised edifices, such as shelters, yards, stalls and shades, in addition to feeding their livestock off household food wastes as well as letting the livestock graze or roam for food. Baah et al. (2012) maintained that most livestock farmers keep their livestock in close proximity to their residence because of theft from unsuspecting persons to ensure

proper monitoring, a situation that has the possibility of facilitating the spread of zoonotic diseases result from close contacts with the animals according to Ayim- Akonor et al. (2020).

In Ghana, Duku et al. (2010) indicated that housing management practices for livestock, including cattle differ from region to region with extensive system being the widely used, therefore increasing the risk of human-animal contact as well as enabling the spread of infections between humans and the animals. As maintained by Voss (2019), farmers who normally employ extensive or semi-intensive housing systems are often acknowledged to have poor practices of deworming and vaccination of their livestock. This increases the risk of the spread zoonotic related diseases in the community. For example, Voss, (2019) indicated that the poor animal husbandry practices and treatment of infections among these groups of farmers are responsible for most outbreaks globally. In the USA, Tu et al. (2019) indicated in a study involving 161 cattle farmers and other ruminants that grazing was commonly used method to feed cattle (70%) and small ruminants (90%). Nonetheless, the trend of cattle grazing varied significantly between seasons ($p < 0.01$), indicated that about 74% of cattle farmers indicated that they take the cattle out for grazing in the rainy season and winter while about 62.0% of farmers indicated that their cattle grazed in the summer months. Additionally, making available supplementary feed to cattle was more common (>50% ) during summer and then reduced (< 50%) in the winter and rainy seasons (Tu et al., 2019).

Corroborating the findings of Chowdhury et al. (2018) in a study in India involving 23 cattle farmers on frequently used animal husbandry and hygiene practices, it was noted that 43% of the farmers kept their livestock in improvised sheds which is just separated by a wall from their living space. Chowdhury et al. (2018) findings showed that the common roof used for the sheds was Tin material (22%/) and concrete made floor (60.87%) followed by earth and brick (30.44% and 8.67%, respectively) (Chowdhury et al., 2018). On hygiene practices, all

the farmers indicated that they maintain a healthy approach of routine shed cleaning and hand washing practices. Likewise, majority of the farmers indicated that farms are situated with well drainage system (87%) as well as about 82% also indicated that they practice of udder cleaning and 47.8% of the farms had clean water for animals (Chowdhury et al., 2018). Overall, Chowdhury et al. (2018) indicated a 34.8% of hygiene practices. This observation is quite disturbing as it has the tendency of making the animal and its products unwholesome and the risk of infections.

Similarly, contemporary studies have argued that unclean livestock including cattle are a potential source of infections, and contaminated meat and other animal products [28]. Again, it is acknowledged that there exist low levels of hygienic practices among the animal production process, from the farmers to even consumers. For example, among butchers who are key stakeholders in the animal production chain, 29 reported inadequate mindfulness about hygienic methods associated with slaughterhouse, meat production and potential work-related threats to them. As observed in a study by Prabhakar et al. (2017) involving 86 participants indicated that only 6.98 % of the butchers were involved in hygienic practices.



### 2.4 Handling of Animal Health and Diseases

Livestock including cattle farming remain an important venture of the poor and rural folks to meet their maintenance desires (Perry et al., 2009). Therefore, diseases that affect the health of the animal and the farmer to a large extent remains essential to the livestock production (FAO, 2002). It is well acknowledged that cattle-related zoonotic diseases contribute significantly to major health problems in addition to impacts national economics especially in low- and middle-income countries (Halliday et al., 2015). As an illustration, it has been reported that approximately 20,000 deaths have caused by rabies and 2.2 million new cases of tuberculosis, known zoonotic diseases (WHO, 2013, Knobel et al., 2005). This highlights the importance of the proper management of cattle-related zoonotic diseases across the globe.

Studies have suggested that the sources of the livestock such as, from the open markets, families and friends further makes it difficult for the most diseases among livestock to be detected as often these open markets are less regulated (Dodua et al., 2019). Similarly, other farmers do acquire their livestock through theft and stray animals. Amissah-Reynolds (2020) stated that livestock often brought into the farms and homes are every so often of unidentified health conditions and combined with none or little medical screening and examination by a veterinary officer, prior to acquisition. As a result, the acquisition of the animal is likely to introduce zoonotic agents into the herd or homes of the farmer. Majekodunmi et al. (2019) equally asserted that, there currently exist inadequate strict confinement of animals in most of the communities, which further increases the potential spread of zoonotic infections among the public. Most countries have enacted regulations on the type of animals permitted around human settlements, however, these regulations are often ignored (Amissah-Reynolds, 2020). Likened to best practices where pets are kept outside the homes, livestock are kept some distance away from human settlements, the common observation in most developing countries including Ghana is that abandoned animals roam glaringly in our streets and communities (Amissah-Reynolds, 2020). It is also worth knowing that most of the livestock farms are situated in rural areas where well established animal medical centers and laboratories are non-existent (Amissah-Reynolds, 2020). Even in the urban centers where they could be identified with some form of animal medical centers are characterized by inadequate investigative materials posing another challenge to the early detection, treatment, and management of zoonotic related diseases (Amissah-Reynolds, 2020). Animal rearing in residential communities in Ghana is regarded as illegal (Majekodunmi et al., 2019). Ensuring a total ban on the rearing of animals in these communities is not achievable as most people flout these regulations and mostly leave these animals to roam on the street. Due to this the services of veterinary officers are less sought. As some studies have acknowledged,

helminthiasis has predominantly been diagnosed through microscopy in most animal medical centers, however, the use of the microscopy is associated with low specificity, due to similarities helminthiasis have with other ova parasite species. This has often resulted in misdiagnoses as well as underestimation of the disease (Amissah-Reynolds, 2020). Furtherance to that, the of issue of limited information on the effectives of drugs often employed by farmers who do report infections at animal medical centers further challenge the effective fight against zoonotic diseases (Amissah-Reynolds, 2020).

Several studies have reported self-medication practices among livestock farmers and suggests a link to the increasing anti-microbial drug resistant globally. According to Silbergeld et al. (2008), antimicrobials have predominately been used in livestock production, especially in the production of cattle, swine, poultry, and aquaculture. It is recognized that antibiotics use in livestock production are classified into all the major classes of antibiotics normally used in clinical practice (Sekyere, 2014). There is evidence that suggest antimicrobials that were licensed for livestock use before their subsequent use in humans (Silbergeld et al., 2008). As maintained by Chee-Sanford et al. (2009) and Laxminarayan et al. (2013), that antimicrobials used in livestock production and husbandry practices by farmers have been associated as a cause of antibiotic resistance in recent times.

According to reports by Silbergeld et al. (2008) , Chee-Sanford et al. (2009) and Page et al. (2012), livestock farmers, including cattle farmers have been observed to use antibiotics to manage conditions such as metaphylaxis, prophylaxis, as well as for growth promotion in animals. It is equally reported that comparatively, larger farm animals such cattle consume more than half the antibiotics produced internationally (Page et al., 2012; Cromwell, 2001). Zoonotic diseases among cattle have effect on their productivity by limiting feed conversion efficiency, slackening the growth rate, as well as increasing their mortalities. Considering the investments dedicated to the production of the cattle and other livestock, farmers resort to the

use of sublethal prescriptions of antibiotics to prevent diseases and promote growth in their cattle (Page et al., 2012). As was observed in Ghana among 110 livestock farmers by Sekyere, (2014), the various types of antibiotics used in their farms included injectable tetracycline, sulphadimidine, benzylpenicillin, and dihydrostreptomycin containing antibiotics were overly used by the farmers especially in the management of diarrhea, rashes, and coughs. Additionally, Sekyere, (2014), indicated that unsafe storage and disposal practices observed among the farmers reflected the abysmal knowledge on appropriate use of antibiotics. Again misdiagnosis and inadequate protection during antibiotic handling in the farms increased the risk of antibiotic resistance development and spread (Sekyere, 2014). However, the WHO recommends that to reduce the amounts of antibiotics employed in the livestock production, including the cattle farming, the practices of hygiene-based husbandry, veterinary supervision, and antibiotic dispensing under prescriptions only to policy makers and governments should be respected (WHO, 2011).

As maintained by Aso (2016), cattle-related zoonotic diseases including that of bovine and avian diseases greatly decrease the production and upsurge mortality the cattle by 30%. Other issues that complicates the detection of cattle-related zoonotic diseases revolve around the less qualified para-veterinarians and community animal health workers. This continue to affect the regular vaccination of cattle and other important livestock in most developing countries. The lack of qualified para-veterinarians and community animal health workers has been associated with lack of financial incentives committed to these workers. However, Aso (2016) is of the view that the privatization of vaccination services for cattle as well as paying para-veterinarians on commission basis might aid invigorate this important link. Nonetheless, this raises the question of the appropriate use and disposal of veterinary drugs. It has been acknowledged that all most all countries in West Africa have poorly controlled systems to dispose of diseased animals (Aso, 2016). Equally, the slaughterhouses and abattoirs have

been a source of contamination of non-diseased carcasses by diseased ones (Aso, 2016). The situation of slaughterhouses and abattoirs not meeting international standards increases the risk of zoonotic diseases (Fearon et al., 2014). Research continue to give varying evidence to the handling of zoonotic related diseases among livestock farmers. As was observed by Singh et al. (2019) in a study involving 558 livestock farmers, that about 359 (42%) of the participants indicated animals that dies as a result of any disease needed to be buried and application of disinfectants including lime. Additionally, Singh et al. (2019) indicated in the study that only 10% and 8% of the farmers actually tests brucellosis and tuberculosis, respectively among their cattle.

# CHAPTER THREE

## STUDY AREA AND RESEARCH METHODOLOGY

### 3.1 Study Area

The study was conducted in the Tamale Metropolis in the Northern Region of Ghana. The Tamale Metropolitan Assembly was established by legislative instrument (LI 2068) which gave rise to the then Tamale Municipal Assembly to become a Metropolis in the year 2004. It has Tamale as the Metropolitan Capital city and as well the regional capital of the Northern Region (GSS, 2010). The Tamale metropolis is composed of the Tamale Central, the Tamale South and the Tamale North constituencies. The Tamale Metropolis is one of the 26 districts in the Northern Region. It is in the central part of the Region and shares boundaries with the Sagnarigu District to the west and north, Mion District to the east, East Gonja to the south and Central Gonja to the south-west. The Metropolis has a total estimated land size of 646.90180sqkm (GSS-2010). Geographically, the Metropolis lies between latitude 9º16 and 9º 34 North and longitudes 0º 36 and 0º 57 West. Tamale is strategically located in the Northern Region and by this strategic location, the Metropolis has a market potential for local goods from the agricultural and commerce sectors from the other districts in the region. Besides the comparative location of the Metropolis within the region, the area stands to gain from markets within the West African region from countries such as Burkina Faso, Niger, Mali and the northern part of Togo and also en-route through the area to the southern part of Ghana (Ghana Statistical Services, 2010).

The study was specifically conducted amongst five (5) rural farming communities in the Tamale Metropolis. The selected communities included Bilpella, Adubilyili, Foshagu, Kudala and Tugu. These communities were specifically selected as majority of the cattle farmers in the metropolis are known to reside within these communities and are noted for both

subsistence and commercial cattle farming activities. The careful consideration of these communities allowed the researcher to address the theme of this research.

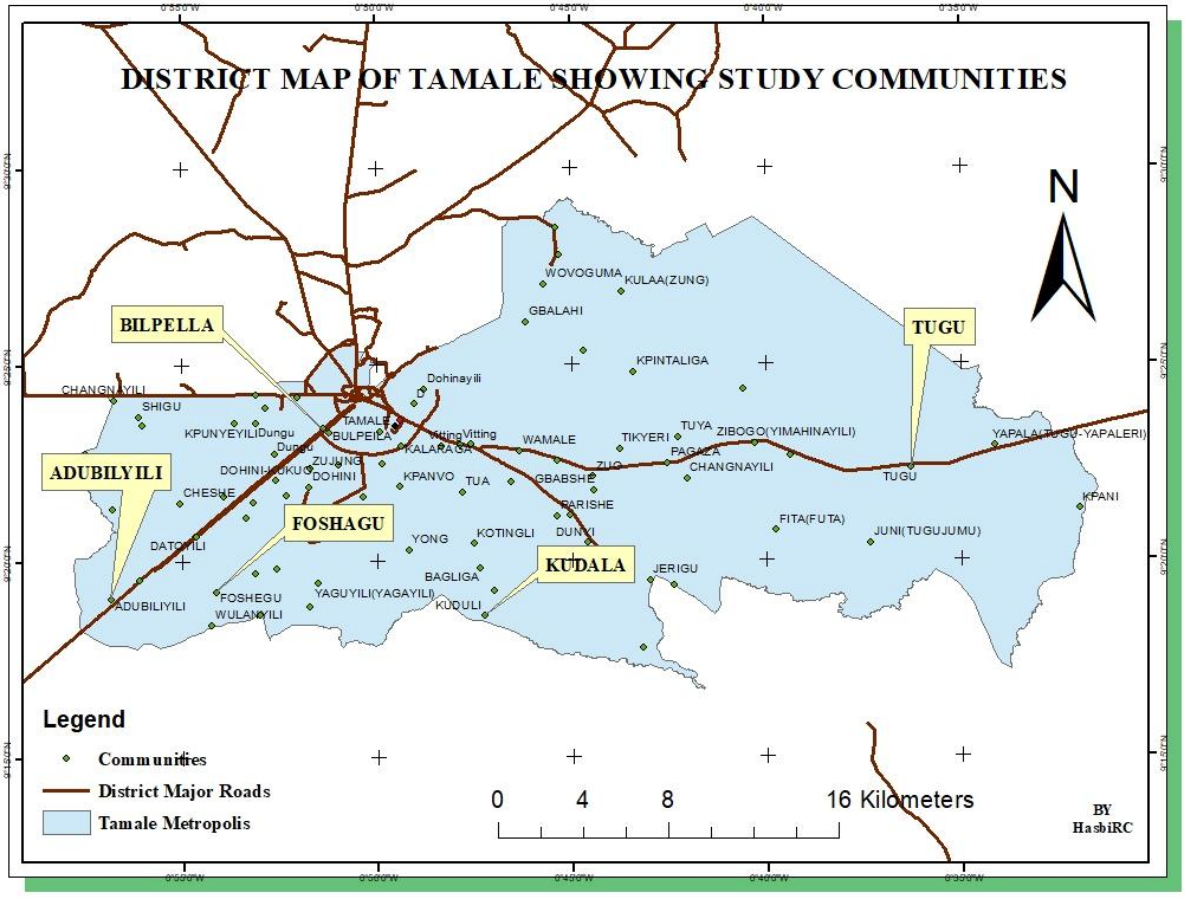


Figure 3.1. Map of Tamale Metropolis: Source, Developed by Author.

### 3.2 Research design

A descriptive cross-sectional study was be conducted from October 2019 to June 2020. A mixed method (Quantitative and Qualitative) approach was employed for the study. This provided a more holistic approach to the study, whereby the weaknesses of one method compensated for the strengths of the other instruments and vice-versa as well as providing a multi-perspectival approach to the study.

### *3.2.1 Qualitative study*

The researcher adopted an in-depth focused group discussions (FGDs) using focus group guide to obtain data on knowledge and attitudes on ZDs amongst the study participants. The FGDs was conducted among the heads of the cattle farmers associations in the five communities (Bilpella, Adubilyili, Foshagu, Kudala and Tugu) considered for this study. Five (5) FGDs were conducted, one from each of the communities involving 5-8 elders and heads of the cattle farmers in the communities. The researcher employed FGDs as it offered the advantage of gathering participants with experiences in cattle farming to provide detailed information on the themes for this study as well as providing cost-effective and time saving advantages. Purposive sampling technique was used in selecting heads of the cattle farmers for the FDGs. Responses was audio-taped and detailed notes was also taken to reinforce the process.

### *3.2.2 Quantitative study*

The quantitative approach of the study involved the use of structured questionnaires on zoonotic diseases. A structured closed ended and open-ended questionnaire were developed to assess the knowledge and attitudes toward zoonotic diseases among cattle farmers in the selected rural communities. The questionnaire would be developed to collect detailed demographic information and related to Knowledge, Attitudes and Practices of cattle farmers about ZDs. The demographic information collected would include age, gender, marital status, family size, income, and the educational qualifications. The cattle farm associated data may include experience in cattle farming (thus, years in cattle rearing) and ownership of the cattle.

The knowledge assessment questions comprised of six main questions. The knowledge was categorized into poor or good based on the knowledge score of participants. A correct knowledge attracted a one mark.

The attitudes on cattle-related zoonotic questions consisted of five (5) main questions and categorized into poor or good depending on the score of the participant. A correct practice attracted a one mark.

The practices related questions comprised of eleven set of cattle-related zoonotic questions. It was further categorized in to poor and good practices based on the score of a participant. A correct practice attracted a one mark.



### 3.3 Study population

The study population included all cattle farmers in the Tamale Metropolis.

#### *3.3.1 Study Unit*

For the purpose of this study, the study unit is defined as farmers who keep cattle for commercial and or subsistence purposes in the rural areas in the Tamale Metropolis especially among cattle farmers in Bilpella, Adubilyili, Foshagu, Kudala and Tugu rural communities to assess their knowledge, attitudes and practices towards cattle-related zoonotic diseases.

#### *3.3.2 Inclusion criteria*

The inclusion criteria consist of:

1. Both Male and Female cattle farmers.
2. Must be cattle farmers (both subsistence and commercial farmers)
3. Must consent to participate in the study.

#### *3.3.3 Exclusion criteria*

Participants will be excluded based on:

1. Refusal to consent to participate in the study.
2. Not been a cattle farmer

### 3.4 Sample Size

The study conveniently selected 100 study participants in the five selected rural communities in Tamale. The distribution of participants among the five communities is presented in Table 3.1. Subsequently, a snowballing sampling approach was used identify the cattle farmers to attempt the items on the questionnaire. Convenient sampling and snowballing sampling approaches were adopted for this work because of the study was conducted in the era of the COVID-19 pandemic. As was strongly advised by the WHO (2020) and the Government of Ghana and the Ministry of Health to observe social distance, avoidance of social gatherings and encouragement of staying at home, the convenient sampling offered the researcher the opportunity to gather enough data to address the research objectives. Equally, the convenient sampling approach reduced the risk of having to come into close contacts with a lot of people, which would in turn increase the risk of contracting the COVID-19. Hence using the convenience sampling allowed the researcher to draw from the part of the population that is close to hand.

Again the snowballing approach allowed the research to identify individuals who were into cattle farming and readily available to participate in this study.

Table 3.1. Distribution of Participants among the Five Rural Communities

| Community | Number of Study Participants |
|---|---|
| Bilpeila | 18 |
| Adubilyili | 22 |
| Foshagu | 20 |
| Kudula | 19 |
| Tugu | 21 |
| Total | 100 |

### 3.6 Sampling Technique.

The study involved a multistage sampling approach consisting of convenient and purposive sampling approaches to administer questionnaires to the 100 participants and to conduct the FDGs. The use of the convenient sampling approach to this study is based on participants' readiness and availability in the selected communities. Equally, it offers an advantage to apply both qualitative and quantitative data analysis methods.

The purposive sampling approach to the FDGs of this study offered the advantage of selecting only participants who warranted inclusion based on characteristics such as experience in cattle farming and position(s) participants hold in the community as heads of cattle farmers. The members for the FDGs consisted of 5-8 members. The use of members not more than eight (8) allowed for a greater attention and less destructions among the group and facilitated in the provision of much detailed information on zoonotic diseases.



### 3.7 Source of Data

The study used data from two main sources: namely primary and secondary data sources. The primary data source involved the use of semi-structured focus group guide and structured questionnaire to gather data from cattle farmers in the five rural communities in the Tamale whereas the secondary data source for the study included the use of related literature on zoonotic diseases from journal sources.

### 3.8 Study Instruments

For the qualitative aspect of the study, the researcher used a semi-structured focused group interview guide to solicit for information amongst the heads of the cattle farmers. The use of the structured interview guide allowed the researcher to ask predetermined questions and for an exploration of new information from the participants during the discussions among the

elders of the cattle farmers on ZDs. Responses were audio-taped and detailed notes were also be taken to reinforce the process.

Equally, for the quantitative aspect of the study, the researcher employed a semi-structured questionnaire on cattle-related zoonotic diseases. The semi-structured questionnaire was developed using a closed ended type of questions. The adoption of the closed ended type of questions allowed the researcher to identify predefined questions on cattle farmers' knowledge, perception, and attitudes towards ZDs.



### 3.9 Data Collection Instrument

Quantitative Data: The data collection tool (questionnaire) had six main themes which was expanded to into thirteen items. The themes included Sociodemographic Characteristics, Awareness and Knowledge on Cattle Related Zoonotic Diseases, Cattle Farming Sanitary Practices, Attitudes towards Cattle Related Zoonotic Diseases, Practices of Animal Husbandry and Handling of Cattle Related Zoonotic Diseases. The questionnaire was developed by considering studies described elsewhere (Ayim-Akonor et al., 2020)Chowdhury et al., 2016; Schenker et al., 2002). The questionnaire was subsequently pretested, and modifications made to ensure that it address the research objectives.

Qualitative data: The data collection tool for the qualitative data was interview guide consisting of open-ended questions.

### 3.10 Data Variables

For this study, the researcher employed the demographic characteristics of participants (age, sex, marital status, income etc.) and ownership of the cattle as the explanatory variables for this study.

The outcome variables for the study would consist of Knowledge of ZDs, Husbandry Practices and Attitudes towards ZDs. Again, the researcher developed an index score for knowledge, practices, and attitudes on ZDs.

The 'Knowledge" considered the meaning of zoonosis and routes of transmission of ZDs. The 'Practice" considered participant's animal deworming practices, habit of consuming raw milk, washing hands after contact with animals, the habit of walking bare feet at home or at the farm and testing of the herds for brucellosis or tuberculosis. The 'Attitude' aspect consisted of the attitude towards disposal of carcasses and for the deworming practices.

The Awareness and knowledge levels were assessed by scoring participants on a scale of 0-12. This was dependent on the responses a participant gives concern knowledge questions on the questionnaire. A score of less than six (6) was regarded as poor knowledge and a score of six (6) or more was regarded as good knowledge.

The Attitudes of the study participants were examined by scoring participants on a scale of 0-23. A score of less than ten (10) was designated poor attitude and a score of more than ten (10) was designated good attitude.

The practices of the participants were assessed on a score of 0-14. A score of less than seven (7), was designated as poor practices and a score of seven or more was designated as good practices.

### 3.11 Data Quality Control

The researcher conducted a training session for three research assistants to help in the data collection process of the study. The researcher extensively explained the rationale and study objectives to the research assistants. The researcher encouraged the research assistants to ask any question regarding study and address them appropriately to facilitate the quality of data

generated. The research assistants were selected based on their fluency in at least one local dialect including Dagomba in addition to the English language.

Equally, the researcher conducted a pretest of the study instruments together with the research assistants. The pretesting of the data collection tools was conducted at the Dungu Cattle Market. This allowed the researcher and research assistants to familiarize with the research tools and learn any unanticipated challenge(s). Observed challenges with respect to the data collection tools after the pretesting exercise were modified where necessary to be able address the objectives of the study.

In addition, the researcher and the research assistants carefully explained into detailed, every item on the data collection instrument especially for participants who are unable to read. The data collection tools (interview guide and questionnaire) was crossed checked to ensure that all items have been attempted by participants.

### 3.12 Ethical Issues

Ethical approval for the study was obtained from the Institutional Review Board of the University for Development Studies (UDS). The researcher equally sought for permission from the Chiefs and elders of the cattle farmers in the selected communities to avoid and prevent any unanticipated hindrance to the data collection process. Both verbal and written consent were sought from the study participants to participate in the study.

The researcher explained the rationale of the study together with any anticipated harm(s) and benefit(s) to the participants to make an informed decision either to participate or not to participate in the study. Participating in this study was voluntary and signing of the consent form does not in any way bind participants to complete the study to the later. Participants were at liberty to choose to redraw from the study at any point in time.

Electronic data generated from this study was pass-worded to secure it and hard copies of the data was also kept with the Ghana Data Commission for the data to be made secured. The hardcopies would be destroyed after three years of the award of the Master of Public Health.

### 3.13 Data Analysis and Presentation Method

Data obtained for the quantitative part of study was entered on Microsoft Excel 2010, validated, and later exported to SPSS for further data management and analysis. The results of the study were presented in frequency, percentage, charts, and tables for clarity. A test of association between the explanatory and outcome variables was performed using chi-square test at a significance of $p< 0.05$.

For the qualitative part of the study, transcripts and notes derived from the focused group discussions and narratives in local dialects were translated to English. The transcripts were analyzed using content analysis. The analysis was organized into themes based on the research objectives to provide more explanations to the observation made in the quantitative data.

### 3.14 Study Limitations

The expected study limitations included the language barrier as most of the participants are likely not to be educated, hence they may not be able to read the items on the questionnaire. However, having researchers who can speak some of the local dialects will help minimize the effects of the language barrier on the data collection process. Secondly, the researcher anticipates a none-response from some of the participants. This was because of participants harboring the fear of maybe the researcher reporting them for any "wrongdoing" to authorities. The researcher took time and explained the rationale or intent of the study to participant to alley their fears.

### 3.15 Dissemination of results

The outcome of the study would be disseminated to the Tamale Metropolitan Food and Agricultural department, the Veterinary Service, the Department of Community Health and Family Medicine-School of Medical and Health Sciences-UDS, UDS Graduate School and learned societies as well as published in peer reviewed journals.



# CHAPTER FOUR

# DATA ANALYSIS AND PRESENTATION

## 4.0 INTRODUCTION

This chapter is dedicated to the presentation of results on the data gathered for the study. The chapter presents the results in line with the objectives of the study.it starts by highlighting the general synopsis of the socio-demographic characteristics of the study participants, level of knowledge, attitudes and practices on cattle related zoonotic diseases, the cattle rearing systems in the area and its associated risks to the animals and the cattle farmers, how zoonosis diseases are handled in the area and finally presents results on the relationship between cattle rearing knowledge on zoonosis and how the disease is spread.

## 4.1 SOCIODEMOGRAPHIC CHARACTERISTICS

**Table 4.1** present sociodemographic characteristics of the study participants. A total of 100 participants were recruited onto the study with a response rate of 100% (100). The mean age was found to be 47.46 (SD: 10.84) with age range of 25 to 70 years.

Overall, majority of the study participants were males 98(98.0%). Also, 37(37.0%) of the participants, representing the majority were in the age bracket of 41-50 years with age 21-30 years being the least represented 10 (10.0%).

Out of the hundred participants, 95(95.0%) persons were married with only 5(5.0%) being single. Dagomba's were the most represented with 36 (36.0%) participants, followed by fulanis' 29(29.0%) and Konkonmbas' 14 (14.0%).

88 (88.0%) of the study participants were Muslims and 12 (12.0%) of the participants were Christians.

On the educational background of the participants, it was found that 30 (30.0%) participants indicated that they do not have education with 28 (28.0%) of the participants also indicating they have also had non-formal education. 36 (36.0%) of the study participants also indicated that they have had basic education, Junior High School 5.0% (5) and Senior High School 1.0% (1). None of the participants did not have tertiary education.

Responses from the qualitative aspect of the study also showed similar socio-demographic characteristics as that of the quantity data. All the five participants interviewed from the five communities were in their middle ages (48, 49, 50, 54 and 55 years of age). All were males and married with only two (2) having some form of formal education. Equally, interviewees were Muslims with ethnic representation of 3 Dagombas, and 2 konkombas, respectively.

**Table 1. Sociodemographic Characteristics**

| **(N=100)**<br>**Mean age =47.46 (SD:10.84)**<br>**Minimum age = 25; Maximum age = 70.**<br>**Variable** | **Frequency (%)** |
|---|---|
| **Sex** | |
| Female | 2(2.0) |
| Male | 98(98.0) |
| **Age** | |
| 21-30 | 10 (10.0) |
| 31-40 | 21(21.0) |
| 41-50 | 37(37.0) |
| 51-60 | 19(19.0) |
| 61-70 | 13(13.0) |
| **Marital status** | |
| Married | 95 (95.0) |
| Single | 5(5.0) |
| Divorced | - |

| | |
|---|---|
| **Ethnicity** | |
| Dagomba | 36(36.0) |
| Fulani | 29(29.0) |
| Huasa | 10(10.0) |
| Konkomba | 14(14.0) |
| Others | 11(11.0) |
| **Religion** | |
| Christian | 12(12.0) |
| Muslim | 88 (88.0) |
| Traditionalist | - |
| **Educational Background** | |
| No education | 30(30.0) |
| Non formal | 28(28.0) |
| Basic school | 36(36.0) |
| JHS/JSS | 5(5.0) |
| SHS/SSS | 1(1.0) |
| Total | 100(100) |

Source: Field Data, 2020. *(JHS= Junior High School, JSS= Junior Secondary School, SHS= Senior High School, SSS= Senior Secondary School).*

### *4. 1.1 cattle-related characteristics*

**Table 4. 2** describes the cattle-related characteristics of the study participants. Out of the 100 study participants, about 53(53.0%) have reared cattle for more than five (5) years with 47 (47.0%) also indicating that they have reared cattle for less that five (5) years. On proximity of participants houses to where the cattle are kept, 82 (82.0%) of the participants indicated that they reside close to their cattle whereas 18 (18.0%) also indicated they do not reside close to their cattle.

Additionally, on the type of farming (rearing) systems employed by the participants, 76 (76.0%) indicated that they practice extensive system of cattle farming, followed by intensive (14 (14.0%)) and semi-intensive (10 (10.0%)) systems of cattle rearing respectively.

90(90.0%) of the study participants indicated ownership of the cattle whereas 10 (10.0%) also indicated non-ownership of the cattle. On the average, more than half (71 (71.0%)) of the study participants indicated earning more than GHc.1000.0 on monthly basis from the sale of the cattle.

**Table 4.2. Cattle-related Characteristics and their frequencies**

| **(n= 100)** | |
|---|---|
| **Variable** | **Frequency (%)** |
| **Years of rearing cattle** | |
| <5 years | 47(47.0) |
| 5≥ years | 53(53.0) |
| **Do you live close to your cattle?** | |
| Yes | 82 (82.0) |
| No | 18 (18.0) |
| **Please, how do you keep your cattle?** | |
| Extensive System | 76 (76.0) |
| Intensive System | 14 (14.0) |
| Semi-intensive | 10 (10.0) |
| **Are you the owner of the cattle?** | |
| Yes | 90 (90.0) |
| No | 10(10.0) |
| **On the average, how much do you make from the sale of the cattle monthly?** | |
| ≤ Ghc500.00 | 2 (2.0) |
| Ghc500-1000.00 | 27 (27.0) |
| Ghc ≥ 1000.00 | 71 (71.0) |

Source: Field Data, 2020

Results from the qualitative aspect of the cattle-related system of the study participants supports the quantitative findings of the study. As illustrated by the following participants during in-depth interviews and focus group discussions. The following were some of the revelations.

48-year old participant indicated:

"*…madam you know, this business (cattle rearing) is a family business. So, I started as a young man taking the cattle for grazing. I can say that I have been rearing the cattle for more than 30 years. My father handed everything to me, and they were about 20 cattle, now I have taken care of them very well and now I am counting not less than 100 cattle.*

*I should say that I have made a lot of money out of this business. I earn about more than GHC2000.00 from the sale of the cattle and this is what I have used to cater for 2 children in school..*"

The assertions by the participant does not only portray his years of experience in cattle rearing but also ownership and earnings from the cattle as well as how beneficial the cattle farming is to him and his household.

Equally, responses from the other interviewees also portrayed similar trend in the number of years participants have been rearing cattle and ownership. The responses from the other four were as follows:

**Participant 56 years:**

*"… I started rearing cattle about 40 years ago. I can say that I was 16 years when I started going out with my seniors to take care of my father's cattle. So, when I turned 25 years, I also decided to start mine.*

*Madam, asking about the money I make, hmmmm!, when I even sell one cattle, the small one, I make not less than GHC1000.00, so is really a good business the youth must venture…"*

**Participant 50 years:**

*"… I think all my life, this is what I have been doing. My parents were also cattle farmers, so when my father passed-on I took over. It is about 35 years now..."*

*If get a good sale, I can say I would make not less than GHC3000.00 from the cattle in a month…"*

**Participant 54 years:**

*"…smiled; only God knows when I started. I think it should not be less than 40 years. Oh! for the money it depends on the season. During Ramadan like this I can sell my cattle and get almost GHC 10,000 but normal days the amount reduces" the best season for my cattle business is the big Muslim Salla Idel Adaa. I can sell a cow for GHC 5,000.*

**Participant 55 years:**

*"…eei! This work, hmmm. I have been into cattle rearing for the past 40 years. I started at a very younger age. I remember taking the cattle out for grazing with my other siblings and when our father died, the cattle I got, I have been taking care of it since then. If take good care of the cattle, they also take good of you. This is something I believe and so I look after the cattle well to sell and get money. This month like this I have made about GHC 7000.00. So you see what I am talking about. The cattle rearing to me is like a custom and is part of our culture so that any time an elder in the family dies we look for a big cow to perform the funeral.*

This illustrate the fact that culture has played a vital role in cattle rearing in northern Ghana especially within the Dagban traditional area.

Additionally, on the issue of the environment where the cattle are kept, the participants gave the below responses which were consistent with the quantitative findings of the study.

**48-year old participant indicated:**

*"...I leave them in them open where my house so that I can monitor them very well. Once I am here with them it become somehow difficult for thieves to come around a steal them..."*

**Participant 42-year-old reported that as follows:**

*".....My cattle are just by my window. When they struggle I get to know that something is disturbing them. As a result of the thieves in this area I tried them just closed to my window.*

When asked whether he aware of the risks associated with keeping the cattle close to his room he lamented as follows: *yes I am aware but what can I do should I leave them in the bush so that they will come and steal them? That is my source of livelihood, so if I fall sick I can be treated but if they still my animals that will be my end...."*

**Participant 49 years:**

*"... I have some wooden structure that I normally let the cattle sleep in and it is there you go and have a look. Though is it not standard but protects the cattle from thieves..."*

**Participant 50 years:**

*"... One day some people (thieves) tried taken my cattle at back of my house so because I put this wooden structure to at least protect some shelter for them in the evening. Once they are in this structure it will somehow difficult for the thieves..."*

**Participant 54 years:**

*"...my cattle always sleep here in front of my house and from time to time in the evening I come out to see that they all ok, then I go inside. Madam, you know my ears are always on the ground... I don't sleep well in the night because of the cattle. I don't want these young boys from the big city to come and steal my cattle....."*

**Participant 55 years:**

*"... Come and see where I keep them. I made this structure several years ago. At least it is confining them. Any time they are back from grazing they get a place to sleep and also be protected against thieves..."*

**4. 2 Knowledge on Zoonosis Diseases among Cattle Rearing.**

**Table 4.3** describes participant's knowledge on zoonotic diseases.

Out of the 100 study participants, 52(52.0%) of the participants exhibited good knowledge, whereas 48(48%) equally exhibited poor knowledge score. Again, 73(73.0%) of the participants indicated that they are aware that animals are capable of transmitting diseases to humans with 27(27.0%) indicating that they are not aware that animals are capable of transmitting diseases to humans. majority of the study participants 85(85.0%) held the belief that residing close to the cattle can increase one's risk of contracting zoonosis diseases.

Colleague Farmers/ Friends/Family were the main source of information on zoonosis disease among the study participants (83(83.0%), with 12(12.0%) and 5(5.0%) indicating their sources via District Assembly/Veterinary Officers and media such as the Radio/FM/ and TV stations, respectively.

45(45.0%) of the study participants indicated knowledge on how cattle-related diseases could be transferred with only 43 (43.0%) being able list or name how the cattle-related diseases can be transferred from the cattle to humans.

89 (89.0%) of the study participants indicated they have knowledge on the signs and symptoms of zoonotic diseases with about 38 (38.0%) of the participants being able to list/name at least one cattle-related signs and symptoms of zoonosis diseases. Overall, 72

(72.0%) study participants were able to list or name at least one cattle-related zoonotic diseases.

**Table 4.3. Awareness and Knowledge on cattle-related zoonotic diseases**

| **(n=100)** | |
|---|---|
| **Variables** | Frequency |
| **Please, are you aware that animals are capable of transmitting diseases to humans (zoonotic disease)?** | |
| Yes | 73 (73.0) |
| No | 27(27.0) |
| **Do you think sharing the same or leaving close to the cattle can increase your risk of contracting certain diseases or have any health implication?** | |
| Yes | 85 (85.0) |
| No | 15 (15.0) |
| **Source of information on cattle-related information** | |
| Radio/FM/TV stations | 5(5.0) |
| Colleague Farmers /Friends/family | 83 (83.0) |
| District Assembly/Vertinary Officers | 12(12.0) |
| **Do you know how the diseases are transferred from the cattle to humans?** | |
| Yes | 45 (45.0) |
| No | 55 (55.0) |
| **Could list/name any disease that can be transferred from animals to humans you may know.** | |
| Yes | 43 (43.0) |
| No | 57 (57.0) |
| **Do you know of any signs or symptoms that your cattle show when it is sick?** | |
| Yes | 89(89.0) |
| No | 11(11.0) |

Source: Field Data, 2020.

**Table 4.3.1 Awareness and Knowledge on cattle-related zoonotic diseases**

| Variables (n=100) | Frequency |
|---|---|
| **Could list or name any of the signs and symptoms of cattle-related diseases** | |
| 1 sign and symptom | 38 (38.0) |
| 2 signs and symptoms | 30 (30.0) |
| More than 3 signs and symptoms | 21 (21.0) |
| Not all | 11(11.0) |
| **Able to name/list common disease(s) among the cattle** | |
| 1 disease | 37 (37.0) |
| 2 diseases | 22(22.0) |
| 3 or more diseases | 13(13.0) |
| Not all | 28 (28.0) |
| Total | 100(100.0) |

Source: Field Data, 2020.

During the focus group discussion, the respondents reported the following at various selected areas for the study where focus group discussions were organized:

In community A: the participants reported as follows: "...the officials from the ministry of Agriculture comes to this village to take us through the risks factors associated with zoonosis diseases. They examine our animals and educate us on how to take care of them so that they will not be contracted by zoonosis diseases.

At the Bilpella community the participants reported as follows:

"*Zoonosis diseases are real, but we are not getting enough education on them unlike crop farming where every time all radio stations are talking and educating farmers on when to cultivate and the type of seeds to use hmmm!! That type of education is not given to we the animal farmers perhaps they think we are in the minority and not important….*"

### 4.2.1 Signs and Symptoms of Cattle-related Zoonotic Diseases

**Figure 4.1** presents the signs and symptoms of Cattle-related zoonotic diseases given by the study participants. A total of 171 signs and symptoms of Cattle-related zoonotic diseases were mentioned by the study participants. Dullness/Weakness (39(22.8%) was found to be the major signs and symptoms given by the study participants, followed by bloody diarrhea (30(17.5%) and loss of appetite (29(17.0%) as the three (3) topmost signs and symptoms.

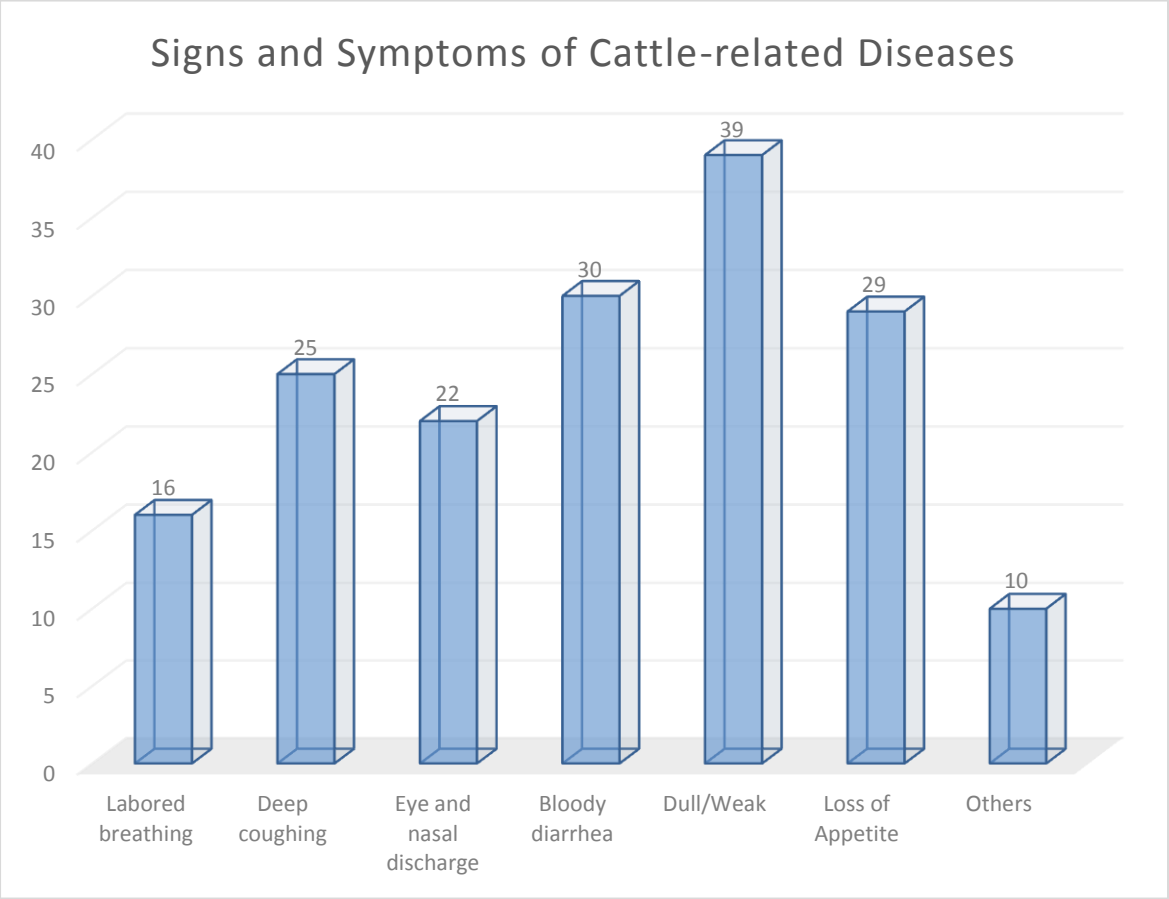


**Figure 4.1. Signs and Symptoms of Cattle-related Zoonotic Diseases**

Source: Field Data, 2020 (Note; Others: calf pneumonia,

The qualitative findings also supports that of the quantitative study except that some respondents reported that the cattle mostly are infected with skin diseases and that when they see such signs they don't even want to touch such animals.

"…Any *time my cattle are losing weight I suspect zoonosis. Nevertheless, that may not be the case. Some of the symptoms are lost of weight, inability to eat well, weakness and some will have skin infections…".*

### 4.2.2 Cattle-related Zoonotic Diseases

**Figure 4.2** presents the data on the Cattle-related zoonotic diseases mentioned by the study respondents. Overall, 153 cattle-related diseases were mentioned by the study respondents. Out of the 153 cattle-related zoonotic diseases, 39 (24.5%) indicated knowledge of Anthrax disease, 36 (23.5%) Worm Infection and 33 (21.6%) Skin Disorders as the three (3) topmost diseases.

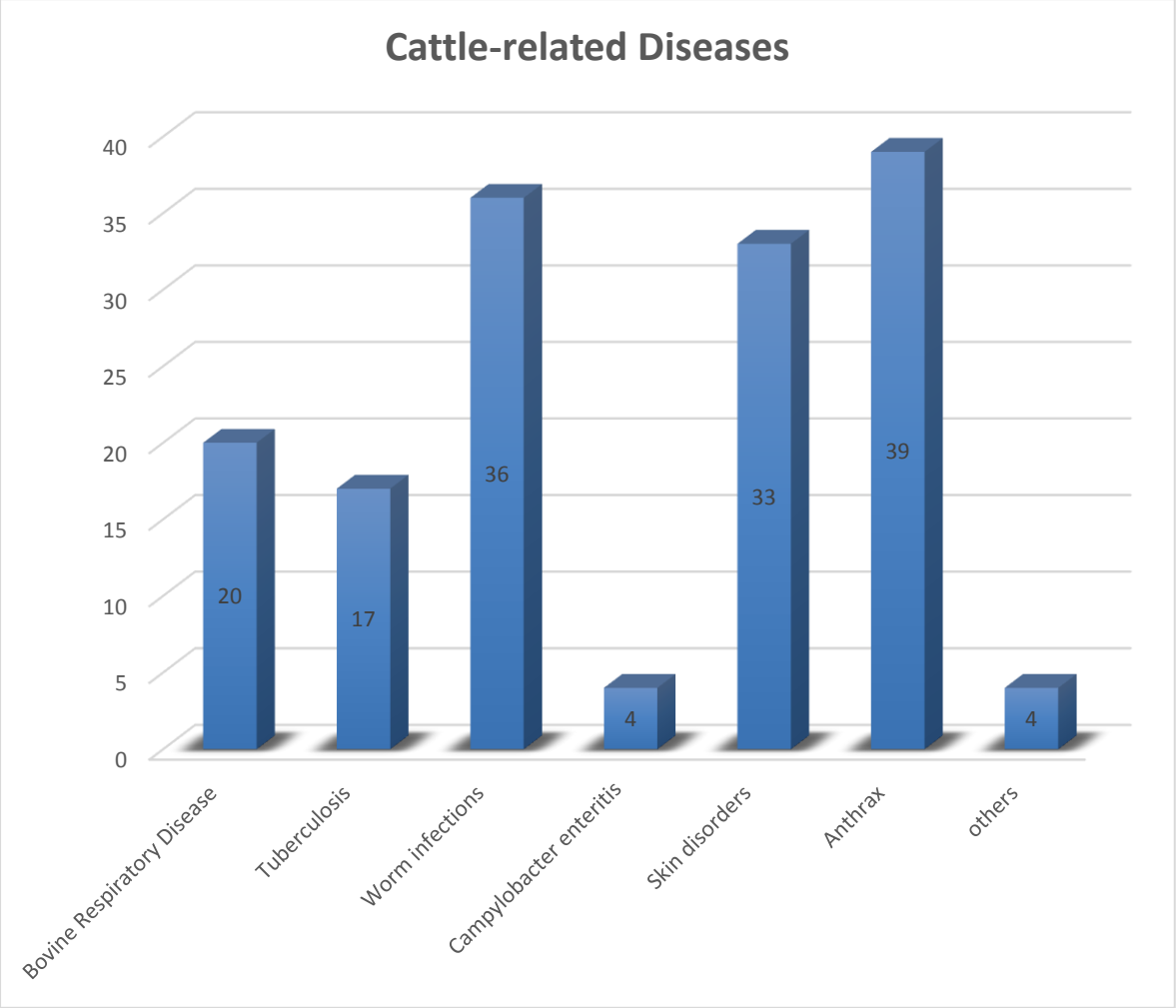


**Figure 4.2. Cattle-related Zoonotic Diseases**

Source: Field Data, 2020 (Note; Others:

### 4.2.3 Knowledge on how the cattle-related zoonotic diseases can be transferred to humans

**Figure 4.3** presents the results on responses given by study participants on how cattle-related zoonotic diseases can be transferred to humans. 80 modes of transmission of cattle-related zoonotic diseases responses was given by participants. Out of the 80 modes of transmission; 32 (40.0%) indicated that cattle-related zoonotic diseases can be transmitted through contaminated meat/food, followed by contaminated water 19 (23.8%) and Open Skin/Wound 12(15.0%) as the topmost three (3) ways of transmission of cattle-related diseases.

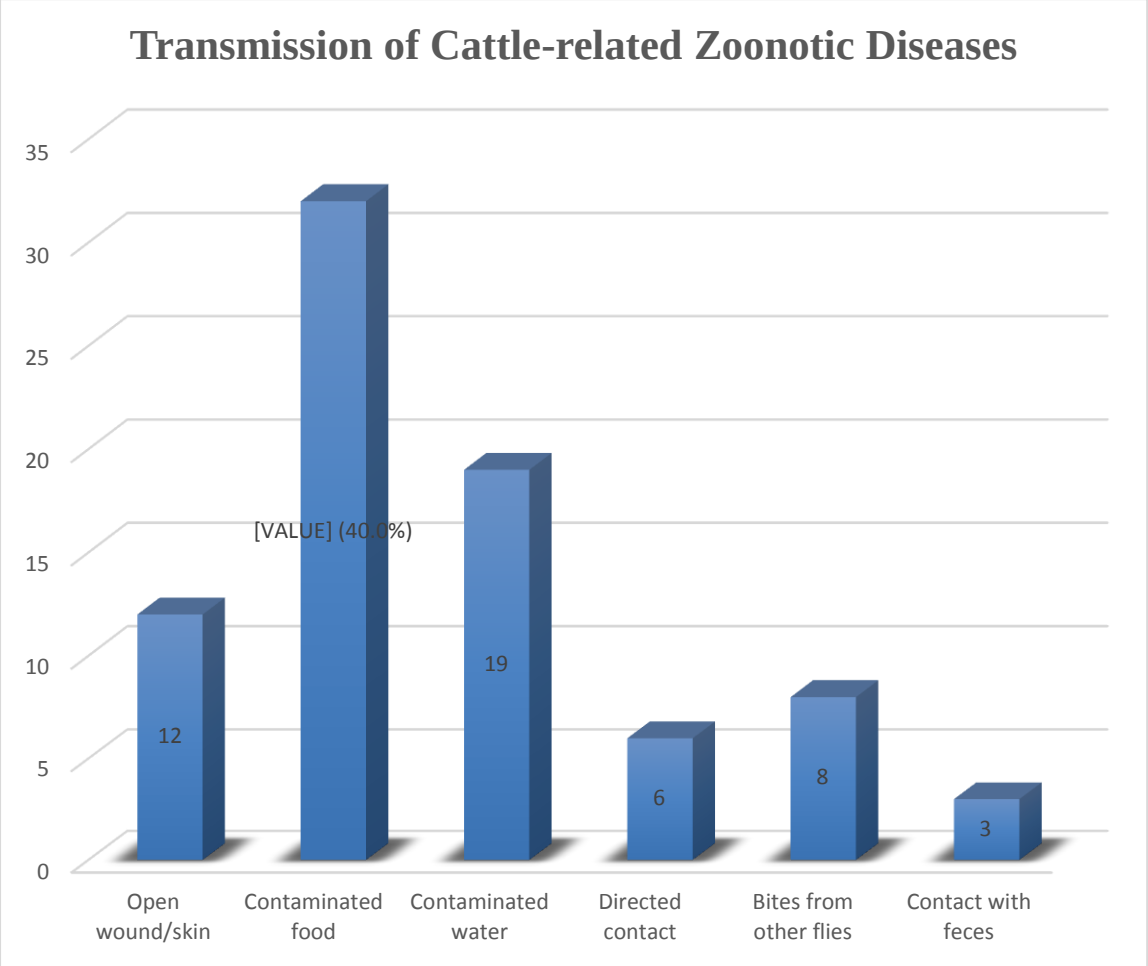


**Figure 4.3. Knowledge on how the cattle-related zoonotic diseases can be transferred to humans**

Source: Field Data, 2020.

### 4.3 Housing and Cattle Farming Sanitary Practices

**Table 4.4** presents the housing and farming sanitary practices by the participants. Out of the 100 participants, majority of the participants (96(96.0%) indicated that they keep their cattle in the open with only 29(29.0%) of the participants engaged in cleaning of the where the cattle are kept. On the frequency of cleaning, majority of the participants cleaned where cattle are kept on weekly basis (12(12%), followed by monthly 11(11.0%) and daily basis 6(6.0%). Only 4(4.0%) of the participants feed their cattle using feeding troughs/water cans and 67(67.0%) not sanitizing their feeding troughs/water cans.

**Table 4.4. Housing and Cattle Farming Sanitary Practices**

| (n=100) | |
|---|---|
| Variables | Frequency (%) |
| **How do you keep your cattle?** | |
| In the open | 96(96.0) |
| I keep them in an enclosed area | 4 (4.0) |
| **Do you clean your cattle area?** | |
| Yes | 29 (29.0) |
| No | 71(71.0) |
| **How often do you clean where you keep the animals?** | |
| Everyday | 6(6.0) |
| Weekly | 12(12.0) |
| Monthly | 11(11.0) |
| I do not sweep at all | 71 (71.0) |
| Total | 100(100.0) |

Source: Field Data, 2020.

**Table 4.4.1 Housing and Cattle Farming Sanitary Practices**

| Variables (n=100) | Frequency (%) |
|---|---|
| **Do you feed your cattle with feeding troughs and water cans?** | |
| Yes | 4(4.0) |
| No | 96(96.0) |
| **Do you sanitize/wash your equipment such as feeding troughs and water cans** | |
| Yes | 33(33.0) |
| No | 67(67.0) |
| **Total** | **100.0** |

Source: Field Data, 2020

### 4.3.1 Sanitization of Cattle tools and Equipment

**Figure 4.4** presents the results on the methods employed by participants to sanitize their Cattle tools and equipment. 33 participants responded to this section the study. From the results, 25(75.8%), representing the majority indicated that the use only warm water in sanitizing their tools and equipment, followed the use of chemical only 5(15.2%) and the use of both water and chemical 3(9.1%), accordingly.

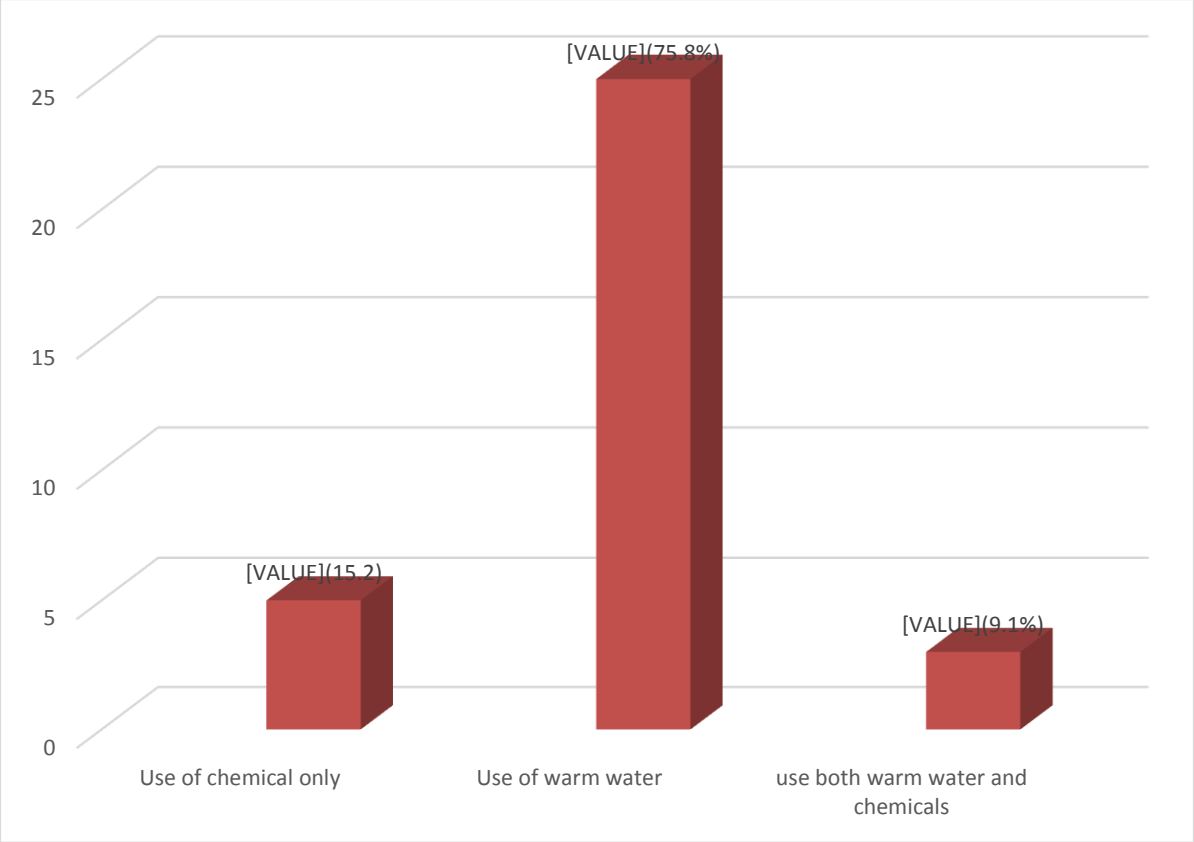


**Figure 4. 4. Methods of Cleaning of Cattle tools and Equipment**

Source: Field Data, 2020.

### 4.4 Attitudes towards cattle-related zoonotic diseases

**Table 4.5** presents result on the attitudes towards cattle related diseases. On the question of drinking raw milk from cattle increases the risk of getting cattle related zoonotic disease, the following were the responses from the participants: Disagree74 (74.0%), Slightly Disagree 5(5.0%), Slightly Agree 7(7.0%) and Agree 14(14.0%) out of the 100 participants.

Having direct contact with animals increasing the risk of getting cattle related zoonotic disease, participants indicated that they: Disagree 10(10.0%), Slightly Disagree 24(24.0%), Slightly Agree 60(60.0%) and Agree 6(6.0%) out of the 100 participants.

Additionally, on walking bare footed in the "animal house" putting the farmer at risk of contracting cattle related zoonotic disease, participants gave the following responses:

Disagree 30(30.0%), Slightly Disagree 27(27.0%), Slightly Agree 23(23.0%) and Agree 20(20.0%) out of the 100 participants

Also, enquiring whether cattle droppings /manure does not contain any infectious disease agent, participants responded as: Disagree 22(22.0%), Slightly Disagree 4(4.0%) Slightly Agree 20(20.0%)) and Agree 32 (32.0%) out of the 100 participants.

Lastly on whether Deworming of the cattle protect them totally from any infection, participants indicated the following: Disagree 17(17.0%), Slightly Disagree 26(26.0%), Slightly Agree 55(55.0%) and Agree 24 (24.0%) out of the 100 participants.

**Table 4.5. Attitudes towards cattle related diseases**

| Variable | Responses (%) | | | | |
|---|---|---|---|---|---|
| | Disagree | Slightly Disagree | Slightly Agree | Agree | **Total** |
| Drinking raw milk from cattle increases the risk of getting cattle related zoonotic disease | 74(74.0) | 5(5.0) | 7(7.0) | 14(14.0) | 100(100.0) |
| Having direct contact with animals increases the risk of getting cattle related zoonotic disease | 10(10.0) | 24(24.0) | 60(60.0) | 6(6.0) | 100(100.0) |
| Walking bare footed in the "animal house" does not put me at risk of contracting cattle related zoonotic disease | 30(30.0) | 27(27.0) | 23(23.0) | 20(20.0) | 100(100.0) |
| Cattle droppings /manure does not contain any infectious disease agent | 22(22.0) | 26(26.0) | 20(20.0) | 32 (32.0) | 100(100.0) |
| Deworming of the cattle protect them totally from any infection | 17(17.0) | 4(4.0) | 55(55.0) | 24 (24.0) | 100(100.0) |

Source: Field Data, 2020

### 4.5 Practices of animal husbandry

**Table 4.6** presents the result on the animal husbandry practices of the participants. Out of the 100 participants only 10(10.0%) and 12(12%) indicated that they wash their hands before and after attending to any of the cattle. Additionally, only 8(8.0%) of the participants apply soap when washing their hands. Only 11(11.0%) of the participants indicated the need to practice handwashing before attending to the cattle. On the use of protective clothing before attending to the cattle, 95(95.0%) indicated that they do not use any protective clothing.

**Table 4.6. Practices of animal husbandry**

| **(n=100)** | |
|---|---|
| **Variable** | **Frequency (%)** |
| **Do you wash your hands before attending to any of the cattle?** | |
| Yes | 10(10.0) |
| No | 90(90.0) |
| **Do you wash your hands after attending to any of the cattle?** | |
| Yes | 12(12.0) |
| No | 88(88.0) |
| **Do you always apply soap when washing hands?** | |
| Yes | 8(8.0) |
| No | 92(92.0) |
| **Do you think washing of hands is important in handling the cattle?** | |
| Yes | 11(11.0) |
| No | 89(89.0) |
| **Do you use any protective clothing before attending to the cattle?** | |
| Yes | 5(5.0) |
| No | 95(95.0) |
| Total | 100(100.0) |

Source: Field Data, 2020. *(The protective clothing used most of the time by some of the respondents included Hand gloves (3/5) and overall coat (2/5))

### 4.6 Handling of cattle related zoonotic diseases

**Table Seven** presents result on the handling of cattle related zoonotic diseases from the study participants. Out of the 100 participants, 83(83.0%) representing the majority indicated that they handle sick cattle by practicing "self-medication" and 17(17.0%) also indicated that they call on the veterinary officers to treat their sick cattle. 92(92.0%) of the participants also indicated that they do not use hand glove when attending to the sick cattle. Only 61(16.0%) participants also indicated that do isolate the sick cattle from the rest. 83(83.0%) representing the majority also indicated that they sell the diseased cattle if the disease/sickness of the cattle does not resolve after treatment.

**Table 4.7. Handling of cattle related zoonotic diseases**

| (n= 100) | |
|---|---|
| Variables | Frequency (%) |
| **How do you treat any sick cattle?** | |
| I self-medicate | 83 (83.0) |
| I call on veterinary officers | 17(17.0) |
| I leave it to resolve/heal | - |
| **Do you use hand-gloves when you attend to sick cattle?** | |
| Yes | 8(8.0) |
| No | 92(92.0) |
| **Do you isolate sick cattle from un-sick cattle?** | |
| Yes | 16(16.0) |
| No | 84 (84.0) |
| **If the disease or sickness of the cattle does not resolve after treatment, what do you to the sick cattle?** | |
| Sale it for slaughtering | 83 (83.0) |
| Kill it and burry it | 17 (17.0) |
| Total | 100(100.0) |

Source: Field Data, 2020.

### 4.7 Relationships between Social Demographic Characteristics Analyzed by Chi-square Test

The social demographic characteristics were considered as independent variables and were analyzed with the outcome variables (Knowledge on Cattle-related zoonotic diseases, Attitudes and Practices of good animal husbandry) by chi-square test and statistical significance were represented in **Tables 4.8** -4.**10.**

The result revealed that there was significance in the Age (p= 0.022) of the participants and their attitude. Equally, there was a significance in the Ethnicity (p=0.039) of participants and their knowledge and practices of good cattle farming methods (p=0.042). The results also showed significance in the Attitudes of participants and their educational background (p=0.042).

The Gender/Sex together with the marital status and Religion of participants did not show any level of significance.



**Table 4.8** Relationship between Sociodemographic Characteristics, Level of Knowledge, Attitude and Practices Analyzed by Chi-square Test

| | **Knowledge** | | | **Attitude** | | | **Practices** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Variable** | **Good (%)** | **Poor (%)** | **p-value ($x^2$, df)** | **Good (%)** | **Poor (%)** | **p-value ($x^2$, df)** | **Good** | **Poor** | **p-value ($x^2$, df)** |
| **Sex** | | | | | | | | | |
| Female | 0(0.0) | 2(4.2) | 0.137 (2.211, 1) | 2(3.0) | 0(0.0) | 0.316 (1.005, 1) | 0(0.0) | 2(2.4) | 0.533(0.389, 1) |
| Male | 52(100.0) | 46(95.8) | | 65(97.0) | 33(100.0) | | 16(100.0) | 82(97.6) | |
| Total | 52(100.0) | 48(100.0) | | 67(100) | 33(100.0) | | 16(100.0) | 84(100.0) | |
| **Age** | | | | | | | | | |
| 21-30 | 3(5.8) | 7(14.6) | 058 (9.116, 4) | 3(4.5) | 7(21.2) | **0.022(11.495, 4) *** | 0(0.0) | 10(12.0) | 0.317(4.719,4) |
| 31-40 | 7(13.5) | 14(29.2) | | 12(18.0) | 9(27.3) | | 3(18.8) | 18(21.4) | |
| 41-50 | 20(38.5) | 17(35.4) | | 27(40.3) | 10(30.3) | | 7(43.8) | 30(35.7) | |
| 51-60 | 12(23.1) | 7(14.6) | | 13(19.4) | 6(18.2) | | 2(12.5) | 17(20.2) | |
| 61-70 | 10(19.2) | 3(6.3) | | 12(18.0) | 1(3.0) | | 4(25.0) | 9(10.7) | |
| Total | 52(100.0) | 48(100.0) | | 67(100.0) | 33(100.0) | | 16(100.0) | 84(100.0) | |
| **Marital status** | | | | | | | | | |
| Married | 49(94.2) | 46(95.3) | 0.713 (0.135, 1) | 65(97.0) | 30(91.0) | 0.188 (1.735, 1) | 16(100.0) | 79(94.0) | 0.317(1.003,1) |
| Single | 3(5.8) | 2(4.2) | | 2(3.0) | 3(9.0) | | 0(100.0) | 5(6.0) | |
| Divorced | - | - | | - | - | | - | - | |
| Total | 52(100.0) | 48(100.0) | | 67(100.0) | 33(100.0) | | 16(100.0) | 84(100.0) | |

Source: field data, 2020 **(note: * significant, df=degree of freedom, $x^2$ =chi-square**)

**Table 4.8.1** Relationship between Sociodemographic Characteristics, Level of Knowledge, Attitude and Practices Analyzed by Chi-square Test

| | Knowledge | | | Attitude | | | Practices | | |
|---|---|---|---|---|---|---|---|---|---|
| **Variable** | **Good (%)** | **Poor (%)** | **p-value ($x^2$, df)** | **Good (%)** | **Poor (%)** | **p-value ($x^2$, df)** | **Good** | **Poor** | **p-value ($x^2$, df)** |
| **Ethnicity** | | | | | | | | | |
| Dagomba | 19(36.5) | 17 | **0.039(10.093, 4) *** | 23(34.3) | 13 | 0.113 (7.470, 4) | 6(37.5) | 30 | **0.042(9.919, 4) *** |
| Fulani | 16(30.8) | 13(27.1) | | 21(31.3) | 8(24.2) | | 9(56.3) | 20(23.8) | |
| Huasa | 9(17.3) | 1(2.1) | | 7(10.4) | 3((9.1) | | 1(6.3) | 9(10.7) | |
| Konkomba | 5(9.6) | 9(18.8) | | 12((17.9) | 2(6.1) | | 0(0.0) | 14(16.7) | |
| Others | 3((5.8) | 8(16.7) | | 4(6.0) | 7(21.2) | | 0(0.0) | 11(13.1) | |
| Total | 52(52.0) | 48(100.0) | | 67(100.0) | 33(100.0) | | 16(100.0) | 84(100.0) | |
| **Religion** | | | | | | | | | |
| Christian | 5(9.6) | 7(14.6) | 0.445 (.583, 1) | 6(9.0) | 6(18.2) | 0.182 (1.782, 1) | 1(6.3) | 11(13.0) | 0.440 (0.596, 1) |
| Muslim | 47(90.4) | 41(85.4) | | 61(91.0) | 27(81.8) | | 15(93.8) | 73(87.0) | |
| Traditionalist | - | - | | - | - | | - | - | |
| **Total** | 52(100.0) | 48(100.0) | | 67(100.0) | 33(100.0) | | 16(100.0) | 84(100.0) | |

Source: Field Data, 2020. **(Note: * significant, df=degree of freedom, $x^2$ =chi-square**)

**Table 4.8.2** Relationship between Sociodemographic Characteristics, Level of Knowledge, Attitude and Practices Analyzed by Chi-square Test

| Variable | Knowledge | | | Attitude | | | Practices | | |
|---|---|---|---|---|---|---|---|---|---|
| | Good (%) | Poor (%) | p-value ($x^2$, df) | Good (%) | Poor (%) | p-value ($x^2$, df) | Good | Poor | p-value ($x^2$, df) |
| **Educational Background** | | | | | | | | | |
| No education | 20(38.5) | 20(41.7) | 0.511(1.344, 2) | 21(31.3) | 19(57.8) | **0.042(6.341, 2) *** | 4(25.0) | 36(42.9) | 0.285(2.513, 2) |
| Formal education | 16(30.8) | 18(37.5) | | 26((38.8) | 8(24.2) | | 8(50.0) | 26(31.0) | |
| Non-formal education | 16(30.8) | 10(20.8) | | 20(30.0) | 6(18.2) | | 4(25.0) | 22(26.2) | |
| **Total** | 52(100.0) | 48(100.0) | | 67(100.0) | 33(100.0) | | 16(100.0) | 84(100.0) | |

Source: Field Data, 2020. **(Note: * significant, df= degree of freedom, $x^2$ =chi-square**)

### 4.8 Relationships between Cattle-related Characteristics analyzed by Chi-square test

The cattle-related characteristics were equally considered as independent variables and analyzed with the outcome variables (Knowledge on Cattle-related zoonotic diseases, Attitudes and Practices of good animal husbandry) by chi-square test and statistical significance were represented in **Tables .411-4.13.**

The result revealed that there was significance among participants leaving close to the cattle and their knowledge **(p=0.023**) and attitudes (p=**0.025)** respectively. The type of farming system (p=**0.021),** ownership of the cattle (p=**0.033**) and average monthly income (p=**0.023**) were noted to be significantly associated with the level of knowledge.

The Gender/Sex together with the marital status and Religion of participants did not show any level of significance.

**Table 4.9**. Relationship between Cattle-related characteristics, Level of Knowledge, Attitude and Practices Analyzed by Chi-square Test

| | **Knowledge** | | | **Attitude** | | | **Practices** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Variable** | **Good** | **Poor** | **p-value ($x^2$, df)** | **Good** | **Poor** | **p-value ($x^2$, df)** | **Good** | **Poor** | **p-value ($x^2$, df)** |
| **Years of experience** | | | | | | | | | |
| less than 5 years | 23(44.2) | 24(50.0) | 0.564 (0.334, 1) | 31(46.3) | 16(23.9) | 0.835 (0.044, 1) | 9(56.3) | 38(45.2) | 0.419 (0.654, 1) |
| more than 5 years | 29(55.7) | 24(50.0) | | 36(53.7) | 17(25.4) | | 7(43.8) | 46(54.8) | |
| Total | 52(100.0) | 48(100.0) | | 67(100.0) | 33(100.0) | | 16(100.0) | 84(100.0) | |
| **Leaving close to cattle house** | | | | | | | | | |
| Yes | 47(90.4) | 35(72.9) | **0.023 (5.160, 1) *** | 59(88.0) | 23(70.0) | **0.025 (5.051, 1) *** | 14(87.5) | 68(81.0) | 0.532(0.390,1) |
| No | 5(9.6) | 13(27.1) | | 8(12.0) | 10(30.0) | | 2(12.5) | 16(19.0) | |
| **Total** | 52(100.0) | 48(100.0) | | 67(100.0) | 33(100.0) | | 16(100.0) | 84(84.0) | |

Source: Field Data, 2020 **(note: * significant, df= degree of freedom, $x^2$ =chi-square**)

Table 4.9.1 Relationship between Cattle-related characteristics, Level of Knowledge, Attitude and Practices Analyzed by Chi-square Test

| Variable | Knowledge | | | Attitude | | | Practices | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Good (%)** | **Poor (%)** | **p-value ($x^2$, df)** | **Good (%)** | **Poor (%)** | **p-value ($x^2$, df)** | **Good** | **Poor** | **p-value ($x^2$, df)** |
| **Farming system** | | | | | | | | | |
| Extensive system | 46(88.5) | 34(70.8) | **0.021 (9.688, 3)*** | 53(79.0) | 23(70.0) | 0.778 (1.095, 3) | 13(81.3) | 63(75.0) | 0.783 (1.077,3) |
| Intensive system | 3(5.8) | 11(23.0) | | 8(12.0) | 6(18.0) | | 1(6.3) | 13(15.5) | |
| Semi -intensive system | 7(13.5) | 3(6.3) | | 6(9.0) | 4(12.0) | | 2(12.5) | 8(9.5) | |
| **Total** | 52(100.0) | 48(100.0) | | 67(100.0) | 33(100.0) | | 16(100.0) | 84(100.0) | |
| **Cattle ownership** | | | | | | | | | |
| Yes | 50(96.2) | 40(83.3) | **0.033 (4.558, 1)*** | 60(89.6) | 30(91.0) | 0.832 (0.045, 1) | 15 | 75(89.3) | 0.585 (0.298, 1) |
| No | 2 | 8(16.7) | | 7(10.4) | 3(9.0) | | 1 | 9(10.7) | |
| **Total** | 52 | 48(100.0) | | 67(100.0) | 33(100.0) | | 16 | 84(100.0) | |

Source: Field Data, 2020. **(note: * significant, df=degree of freedom, $x^2$ =chi-square**)

**Table 4.9.2** Relationship between Cattle-related characteristics, Level of Knowledge, Attitude and Practices Analyzed by Chi-square Test

| | Knowledge | | | Attitude | | | Practices | | |
|---|---|---|---|---|---|---|---|---|---|
| **Variable** | **Good (%)** | **Poor (%)** | **p-value ($x^2$, df)** | **Good (%)** | **Poor (%)** | **p-value ($x^2$, df)** | **Good** | **Poor** | **p-value ($x^2$, df)** |
| **Average monthly income** | | | | | | | | | |
| less GHC 500.00 | 1(2.0) | 1(2.1) | **0.023 (7.502, 2) *** | 2(3.0) | 0(0.0) | (1.007, 2) | 1(6.3) | 1(1.2) | 0.414 (1.762, 2) |
| GHC 500-GHC1000 | 8(15.3) | 19(39.6) | | 18(26.9) | 9(27.3) | | 4(25.0) | 23(27.5) | |
| More than GHC1000 | 43(82.7) | 28(58.3) | | 47(70.1) | 24(72.3) | | 11(68.7) | 60(71.3) | |
| **Total** | 52(100.0) | 48(100.0) | | 67(100.0) | 33(100.0) | | 16(100.0) | 84(100.0) | |

Source: Field Data, 2020. **(note: * significant, df=degree of freedom, $x^2$ =chi-square**)

# CHAPTER FIVE

# DISCUSSIONS

## 5.0 Introduction

This section of the thesis discusses the results of the study findings. The results were discussed based on the four main objectives of this study, which included,

1. To examine the level of knowledge on cattle related zoonotic diseases among cattle farmers in rural communities in Tamale.
2. To assess the attitudes of cattle farmers towards cattle related zoonotic diseases in rural communities in Tamale.
3. To examine the cattle rearing practices employed by cattle farmers in rural communities in Tamale.

Additionally, the results were discussed by referring to other related literature on zoonotic diseases.



### 5.1 Socio-demographic and cattle-related characteristics of study participants

A total of 100 participants were recruited onto the study with a response rate of 100% (100). The mean age was found to be 47.46 (SD: 10.84). Also, 37(37.0%) of the participants, representing the majority were in the age bracket of 41-50 years with age 21-30 years being the least represented 10 (10.0%). This observations was consistent with Chowdhury et al. (2016) findings in a study among livestock farmers, including cattle farmers, reported most of the farmers were in the 36-45years age brackets. This shows that most of the cattle farmers are in their middle-age which are mostly the work class of the society. It equally demonstrates that farming activities which was mostly known among the elderly is changing. This would greatly influence the governments flagship programmes, planting for foods and jobs as well as rearing for foods and jobs (Amissah-Reynolds, 2020). The overall male 98(98.0%) representation were more than the females, this would have effect on trying to create job opportunities for everyone, including males and females in rearing for foods and jobs. There should therefore be deliberate efforts to target females in this regard to address the social inequalities when it comes to the job roles of females. Observations on the educational statuses of the participants could really have an impact on the knowledge, attitudes and practices the farmers portray towards cattle-related zoonotic diseases. For example, it was noted that quite a substantial number of the participants (30.0%) did not have any form of education. Nonetheless, there were some participants that have had some form of formal education and training (which included non-formal education (28.0%), basic school (36.0%), JHS (5.0%) and SHS (1.0%), however, it is assumed that the higher the educational qualifications of individuals the better these individual appreciate most concepts well including cattle-related zoonotic diseases. Noting the low-level educational status may negatively affect farmers knowledge attitudes and practices towards cattle-related diseases. A

related observation was made by Addo et al. (2011) 83.9% in the coastal savannah regions of Ghana that most of the study participants (livestock farmers) (83.9%) did not have any formal education. This observation was consistent with Chowdhury et al. (2016) findings in a study among livestock farmers, including cattle farmers in India and described the situation as alarming. Equally, in Ethiopia, Girma (2017) also reported a low level of education in a study among 230 cattle farmers. This creates a disturbing scenario as these studies are among farmers in developing countries, which studies have acknowledged that thy are mostly affected by zoonotic related diseases and further pushes the poverty gap (Molyneux et al., 2011). Several studies on zoonotic related diseases have continually described livestock farmers with low or no education are at more risk to contracting zoonotic related diseases as such people are not aware of most of the diseases among their herd (Delelegn et al., 2018; Munisamy et al., 2017). To emphasize more on educational status and knowledge, attitudes, and practices of milk-borne zoonotic diseases in Mandefero et al. (2018) findings, about 64.3% of participants with no education indicated no knowledge of preventive measures for milk-born zoonotic diseases combined with another 25% and 0% of participants with educational high school and above high school education equally indicated no knowledge of the preventive measures of milk-borne zoonotic diseases. This further demonstrates the effect of education on the prevention of cattle-related zoonotic diseases.

It is a common knowledge that experience is the best teacher. Observations from the study results showed that majority of the study participants (53.0%) have reared cattle for more than five (5) years. This may also influence their knowledge, attitudes, and practices towards cattle-related zoonotic diseases, if their experience in cattle farming is anything to go by. As maintained by Huang et al. (2016) livestock farmers with long years of experience tend to

practice good animal husbandry protocols. In addition to that, Ayim-Akonor et al. (2020) equally maintained that in a study zoonotic diseases among poultry and livestock farmers that farmers with longer work practice had enhanced knowledge of poultry and zoonotic related diseases in general.

In addition, on the type of farming (rearing) systems employed by the participants, majority of the participants (76.0%) indicated that they practice extensive system of cattle farming. As was also indicated by a participant; *"...I leave them in them open where my house so that I can monitor them very well. Once I am here with them it become somehow difficult for thieves to come around a steal them..."* According to Amissah-Reynolds (2020), there exist three kinds of housing systems employed by livestock farmers and include intensive, semi-intensive, and extensive housing systems. Among the three housing systems, it is acknowledged that the intensive housing system warrants the confinement of livestock, nonetheless, the intensive housing system is the least used because is awfully expensive (Amissah-Reynolds, 2020). This would in a way explain why most livestock farmers, including cattle farmers allow their herd/cattle to be roaming and grazing in the communities and contaminating the environment through undiscriminating defecation, urination, and salivation. As maintained elsewhere (Tu et al., 2019; Oo 2010; Henning et al. 2007; Devendra et al., 2002) that livestock including cattle are mainly raised on through backyard farms, and characterized with traditional ways of feeding such as grazing, scavenging in a community's environment and utilizing standing crop residues and by-products.

**Knowledge on Zoonosis Diseases among Cattle Rearing**

The overall knowledge score was 52%, indicating that majority of the participants had appreciable level of awareness about cattle related zoonotic diseases. Ayim-Akonor et al. (2020)

observed a higher (87%) level of knowledge of zoonotic diseases among both poultry and livestock farmers in Ghana. However, Tebug (2013), observed a low level of knowledge on zoonotic diseases in a study in Malawi among cattle farmers and maintained, awareness level of milk-borne zoonotic diseases was unsatisfactory, with an average score of 4.6 ±2.1. The observed differences in the level of knowledge maybe partially attributed to the number of participants recruited unto these studies. Even though, the current study found a statistically significant proportion of cattle farmers with good knowledge on cattle-related zoonotic diseases, nonetheless, there still remain a good number of participants who do not have adequate knowledge of cattle-related zoonotic diseases and must be targeted for interventions. As per the definition of zoonotic diseases, they are those diseases which naturally spread between vertebrate animals and man (World Health Organization, 2005). Similarly, zoonotic diseases are acknowledged to be transmitted to humans either directly, through exposure to infected animals, or indirectly, through exposure to animal waste or the consumption of contaminated food (Adesokan et al., 2013). This suggest that even if one cattle farmer contracts the zoonotic infection, there could be further spread between the farmer and other immediate persons. Equally, if a cattle contract the infection, there would still be a spread if immediate steps are not taken to treat as it is acknowledged that these infected cattle are capable of contaminating the environment through undiscriminating defecation, urination, and salivation (Woolhouse & Gowtage-Sequeria, 2005). Zoonotic diseases are acknowledged to be transmitted to humans either directly, through exposure to infected animals, or indirectly, through exposure to animal waste or the consumption of contaminated food (Adesokan et al., 2013). This therefore places importance on the need to continually educate or train livestock farmers, including cattle farmers on zoonotic diseases. Zoonotic diseases are not only of public health importance but also of both

agricultural and economic significance. The impact of zoonotic diseases on agriculture may include low consumption of animal and its products and drop in a countries export of animal products combined (Halliday et al., 2015). As even Ghana pushes to take advantage of the many prospects in animal rearing, with the ultimate goal of creating jobs in the country, it will become important to integrate zoonotic diseases training for farmers that would venture in to animal farming. As asserted by Amissah-Reynolds (2020) on the impact of the Government of Ghana's rearing for foods and job program that this initiative has the potential of increasing the livestock population as well as the human contacts with most livestock, this would in turn have consequences for the spread of zoonotic diseases in the country.

Narrowing the discussion to some important aspects of the study, majority of the cattle farmers (73.0%) showed that they were aware that the cattle are capable of spreading diseases to humans as well as majority also were of the view that residing close to where cattle are kept can increase one's risk of contracting zoonosis diseases. Likewise, less than half of the farmers (43.0%) were able list or name how the cattle-related diseases can be transferred from the cattle to humans. Another important observation was that a greater number of the participants (89.0%) indicated they have knowledge on the signs and symptoms of zoonotic diseases, however less than half these farmers (38%) were able to list or name at least one cattle-related signs and symptoms of zoonotic diseases. This observation does not really create a good picture about the overall knowledge on cattle-related zoonotic diseases. There exist differences in the knowledge level of zoonotic diseases among both poultry farmers and livestock farmers. For example, in a study among 152 poultry farmers Ayim-Akonor et al. (2020) reported that about 86.8% of the farmers are able to tell when a bird is sick with common clinical signs and symptoms such as greenish diarrhoea, weakness, loss of appetite, cough, sneeze, and bloody spots in faces. Among farmers

who could identify the sick birds quite a significant number (22.0%) of them were not name the actual disease (Ayim-Akonor et al., 2020).

Similarly information on cattle-related zoonotic diseases was mainly sought from colleague farmers, friends, and family members with only a few who indicated that they receive information from the district assembly or veterinary officers and media such as the Radio/FM/ and TV stations, respectively. The realization of colleague farmers, friends, and family members being the main information source on cattle-related related diseases among the farmers could be implored by the district assembly to train some key members of the farming community, where these members would in turn also organize some training sessions for their members. However, this training activities should be a coordinated one with some supervisory role from the district or metropolitan assembly and the ministry of agriculture.

**The attitudes and practices towards Cattle-related Zoonosis among Cattle Rearing**

The general attitudes of the cattle farmers towards zoonotic diseases was statistically significant (67%). Most of the cattle farmers recognized that drinking raw milk from cattle increases the risk of getting cattle related zoonotic disease combined with direct contact with animals increasing the risk of getting cattle related zoonotic disease. Additionally, the cattle farmers acknowledged that walking bare footed in the animal house puts the farmer at risk of contracting cattle related zoonotic disease as well as cattle droppings or manure do contain infectious disease agent. Lastly, the cattle farmers indicated that deworming of the cattle do not protect them totally from any infection. Though the farmers portrayed good attitudes towards cattle-related diseases, nonetheless the question to ask is whether good attitudes translate into good practices? From the current study's results, it appears that good attitudes do not automatically result in good animal

husbandry practices. As in this study poor husbandry practices were acknowledged among the farmers (16.0%).

Of the 100 participants, the study observed that majority of the cattle farmers (96.0%) keep their cattle in the open with less than half of them (29.0%) of the participants engaged in cleaning of the where the cattle are kept and only 33% of the participants equally indicated sanitizing feeding troughs/water cans. These findings confirm assertions described elsewhere. According to Amissah-Reynolds (2020), there exist three kinds of housing systems employed by livestock farmers and include intensive, semi-intensive, and extensive housing systems. Among the three housing systems, it is acknowledged that the intensive housing system warrants the confinement of livestock, nonetheless, the intensive housing system is the least used because is awfully expensive (Amissah-Reynolds, 2020). This would in a way explain why most livestock farmers, including cattle farmers allow their herd/cattle to be roaming and grazing in the communities and contaminating the environment through undiscriminating defecation, urination, and salivation. As maintained elsewhere (Tu et al., 2019; Oo 2010; Henning et al. 2007; Devendra et al., 2002) that livestock including cattle are mainly raised on through backyard farms, and characterized with traditional ways of feeding such as grazing, scavenging in a community's environment and utilizing standing crop residues and by-products. According to Dodua et al. (2019), as a results of the cost involved in the intensive housing systems, livestock farmers especially in developing countries including Ghana keep their livestock under improvised edifices, such as shelters, yards, stalls and shades, in addition to feeding their livestock off household food wastes as well as letting the livestock graze or roam for food. As maintained by Voss (2019), farmers who normally employ extensive or semi-intensive housing systems are often acknowledged to have poor practices of deworming and vaccination of their livestock. This increases the risk of the

spread zoonotic related diseases in the community. For example, Voss, (2019) indicated that the poor animal husbandry practices and treatment of infections among these groups of farmers are responsible for most outbreaks globally.

The practices of hand hygiene among the participants was generally noted to be poor in this current study. The study showed that only 10.0% and 12% of the cattle farmers indicated that they wash their hands before and after attending to any of the cattle. Very few of the cattle farmers (8.0%) admitted applying soap when washing their hands. Likewise, very few of the cattle farmers (11.0%) recognized the need to practice handwashing before attending to the cattle. The use of protective clothing before attending to the cattle was generally among the farmers. These observations were consistent with other contemporary studies that have continued to suggest that livestock farmers, often exposed to zoonotic diseases should use personal protective equipment (PPE) (Odo et al., 2015). According to Çakmur et al. (2015) findings, about 92.1% of the farmers recognized that hand gloves should be employed when attending to livestock, however, about 35.8% of the farmers indicated they use the hand gloves. Additionally, 84.1% also recognized the importance of the use of face masks, however, only 6.6% of the farmers indicated the use of the face masks. Concerning the use of boots when attending to livestock about 89.4% of the farmers recognized the need, however only 42.4% of the livestock farmers used the boots. Similarly, Çakmur et al. (2015), observed that about 88.1% of the participants acknowledged that having a scar or wounds increases the potential of zoonotic diseases however, 46.4% indicated they do attend to their livestock with wounds or scars on their hands. These observations portray that the practices of good animal husbandry are generally low among livestock farmers and a course of worry.

The handling of cattle related zoonosis was also generally poor among the cattle farmers. As most of the common practice of handling cattle related zoonotic diseases, included self-medication with just a small number of them sought for the services veterinary officers to treat their sick cattle. Isolation of sick cattle was poor practiced. Interestingly, most of the participants indicated they sell the cattle if the disease or sickness of the cattle does not resolve after treatment. This was in sharp contrast with the assertation made by Çakmur et al. (2015) as 80.1% of the farmers recognized that sick animal corpse should needed to be buried deep, however only 22.5% of the farmers indicated destroying the sick animal corpse by burying deep.

# CHAPTER SIX

## SUMMARY, CONCLUSION AND RECOMMENDATIONS

### 6.0 Introduction

This chapter presents the summary of the study, conclusion, recommendations, and further research, based on the findings of the study and study limitations.

### 6.1 Summary

A total of 100 cattle farmers were included in the study, from March, to July 2020. The study was descriptive cross-sectional study, involving a mixed approach to research. Thus, both quantitative and qualitative methods. The quantitative approach involved the use of semi-structured questionnaire, which included both closed and open-ended questions and the qualitative approach to the study involved the use of focused group discussions using interview guide.

Results obtained from participants who were mainly cattle farmers, drawn from five main communities in the Tamale Metropolis shows that the mean age was 47.46 (SD: 10.84) with age range of 25 to 70 years. Males were the most represented (98%). Also, 37(37.0%) of the participants, representing the majority were in the age bracket of 41-50 years with age 21-30 years being the least represented 10 (10.0%). Out of the hundred participants, 95(95.0%) persons were married with only 5(5.0%) being single. Dagomba's were the most represented with 36 (36.0%) participants, followed by fulanis' 29(29.0%) and Konkonmbas' 14 (14.0%). 88 (88.0%) of the study participants were Muslims and 12 (12.0%) of the participants were Christians. On the educational background of the participants, it was found that 30 (30.0%) participants

indicated that they do not have education with 28 (28.0%) of the participants also indicating they have also had non-formal education. 36 (36.0%) of the study participants also indicated that they have had basic education, Junior High School 5.0% (5) and Senior High School 1.0% (1). None of the participants did not have tertiary education.

Out of the 100 study participants, about 53(53.0%) have reared cattle for more than five (5) years with 47 (47.0%) also indicating that they have reared cattle for less than five (5) years. On proximity of participants houses to where the cattle are kept, 82 (82.0%) of the participants indicated that they reside close to their cattle whereas 18 (18.0%) also indicated they do not reside close to their cattle. Additionally, on the type of farming (rearing) systems employed by the participants, 76 (76.0%) indicated that they practice extensive system of cattle farming, followed by intensive (14 (14.0%)) and semi-intensive (10 (10.0%)) systems of cattle rearing respectively. 90(90.0%) of the study participants indicated ownership of the cattle whereas 10 (10.0%) also indicated non-ownership of the cattle. On the average, more than half (71 (71.0%)) of the study participants indicated earning more than GHc.1000.0 on monthly basis from the sale of the cattle.



Overall knowledge of cattle-related zoonotic disease was found to 52%. Out of the 100 study participants, 52(52.0%) of the participants exhibited good knowledge, whereas 48(48%) equally exhibited poor knowledge score. Again, 73(73.0%) of the participants indicated that they are aware that animals are capable of transmitting diseases to humans with 27(27.0%) indicating that they are not aware that animals are capable of transmitting diseases to humans. majority of the study participants 85(85.0%) held the belief that residing close to the cattle can increase one's risk of contracting zoonosis diseases.

Equally, overall attitudes and practices towards zoonotic diseases was found to be 67% and 16%, respectively among the cattle farmers. Out of the 100 participants only 10(10.0%) and 12(12%) indicated that they wash their hands before and after attending to any of the cattle. Additionally, only 8(8.0%) of the participants apply soap when washing their hands. Only 11(11.0%) of the participants indicated the need to practice handwashing before attending to the cattle. On the use of protective clothing before attending to the cattle, 95(95.0%) indicated that they do not use any protective clothing.

Finally, the result revealed that there was significance in the Age (p= 0.022) of the participants and their attitude. Equally, there was a significance in the Ethnicity (p=0.039) of participants and their knowledge and practices of good cattle farming methods (p=0.042). The results also showed significance in the Attitudes of participants and their educational background (p=0.042).

**Conclusion**

The study revealed an appreciable knowledge of cattle-related zoonotic diseases among the farmers. Additionally, the study portrayed that the study participants had good attitudes, but their practices of good animal husbandry was extremely poor. This creates a worrying situation as at the time the Government of Ghana is promoting the rearing of animals for food and jobs. Therefore, the Ministry of Agriculture, the Tamale Metropolis and other stakeholders should design interventional programmes to help increase the knowledge, attitudes, and practices of the cattle farmers towards zoonotic related diseases in the Northern Region.

## 6. 2 Study Recommendations

From the study, the following recommendations are suggested:

1. The Ministry of Food and Agriculture should deliberately give the cattle farmers training on cattle-related zoonotic diseases. This will help to increase the general awareness, attitudes, and practices towards zoonotic diseases among livestock farmers in the Tamale Metropolis.
2. The Ministry of Food and Agriculture and other stakeholders should incorporate local languages including Dagbaani, in the health educational and promotional activities on zoonotic diseases.
3. The mass media/fm was recognized less utilized to communicate on cattle-related diseases as observed from the study. Stakeholders should therefore use the mass media/FM to educate the farmers on cattle related zoonotic diseases as it has the potential to reach hundreds of the farmers.
4. Cattle farmers should be made aware of the need for good hand hygiene practices, use of PPE and proper ways handling cattle-related zoonotic diseases.



## 6.3 Opportunity for further research

It is suggested that a comprehensive study should be conducted on the integrated value-chain and risk assessment of cattle-related zoonotic in the Northern Region, Ghana

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**Appendix**

**Quantitative data collection instrument**

**Code** …….. **Date** ……/……./20……

I am a student from the University for Development Studies, Tamale, conducting a study on "ASSESSING THE KNOWLEDGE, ATTITUDES AND PRACTICES TOWARDS ZOONOTIC DISEASES AMONG CATTLE FARMERS IN THE TAMALE METROPOLIS OF THE NORTHERN REGION OF GHANA".

This study is part of my Masters of Public Health Degree hence I would be most grateful if you could assist me by answering the following questions. All information given would be confidentially treated.

**Remember your answers will be kept confidential**

You have been given a copy of questionnaire and a pencil. Please use the pencil to tick the answers provided corresponding to the questions. If you make a mistake, carefully erase/rub out the pencil marks that were made incorrectly and then tick the answer you now choose.

Please **do not write your name** on the questionnaire sheets given to you. Your information is confidential.

**INSTRUCTIONS**

Please answer all the questions.

***PLEASE TICK (√) OR WRITE WHERE APPROPRIATE IN THE BOX FOR ANSWER.***

| **Number** | **Questions** | **Response** |
|---|---|---|
| **Social demographic characteristics** | | |
| **1.** | What is your age? Write age in years in the | …… |

| | | |
|---|---|---|
| | box provided | |
| 2. | Sex | Male 1[ ]<br>Female 2[ ] |
| 3. | What is your highest level of education? | No education 1[ ]<br>Basic School 2[ ]<br>JHS 3[ ]<br>SHS 4[ ]<br>Tertiary 5[ ] |
| 4. | Religious Denomination | Christian 1[ ]<br>Muslim 2[ ]<br>Traditional 3[ ]<br>No Religion 4[ ]<br>Other, specify .....10 |
| 5. | Ethnicity | Hausa 1 [ ]<br>Dagbani 2 [ ]<br>Mossi 3[ ]<br>Other, specify ..... 10 |
| 6. | What is your marital status? | Single 1[ ]<br>Married 2[ ]<br>Divorced 3 [ ]<br>Co-habitation 4 [ ]<br>Others specify…….....10 |
| 7. | How many years have been rearing cattle? | <5 years 1 [ ]<br>5≥ years 2 [ ] |
| 8. | Please, what kind of cattle farming are you engaged in? | Subsistence cattle farming 1[ ]<br>Commercial Farming 2 [ ] |
| 9. | Do you live close to your cattle? | Yes 1 [ ]<br>No 2 [ ] |

| | | |
|---|---|---|
| 10. | Do you think sharing the same or leaving close to the cattle can increase your risk of contracting certain diseases or have any health implication? | Yes 1 [ ]<br>No 2 [ ] |
| 11. | Please, how do you keep your cattle? | Backyard farming 1[ ]<br>Extensive System 2[ ]<br>Intensive System 3[ ]<br>Semi-intensive 4[ ] |
| 12. | Please are you the owner of the cattle? | Yes 1 [ ]<br>No 2 [ ] |
| 13. | How many cattle do you have in total?<br>Please specify | |
| 14. | On the average, how much do you make from the sale of the cattle? | ≤ Ghc500 1[ ]<br>Ghc500-1000 2[ ]<br>Ghc ≥ 1000 3[ ] |
| **Knowledge on Cattle Related Zoonotic Diseases** | | |
| 15. | Please, are you aware that animals are capable of transmitting diseases to humans (zoonotic disease)? | Yes 1[ ]<br>No 2[ ] |

| | | |
|---|---|---|
| 16. | Please, if "Yes" to question 2, kindly list/name any disease that can be transferred from animals to humans you may know. | |
| 17. | Do you know how the diseases are transferred from the cattle to humans? | Yes 1[ ]<br>No 2[ ] |
| 18. | How the diseases are often transferred from animals to humans? **Please specify** | |
| 19. | Do you know of any signs or symptoms that your cattle show when it is sick? | Yes 1[ ]<br>No 2[ ] |
| 20. | Please if yes to 19, kindly list or name any of the signs and symptoms you may know | |
| 21. | Please what common disease(s) do see among your cattle? **Kindly specify** | |
| **Cattle farming sanitary practices** | | |
| 22. | Do you sanitize your equipment such as feeding troughs and water cans? | Yes 1[ ]<br>No 2[ ] |
| 23. | If yes to Q20, kindly tell me how you sanitize your tools | |
| 24. | How do you keep manure (feces) from the cattle? Please, explain | |
| **Attitudes towards cattle related diseases** | | |
| 25. | Drinking raw milk from cattle increases the risk of getting cattle related zoonotic disease | Disagree 1[ ]<br>Slightly Disagree 2[ ]<br>Slightly Agree 3[ ] |

| | | | |
|---|---|---|---|
| | | Agree | 4[ ] |
| 26. | Having skin-skin contact with animals increases the risk of getting cattle related zoonotic disease | Disagree<br>Slightly Disagree<br>Slightly Agree<br>Agree | 1[ ]<br>2[ ]<br>3[ ]<br>4[ ] |
| 27. | Walking bare footed in the "animal house" does not put me at risk of contracting cattle related zoonotic disease | Disagree<br>Slightly Disagree<br>Slightly Agree<br>Agree | 1[ ]<br>2[ ]<br>3[ ]<br>4[ ] |
| 28. | Cattle droppings /manure does not contain any infectious disease agent | Disagree<br>Slightly Disagree<br>Slightly Agree<br>Agree | 1[ ]<br>2[ ]<br>3[ ]<br>4[ ] |
| 29. | Deworming of the cattle protect them totally from any infection | Disagree<br>Slightly Disagree<br>Slightly Agree<br>Agree | 1[ ]<br>2[ ]<br>3[ ]<br>4[ ] |
| **Practices of animal husbandry** | | | |
| 30. | Do you wash your hands before attending to any of the cattle? | Yes<br>No | 1[ ]<br>2[ ] |
| 31. | Do you wash your hands after attending to any of the cattle? | Yes<br>No | 1[ ]<br>2[ ] |
| 32. | Do you always apply soap when washing hands? | Yes<br>No | 1[ ]<br>2 [ ] |
| 33. | Do you think washing of hands is important in handling the cattle? | If "yes", kindly explain | |
| 34. | Do you use any protective clothing before attending to the cattle? | Yes<br>No | 1[ ]<br>2[ ] |
| 35. | If yes to question **31**, please kindly list or name any of the protective clothing | | |

| | | |
|---|---|---|
| | you use most of the time. | |
| **Handling of cattle related zoonotic diseases** | | |
| 36. | How do you treat any sick cattle? | I self-medicate 1[ ]<br>I call on veterinary officers 2[ ] |
| 37. | If you practice "self-medication" for the cattle, kindly tell how you do it? | Please write |
| 38. | Do you isolate sick cattle from un-sick cattle? | Yes 1[ ]<br>No 2[ ] |
| **40** | If the disease or sickness of the cattle does not resolve after treatment, what do you to the sick cattle? | Sale it for slaughtering 1[ ]<br>Kill it and burry it 2[ ] |



**Qualitative Data Collection Instrument**

**Interview Guide**

Introduction of the interviewer

Introduction of interviewees

……

……

**Collection socio-demographic characteristics**

Age …….

Sex……

Religion/ethnicity…….

**Cattle-related characteristics.**

Years of experience

Average monthly income

Where cattle are kept (any reason for keeping them here?)

……

……

……



**Knowledge of cattle-related zoonotic diseases**

Aware of cattle-related zoonotic diseases……..

Name some of the diseases

……

**Describe how you can detect any infection or cattle-related zoonotic diseases**

……

……

……

Give some signs and symptoms you may know

……

……

……

Where do you normally get information from on cattle-related zoonotic diseases?

……

……

……

**Attitudes/practices towards cattle-related zoonotic diseases**

Hand hygiene



……

……

……

Sanitary practices

……

……

……

Handling sick animals

……

……

……

Use of PPE

……

……

……

Others.....

.....

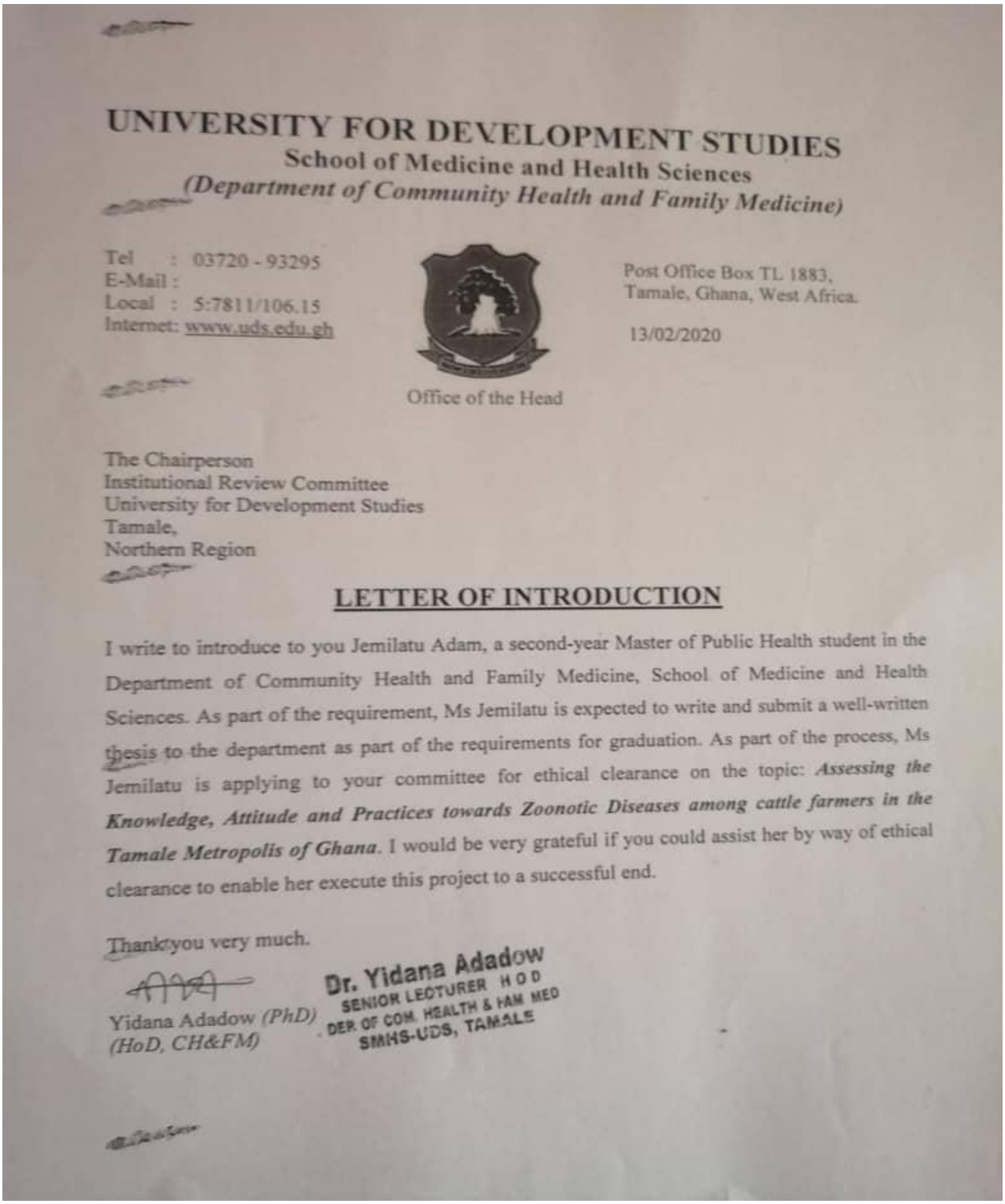
.....

……

……

Thank you for participating in this study.

Approval letter



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13/02/2020

Office of the Head

The Chairperson
Institutional Review Committee
University for Development Studies
Tamale,
Northern Region

LETTER OF INTRODUCTION

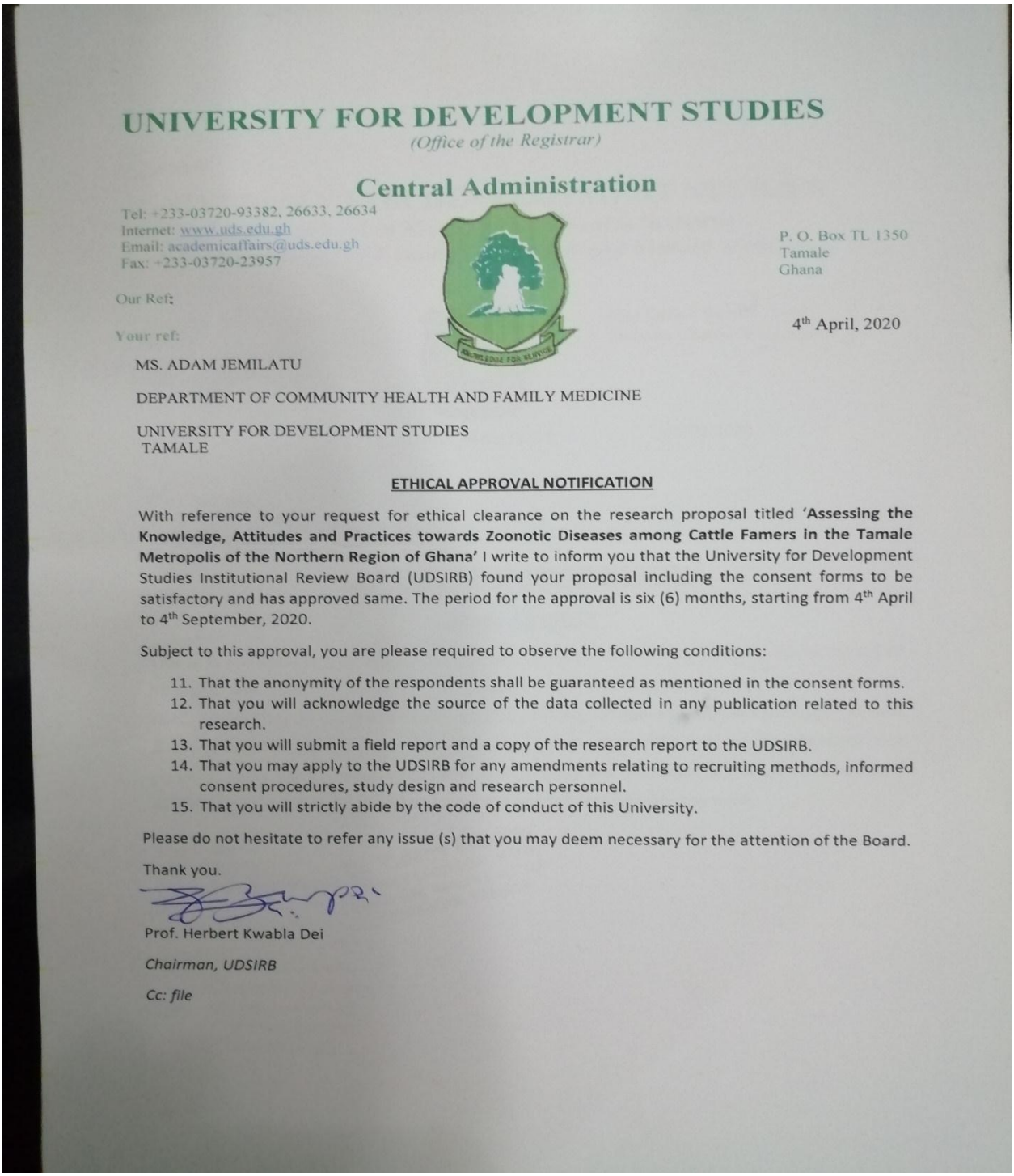
I write to introduce to you Jemilatu Adam, a second-year Master of Public Health student in the Department of Community Health and Family Medicine, School of Medicine and Health Sciences. As part of the requirement, Ms Jemilatu is expected to write and submit a well-written thesis to the department as part of the requirements for graduation. As part of the process, Ms Jemilatu is applying to your committee for ethical clearance on the topic: ***Assessing the Knowledge, Attitude and Practices towards Zoonotic Diseases among cattle farmers in the Tamale Metropolis of Ghana***. I would be very grateful if you could assist her by way of ethical clearance to enable her execute this project to a successful end.

Thankyou very much.

Yidana Adadow *(PhD)*
*(HoD, CH&FM)*

Dr. Yidana Adadow
SENIOR LECTURER HOD
DEP. OF COM. HEALTH & FAM. MED
SMHS-UDS, TAMALE

Ethical Approval Letter



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4th April, 2020

MS. ADAM JEMILATU

DEPARTMENT OF COMMUNITY HEALTH AND FAMILY MEDICINE

UNIVERSITY FOR DEVELOPMENT STUDIES
TAMALE

**ETHICAL APPROVAL NOTIFICATION**

With reference to your request for ethical clearance on the research proposal titled '**Assessing the Knowledge, Attitudes and Practices towards Zoonotic Diseases among Cattle Famers in the Tamale Metropolis of the Northern Region of Ghana'** I write to inform you that the University for Development Studies Institutional Review Board (UDSIRB) found your proposal including the consent forms to be satisfactory and has approved same. The period for the approval is six (6) months, starting from 4th April to 4th September, 2020.

Subject to this approval, you are please required to observe the following conditions:

11. That the anonymity of the respondents shall be guaranteed as mentioned in the consent forms.
12. That you will acknowledge the source of the data collected in any publication related to this research.
13. That you will submit a field report and a copy of the research report to the UDSIRB.
14. That you may apply to the UDSIRB for any amendments relating to recruiting methods, informed consent procedures, study design and research personnel.
15. That you will strictly abide by the code of conduct of this University.

Please do not hesitate to refer any issue (s) that you may deem necessary for the attention of the Board.

Thank you.

Prof. Herbert Kwabla Dei

*Chairman, UDSIRB*

*Cc: file*