

UNIVERSITY OF EDUCATION WINNEBA
COLLEGE OF TECHNOLOGY EDUCATION – KUMASI

**WORKING CONDITIONS AND PUBLIC HEALTH RISKS IN SLAUGHTER HOUSES
IN GHANA: (A CASE STUDY OF KINTAMPO NORTH MUNICIPAL)**



ANABA AHENKAN FLORENCE

AUGUST, 2019

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BY

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**A PROJECT REPORT IN THE DEPARTMENT OF EDUCATIONAL LEADERSHIP,
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IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF
MASTER OF ARTS DEGREE IN EDUCATIONAL LEADERSHIP.**

AUGUST, 2019

DECLARATION

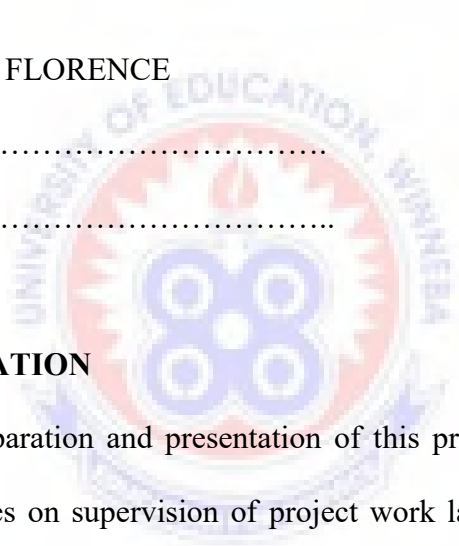
STUDENT’S DECLARATION

I, **ANABA AHENKAN FLORENCE**, hereby declare that this project report is the results are of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

NAME: ANABA AHENKAN FLORENCE

SIGNATURE:

DATE:



SUPERVISOR’S DECLARATION

I hereby declare that the preparation and presentation of this project report was supervised in accordance with the guidelines on supervision of project work laid down by the University of Education, Winneba.

NAME OF SUPERVISOR: MRS. DR. ELLEN OLU

SIGNATURE.....

DATE:

DEDICATION

Foremost, I dedicate this project work to Almighty God for His guidance and protection throughout my schooling and stay in the university. This production is dedicated to my husband, Rev. Peter Akabere who encouraged me in my effort to pursue further in life, and my children Emmanuel, Pamela, Henry and Lois as well as my Parents, Mr. and the Late Mrs. Anaba and finally to my sister Mary.



ACKNOWLEDGEMENTS

May the Most High God be glorify for how far he has brought me. He has been so grateful to me throughout my life time and I would forever appreciate and acknowledge his presence in my life.

I owe a special debt of gratitude to my competent and dedicated supervisor, MRS. DR. ELLEN OLU, a Lecturer at the University of Education, Winneba Kumasi Campus, for his constructive criticism, suggestions, directions, patience and time to which made this study a success.

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Finally to my Area Head, Apostle Retired Kingsford Kyei, Area Head, Apostle Gideon Obeng Darko Debrah, Richard Serbeh, and Mr. Baffoe Sarkodie Kwabena and to everybody who contributed in one way or the other towards the completion of this study, I say may the Almighty God richly bless you.

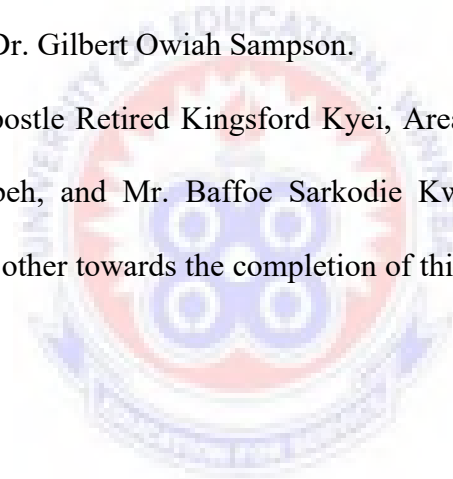


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ABSTRACT

This study looked at the working conditions and public health risks on the residents in the community. The sanitary and hygiene conditions of Slaughterhouses are of important due to the fact most of it are located within the community, which can have effect on the health of the residents. A descriptive survey design was used for this study. The target population were staff of the slaughterhouse and residents of the community (Kintampo), irrespective of position, age or gender. The sample size consisted of 150 respondents, comprising; twenty (20) workers of the slaughterhouse, and hundred thirty (130) residents from the community. Questionnaires, consisting of opened and closed ended questions, and interview guide, were the main data collection instruments used to carry out the study. The collected data was analyzed using frequencies, percentages, charts and tables. The study revealed that the operations of the slaughterhouse do have effect on the health of the residents of the community because wastewater was disposed of into the streams and rivers, which serve a source of drinking water. The workers of the slaughterhouse also attested to it. 74.2% of the residents representing majority answered no when they were asked if the operations of the slaughterhouse were inspected. This was expected because most (70%) the residents indicated in a follow up question that they have never seen an inspector before. The study recommends that government must compel the Kintampo North Municipal Assembly (KiMA), to stop the operators of slaughterhouses and abattoir from construction at unauthorized places.

Keywords: Slaughterhouse, Wastewater, Hygiene.

CHAPTER ONE

INTRODUCTION

1.0 Background of the study

A slaughterhouse is a place where creatures are executed to give nourishment as in meat. The butchering of creatures for human utilization is critical in many countries of the world and goes back to the old circumstances (Bello and Oyedemi, 2009). A slaughterhouse exist principally to give the fitting condition to butchering domesticated animals and controlling waste spill. According to Alonge (1991), “an abattoir or slaughterhouse is a premise approved and registered by the controlling authority for hygienic slaughtering and inspection of animals, processing, effective preservation and storage of meat products for human consumption.” In operating slaughterhouses, certain prerequisite programmes have to be considered, to provide basic environmental and operating conditions that are necessary for production of safe meat. These prerequisite programmes include; good manufacturing practices, good hygiene practice and standard operating procedures.

More concerns are being expressed over the dangers to the health of residents who are neighbours to slaughterhouses, especially in developing countries where level of awareness is low. People are expressing dissatisfaction with the location and ways abattoirs in their neighbourhood are being managed. A slaughterhouse should have the following; main portable water and electricity, main sewage, contiguity with uncongested road and rail system, proximity with public transport, proximity to supply of varied labour, freedom from pollution from other industries, odours, dust, smoke and ash (Gracey, Collins & Huey, 1999). In recent times, the human race has been posed with a lot of health issues, it has therefore become very vital for one to stay hygienic as possible. Slaughterhouse waste just like any other waste can be detrimental to humans and the environment

if definite precautions are not taken. For hygienic reasons slaughterhouses use large amount of water in their operations, this results in producing large amount of wastewater. The major environmental problem associated with wastewater from slaughterhouse is the amount of solids matter and the odour generated from it (Gauri, 2006). Water bodies such as streams and rivers are usually the recipients of wastewater from slaughterhouses. This wrongful discharge of wastewater, which may contain blood and animal faeces into streams can cause increased rate of toxin accumulation (Nwachukwu et al, 2011). Humans may also be affected through outbreak of water borne diseases (Mohammed and Musa, 2012).

Slaughterhouse waste transfer in many developing nations including Ghana has been a noteworthy test for a considerable length of time. Much of the time, waste materials are arranged off without respect to great natural administration practices, in this way making them destructive to people and other earthbound and amphibian life. Concentrates from Ghana and Nigeria demonstrated that, numerous slaughterhouses in the particular nations as a rule store waste materials in the prompt environs or arrange them off straightforwardly into water bodies; some of which fill in as wellsprings of water for the abattoirs (Weobong, 2001; Adelegan, 2002; Osibanjo, and Adie, 2007). This has been clarified that the training is essentially because of absence of or insufficient waste offices (Adeyemo et al, 2009).

In many developing countries, similar to Nigeria, numerous slaughterhouses discard their waste specifically into streams or waterways and furthermore utilize water from a similar source to wash butchered meat (Adelegan 2002). The circumstance is the same in Ghana where most fluid wastes are discharged in to the prompt environs of the abattoir. The Kumasi Abattoir for example dumps its losses into the Subin River about a kilometer upstream of Asago, a little peri-urban group (Weobong, 2001).

In Ghana, expanding interest for animal products particularly meat has prompted increment in the waste produced by abattoir and slaughterhouse, subsequently concerns have being raised about the circumstance. An enquiry into exercises of the fundamental abattoir in the Tamale city demonstrated that emanating water from the office was very dirtied, with all the deliberate parameters surpassing adequate benchmarks set by the Environmental Protection Agency (EPA) of Ghana (Weobong and Adinyira, 2011). The examination additionally uncovered that residents of the community where the slaughterhouse is found grumbled of stench from the emanating, contamination of their water sources and continuous malady flare-ups among others. Concerns have likewise been brought about the way up in which bodies are readied and accordingly taken care of on the way to the business sectors.

1.1 Statement of the problem

Over the previous years at Kintampo, medical issues related with ulcer, bilharzias and cholera have expanded strangely (Kintampo North Municipal Assembly, 2014). The slaughterhouse in the municipality faces a number of problems including poor sanitation and lack of access, affecting the safety of meat products (KNMA, 2014).

One would at this point, ask; where does the water used in washing and cleaning animals disposed? Given this, key questions regarding sanitation practices of abattoir operators remain unanswered. The disgusting stench that welcomes any individual who visits the slaughterhouse has been watched and this motivated the study. The study seeks to analyze the working condition, infrastructure and public health risk in slaughterhouses; assess the challenges associated with butchers in the slaughtering of the animals; find out the perceived effects of poor working conditions, infrastructure

and public health risk.

1.2 Main Objective of the Study

The main objective of this study was to examine the working condition and public health risk in slaughterhouse in Ghana using Kintampo North Municipal as the study area.

1.2.1 Objective of the Study

The study sought to achieve the following specific objectives.

- a) To analyze the working condition, infrastructure and public health risk in slaughterhouses.
- b) To bring out the challenges associated with butchers in the slaughtering of the animals.
- c) To find out the perceived effects of poor working conditions, infrastructure and public health risk in general.

1.2.2 Research Questions

The study was guided by the following questions.

- a) What is the current state of infrastructure and sanitation at the slaughterhouse?
- b) What challenges do butchers encounter in the slaughtering the animals?
- c) What are the perceived effects of poor working condition, infrastructure and public health risk in slaughterhouses?

Respondents included the officials in-charge at the regulatory authority (FDA), some butchers and consumers who patronize meat products from the slaughter house to be used for this research.

1.3 Significance of the study

A study of this nature is significant for a number of reasons;

Firstly, the study will help identify some of the problems pose by slaughterhouse operations to the residents of Kintampo North Municipality and the identification of such problems will be the first step towards finding solutions to the.

The study may also come out with some relevant suggestions and recommendations that may help the Government to compel the operators of slaughterhouse and abattoir from construction at an authorized place.

The Veterinary services, the Regional Health Service Directorate and other such bodies as Environmental Protection Agency (EPA) to have representative on the slaughterhouse board to ensure that necessary legislation are enforced to bring the facility to life.

1.4 Delimitations

Geographically, the study focused on slaughterhouse in the Kintampo township. This choice is largely a product of time and financial constraints encountered by the researcher. Thematically, the focus of the study is on the working conditions and public health risks in slaughterhouses.

1.5 Limitations of the Study

A study of this nature encountered a number of limitations. First, respondents at the slaughterhouse were skeptical about how the researcher might use the information gathered from them. As a result, they were reluctant to provide the required information for achieving the study's objective. To address this, the researcher assured respondents that data will be used for the purposes specified prior to data collection. Additionally, respondents were assured of anonymity in reporting the

findings by using pseudonyms and removing social markers such as age, gender and location. These increased the invisibility of respondents.

Another limitation had to do with the difficulty in obtaining access to the slaughterhouse. This was particularly the case because, the researcher was perceived to be on a faultfinding mission aimed at discrediting the operation of the slaughterhouse. To circumvent this challenge, the researcher engaged in a rapport building process where the purpose of the study was explained to owners and operators of the slaughterhouse. This granted access to the slaughterhouse, respondents and data required to achieve the objectives of the study.

1.6 Organization of the study

This dissertation consists of five chapters. The first chapter focuses on the background of the study, statement of the problem, objective of the study, research questions, significant of the study and delimitation of the study. Chapter two looks at literature review. The methodology used in the study is discussed in chapter three. The focus of chapter four is the presentation and analysis of findings. Chapter five is also devoted to the discussion of the findings. A summary of the findings, conclusions, recommendations, and areas for further research are provided in chapter five.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews literature related to the topic under study as documented by some researchers. The review is done under the following subtopics.

2.1 Sanitation in the slaughterhouse

Sanitation may be defined as the process of ensuring good health by preventing human contact with the hazards of wastes. Such hazards can be physical, microbiological, biological or chemical agents of disease (Hui *et al.*, 2003). The major goal for the food processing industries is to provide safe, wholesome and acceptable food to the consumer and control of microorganisms is essential to meet this objective (Baggen-Ravn *et al.*, 2003). In line with this, a slaughterhouse should be designed to ensure the flow of operations from the live animal holding area through to discharge areas. Meat products should, therefore, proceed progressively through cleaner areas of the operation, without backtracking to areas where the product was previously handled. Edible and inedible areas must be physically and operationally separated. Separation of raw and cooked products must be maintained throughout the plant. In planning a plant, provisions for expansion should not disrupt the flow of operations or interfere with efficient processing. Primarily, there are several key factors that a slaughterhouse should observe to be able to satisfy for the prevention of contamination.

2.2 Infrastructure and planning of the slaughterhouse

2.2.1 Preparation and contents

Where possible, a competent architect, engineer, or other person experienced in slaughterhouse design should be employed to prepare drawings and specifications.

Drawings must be to scale and include the following:

- a) A plot plan showing the boundaries of the plant property; location of the plant in respect to other buildings or structures; streets; driveways and parking sites including drainage systems and surfacing materials (e.g. gravel, pavement etc.); railway lines; sewer lines; potable water sources (e.g. wells); gas and water mains; and power lines. The scale and the north point should be shown.
- b) A floor plan of each level of the plant, showing the purpose for which each room is to be used, location of walls, partitions, windows, doors, posts, conveyor rails and all equipment on the floor or in an elevated position, (e.g. draw-off fans, refrigeration units), hose bibs, sanitizers and hand wash stations.
- c) A floor plan showing location and size of floor drains, location and size of direct drains for pieces of equipment using large amounts of water; curbing, gutters and slope of floor towards drains and the hot and cold-water outlets.
- d) The exterior elevations of the building, showing doors, windows, and platforms.
- e) A cross section of the plant showing ceiling heights.
- f) A roof plan showing skylights, vents, drainage and other pertinent information.
- g) A schedule of room finishes must be on or attached to the plans, including a schedule of door sizes, construction and type of door frame; lighting intensity for each room.

- h) An equipment layout with accompanying flow charts of operations. The design and construction of the equipment must be shown and, where necessary, cross-sections provided to show method of construction and operation.
- i) Where the plans refer to alterations or changes within an existing plant, sufficient description should be made of the surrounding rooms as well as those above and below. Copies of plans of the existing layout and construction should be attached to explain the nature, extent, and effect of proposed changes (Critical Design, Operational and Equipment Guidelines for Licensed Abattoirs, 2012).

The rationale for meeting these requirements is to ensure safe environment for workers at the slaughterhouses. Besides such a working environment ensures the safety of meat products.

2.2.2 Site of Building

Ideally, the slaughterhouse should be located away from residential areas to prevent possible inconvenience to dwelling-places resulting from pollution (FAO, 1985). There must be free access for animals to the site by road and the slaughterhouse should not be situated in flood prone areas. If the slaughterhouse is of regular building construction, the ground should be free of bushes or vegetation in the vicinity of the structure (FAO, 1985).

2.2.3 Size

The size of the slaughterhouse should take into account the number of animals to be slaughtered. The number of animals to be slaughtered is of great importance to avoid sanitary problems resulting from overcrowding (Tove, 1985).

Requirements for slaughterhouses

Food and Drugs Authority must ensure that the construction, layout and equipment of slaughterhouses meet the necessary requirements in order comply with the Public Health Act, 2012, Act 851, Part Seven, Section 131) are slaughtered have:

- a) Adequate and hygienic facilities or, climate permitting, waiting pens that are easy to clean and disinfect. These facilities must be equipped for watering the animals and, if necessary, feeding them. The drainage of the wastewater must not compromise food safety
- b) Separate lockable facilities or, climate permitting, pens for sick or suspect animals with separate draining and sited in such a way as to avoid contamination of other animals, unless the competent authority considers that such facilities are unnecessary.
- c) The size of the lairage facilities ensures that the welfare of the animals is respected. Their layout must facilitate ante-mortem inspections, including the identification of the animals or groups of animals.

To avoid the contamination of meat, the FDA must:

- a) Have a sufficient number of rooms, appropriate to the operations being carried out.
- b) Have a separate room for the emptying and cleaning of stomachs and intestines, unless the competent authority authorises the separation in time of these operations within a specific slaughterhouse on a case-by-case basis.

- c) Stunning and bleeding.
- d) In the case of porcine animals, scalding, depilation, scraping and singeing.
- e) Evisceration and further dressing.
- f) Handling clean guts and tripe.
- g) Preparation and cleaning of other offal, particularly the handling of skinned heads if it does not take place at the slaughter line.
- h) Packaging offal and dispatching meat.
- i) Have installations that prevent contact between the meat and the floors, walls and fixtures
- j) Have slaughter lines (where operated) that are designed to allow constant progress of the slaughter process and to avoid cross-contamination between the different parts of the slaughter line. Where more than one slaughter line is operated in the same establishment, there must be adequate separation of the lines to prevent cross-contamination.

2.2.4 Building / facility

The buildings or facilities involved in such processes are normally described as places, which stand for good sanitation and hygiene. According to international norms, such buildings should normally have clean and unclean processes separated (Eriksen, 1978). Walls and ceilings must be smooth, level, hard and consist of impervious material such as accepted prefabricated panels and, glazed tile, and free from pitting, indentations, cracks, crevices and ledges. All corners and junctions of walls and floors must be covered in kill floor, coolers, condemned and processing areas, and other areas subject to frequent cleaning and moisture. Ceilings should be at least 3.3m in height. Ceilings

of rooms intended for livestock receiving, slaughtering and dressing should be at least 4.8m in height. All mortar joints must be smooth and flush. Scoring cement plaster walls should be discouraged. To promote light reflection and sanitation, wall and ceiling surfaces should be white or light-coloured. Whenever practical, materials that do not require painting should be used. Materials that are absorbent and difficult to keep clean must not be used. Examples of unacceptable materials include wood, plasterboard and porous acoustic-type boards. Walls should be provided with suitable sanitary-type bumpers or sloped curbs to protect them from damage by hand trucks or lifters (Critical Design, Operational and Equipment Guidelines for Licensed Abattoirs, 2012).

2.2.5 Walls and Floors

The flooring of the facility, which is one of the major sources of contamination must be hard, free of cracks, evenly leveled and impervious, and sloping adequately towards a drain to allow cleaning with water and disinfection. The walls as well must be smooth enough to be easily cleaned by water, and recommended materials are, for instance, stone, lava blocks, bricks or concrete. To provide shade, a good environment and finally to keep down the internal temperature in the slaughter line, a roof made up of concrete would be ideal (Eriksen, 1978).

2.2.6 Lighting system

As a matter of hygiene, the slaughterhouse should have a proper lighting system inside the slaughter line to allow proper functioning and avoid accidents, moreover, it will act as a deterrent to insects and rodents (Critical Design, Operational and Equipment Guidelines for Licensed Abattoirs, 2012).

2.2.7 Ventilation system

The internal temperature inside the slaughterhouse shall be maintained to prevent proliferation of unwanted microorganisms and also to cater for a good working environment. Ventilation must be as appropriate as possible to reduce the atmospheric microbial load and to prevent stuffiness in the facility, which can induce sweating and sneezing (Critical Design, Operational and Equipment Guidelines for Licensed Abattoirs, 2012).

2.2.8 Equipment

Equipment for undergoing such process, normally have to follow certain norms and regulations, it has been reported that such equipment has to be of non-corrosive materials, for example stainless steel (Tove, 1985). Structures such as tables, hooks and machines should be positioned such that, they will be easy to relocate to facilitate cleaning and disinfection. The key step for the hygienic handling of carcasses is the equipment for elevating the carcass when slaughtered. In the processing line, cranes are preferred to working tables due to hygienic practices. Procedures that provide for the regular cleaning of hoists should be implemented and should be adhered to. However, the cleaning and disinfection is usually complicated or simply impossible because of the complexity of the machines that may be involved (Tove, 1985). Due to this, equipment that may be easily unassembled for easy relocation are preferred.

2.2.9 Water supply

Water is a vehicle for the transmission of several agents of disease and continues to cause significant outbreaks of disease in developed and developing countries (Kirby and Carl, 2003). Several instances were purported to have been affiliated with poor quality water. For example;

- a) Cholera epidemic in Jerusalem in 1970 was traced back to the consumption of salad
- b) Vegetables which were irrigated with raw waste water (Shuval *et al.*, 1986).
- c) In Canada, an outbreak of *E. coli* was reported (Kondro, 2000) and
- d) In the USA, Cryptosporidium affected approximately 400,000 consumers and caused 45 deaths in 1993 due to the consumption of contaminated water (Kramer *et al.*, 1996, Hoxie *et al.*, 1997).

Since slaughtering is a process, which generates a lot of wastes, to cater for the good running of the processes and minimize contamination, there should be a good supply of water of drinking quality to allow processing and cleaning procedures which will ensure hygienic quality products. Working routines should be planned in such a way as to economically use the consumption of water because of waste water disposal (Kirby *et al.*, 2003). It is also important to ensure that water storage vessels are properly covered, and cleaned regularly to maintain the water in a potable state.

2.2.10. Sanitary facilities

Several water points, sterilizers for hand tools, hoses and cleaning equipment are the keys to providing a good standard of hygiene and these must be sufficiently provided. The availability of hot water in preference to chemical disinfectants should be emphasized. The facility should also be supplied with sterilizers and hand sanitizers wherever possible (Adler 1999). Sanitary facilities must also include an adequate number of toilets and arrangements for changing of clothes, hand-washing and even for bathing (showering). Such facilities must be clean and well-kept at all times and the toilets should possess hand washbasins along with soap, disinfectants, antiseptics, nailbrushes and clean towels readily available. A mess room for resting and eating should be provided for the staff. This room should be separated from the processing line to assure that the

carcasses and the food for the personnel cannot be mixed (FAO, 1985).

2.2.11 Environmental hygiene

As in all sectors of hygiene, the external and internal environment of the slaughterhouse should be protected against any infestation. Insects, birds and rodents have been recognized as important carriers of pathogens and other microorganisms (Olsen & Hammack, 2000). To avoid these, a strict control should be exerted over the following:

a) Pests control

Good Hygienic Practices (GMP) should be employed to avoid generating an environment favourable to pests. Pest control system for pest must include the following:

- a) Good Hygienic Practices should be used to avoid creating an environment conducive to pests.
- b) Pest control programmes could include preventing access to principal site, eliminating harborage and establishing monitoring detection and eradication systems.
- c) Physical, chemical and biological agents should be properly applied by suitably qualified personnel (CAC, 1997b).

b) Proper fencing

Insects, birds and rodents have been recognized as important carriers of pathogens and other microorganisms (Urban & Broce, 2000). In one interesting case a Salmonella outbreak was traced back to amphibians, which had accidentally entered a production facility (Parish, 1998). The aim is to prevent access of unauthorized persons, the public in general, dogs and other animals around the slaughterhouse premises. The fencing should have direct contact with the ground and should be sufficiently high to prevent access into the premises (Urban & Broce, 2000).

c) Bird control

Allowing birds to fly inside the slaughterhouse might cause contamination through its droppings. Birds are often attracted by food supplies, water, special vegetation around buildings, and these attractions should be removed. (Fenlon, 1983) demonstrated that some aquatic birds spread for Salmonella and other human pathogens in the environment. The best control is to prevent them from accessing the buildings by placing nets on the openings and windows.

d) Slaughtering Processing

The hallmark for hygiene principle in processing is that the procedures considered as clean and unclean should be efficiently separated. This requires a well-structured plant layout, where the purpose of any structure should be the protection of the end product against accidental contamination (CAC, 1997a).

e) Transportation

The animals are hauled from pastures or farms to the slaughterhouse. All necessary precautions during transportation should be considered to minimize stress and injury to the animals. This is important because when animals are injured prior to their slaughter, they may grow sick and this can result in an unplanned death. In addition, when animals are stressed, it is observed that their meat is usually of less quality as compared to when they are well rested and relaxed before slaughter (Tove, 1985). Road transport is probably cheaper and more convenient means for conveying animals. Below are some precautions that are worthwhile noting during road transportation of the animals to slaughter:

- a) The transport facility should be designed and modified to convey the stock;
- b) They should provide for sufficient ventilation and lighting;
- c) For open trucks the top should be covered with a tarpaulin to protect the animals from bad

weather conditions,

- d) They should be equipped with appropriate loading and unloading mechanisms to prevent injuries, and most importantly;
- e) They should be as comfortable as possible for the animals (Tove, 1985).

Containers, pumps or tanks used for holding or transporting unprocessed raw materials, have occasionally been used for processed products without any cleaning and disinfection (Morgan *et al.* 1993, Evans *et al.*, 1998, Hennessy *et al.*, 1996, Llewellyn *et al.*, 1998). It is therefore necessary that all equipment in the slaughter house, that come in contact with food, should be fashioned in such a way as to ensure adequate cleaning, disinfection and proper maintenance to avoid contamination (CAC 1997a).

f) Lairage

Lairage is a place where livestock are kept temporarily (Critical Design, Operational and Equipment Guidelines for Licensed Abattoirs, 2012). This is a specific area inside the premises of a slaughter house where the animals are conveyed for rest. Rest is an important factor because when animals are stressed, carcasses of lower quality result from slaughter. There should be sufficient space for the animals and a good supply of potable water for drinking purposes. A washing system where the animals can be cleaned before passing to the slaughter house is generally recommended (FAO 1985).

2.3 Common methods for stunning

Stunning refers to the process of causing animals to become immobile or to render them unconscious, without killing the animal. This is usually done before the animal is slaughtered for food (Tordrup & Kjeldsen, 1994).

a. Captive Bolt Pistol (CBP)

- i. This stunning method is extensively used for all agrarian animals. Gun powder (cartridge), compressed air and spring under tension, propels the bolt through the skull of animals. The name captive means that the bolt is shot out of the barrel but remains in the pistol (Tordrup & Kjeldsen, 1994).
- ii. Concussion stunning: A mechanically operated instrument which delivers a blow to the brain. Used for cattle, sheep and calves. Another method which consisted of knocking or striking a hammer on the head of the animal is now banned with regards to humane practices in some countries (Nigel, 2002).
- iii. Free bullets: are generally used on animals which are difficult to handle for instance, wild pigs, bison and deer.

b. Electric Stunning.

c. Head-Only Stunning: generally, cattle, sheep and pigs are all stunned by the use of this method. The technique involves the application an electric shock using a pair of tongs on either side of the animal head. An electric current is passed through the brain and this leads to the temporary loss of consciousness (Daly *et al.*, 1986).

2.4 Slaughtering and Bleeding

After stunning, the animal is vertically hanged lifting the animal (head down) to a convenient height. The bleeding operation is made by inserting a knife through the neck behind the jaw bone and below the first neck bone. The aim is to sever the carotid artery and jugular vein and let the blood to drain out. The exsanguination process should be as fast and complete as possible due to hygienic norms since insufficient bleeding and slow death could result in blood clotting in the deep

tissues and this might be hazardous in the later stages of slaughtering. Elevation bleeding is more hygienic and is preferred to other alternatives. This is because it reduces the risk of contaminating the carcass (Laurie, 1992).



Plate 2.1: Elevation Bleeding at the Kumasi abattoir

Source: Domfeh, 2015

This process is usually separated from the operations, which will follow. If the blood is not intended for use it should be drained away into a separate pit and should not be allowed to drain into the waste water (Tove, 1985).

2.5 Skinning (Dehairing)

This is the process of carefully removing the skin of animals. Although the process may vary according to the animal (pigs, cattle, sheep or goat), the process follows a similar procedure. Cutting

of the skin is made around the leg with the aim of exposing and loosening the tendon of the animal's lower leg joint to be used for hanging the carcass. After this, the entire skin is removed and the body is prepared for evisceration (Small & Buncic, 2009). This process is usually meant for cattle, goat, deer and sheep.

Dehairing is a process normally done in the slaughter of pigs. It consists of releasing the bled animal into a pool of boiling water for a couple of minutes and then pulling it out for removal of the hairs before proceeding for evisceration.

2.6 Evisceration

Evisceration consists of removing the internal organs of the abdominal and thoracic cavities. The internal organs are also known as offal and they fall into two categories:

- a) Red offal such as the heart, liver and lungs (pluck).
- b) Grey offal such as the stomach or intestine (paunch).

To avoid contamination of the carcass through accidental punctures of the intestines and stomach, it is important that the carcass is placed in the hanging position. The body cavity is severed and the intestinal mass and the stomach (the paunch) are pushed slightly out. The liver is held out carefully during this process. This is to prevent an accidental release of the bile content onto the carcass and as such spoil the taste of the meat. The last stage in evisceration is the removal of the contents from the chest cavity. By cutting the diaphragm which separates the thoracic cavity from the abdominal cavity, the pluck can be pulled out as a single unit (Tove, 1985). Leakage from the rectum is prevented by tying the anus with a process called bagging.

2.7 Splitting and trimming

The carcass is cut down along the backbone and split into two halves using a brisket saw and is then subjected to inspection from an authorized officer for detection of diseases. Trimming is a process that should be performed by trained employees and consists of the removal of visible contamination. All equipment (hooks and knives) should be sanitized between each use to reduce cross-contamination between areas (Reij *et al.*, 2003). Carcasses which have been railed out for visible contamination, such as fecal contamination, should be re-conditioned as quickly as possible to get the carcass through the process and back into the system (CAC 1997a).

2.8 Delivery

After undergoing all processes in the slaughter line, the carcass is weighed and finally labeled for identification and sent for delivery on the local markets.

2.9 Precautions that have to be maintained during slaughtering

a) Disinfection on entering the premises

Every time an authorized officer or member of staff is to enter the slaughter house, he should undergo a process of disinfection by dipping his boots in a footbath, which is a basin situated at each entrance of the slaughter line, to avoid carrying infectious agents that might stick to the boots via soil particles (Adler 1999).

b) Bleeding and exsanguinations

The knife used to slaughter each animal should be cleaned and rinsed in hot water. It is known that a contaminated knife can pass on bacteria into the animal tissues during the initial stages of

bleeding, that is, when the heart is still beating (Reij *et al.*, 2003).

c) Skinning

Knife skinning and the use of bare hands can similarly hosts contaminating organisms on the surface of the carcass. As such washing of the hands is a must after the passage of each carcass to avoid contamination of same (Reij *et al.*, 2003).

d) Evisceration

Extreme care should be taken not to puncture the intestines. The slaughter men should follow the procedure of tying the end part of the intestine and the severed end of the esophagus, then removing intestine and stomach first, followed by the pluck (heart, liver, and lungs of an animal used as meat (FAO, 1985). The pluck should be hanged on a hook while the paunch (stomach) should be dropped in a paunch container. As a matter of hygiene, the stomach and intestines should not be processed while carcass dressing is in operation as any minor splash from same can easily cause contamination of the meat.

e) Washing

It is the process by which the carcasses undergo washing with clean potable water. If water is a problem then a dry slaughter process by trained slaughter men should be used as alternative as it is more appropriate as a safety measure for carcasses to be dry clean than to contaminate them with polluted water (Odeyemi, 1991).

f) Offal handling

The offals (stomach and intestines) are the organs from the carcass which contain the greatest load of infectious organisms and for preventive measure must be moved to a separated chamber provided

for them. At first, they should be emptied of their contents, dried, and then cleansed with water.

g) Personnel

The personal hygiene of the workers is a primordial factor in slaughtering operations. The reason is simply that, contamination of food and disease transmission, depend upon the human factor as well as on the tools and mode of operation. Transfer of microorganisms by personnel particularly from hands is of vital importance (Bloomfield, 2003). During handling, bacteria are transferred from contaminated hands of workers to the food and subsequently to other surfaces (Montville *et al.*, 2001). Low doses of infectious organisms such as *Shigella* and pathogenic *Escherichia coli* have been linked to hands as a source of contamination (Snyder, 1998). Poor hygiene, particularly deficient or absence of hand washing has been identified as the causative mode of transmission. Proper hand washing and disinfection has been recognized as one of the most effective ways to control the spread of pathogens, especially when considered along with the restriction of sick workers (Montville *et al.*, 2002). Moreover persons with unhygienic habits like spitting, coughing and nose-blowing should be strictly monitored to ensure that they do not contaminate the food they work with. It is important to limit access into the premises during the time of slaughter. All personnel that are allowed access should also be dressed in the appropriate personal protective clothing, e.g. clean trousers and wearing appropriate waterproof aprons.

Boots should be worn with the trousers neatly folded inside. The hallmark is that the workers must strictly abide to a formal code of hygiene.



Plate 2.2: Staff of a slaughterhouse dressed in personal protective clothing.

Source: <https://www.google.com/search?q=staffpersonnel> (2019)

h) Hand-washing

As stated by the Centers for Disease Control and Prevention: It is well-documented that one of the most important measures for preventing the spread of pathogens is effective hand washing (Montville *et al.*, 2002). Fundamentally, the good habit of careful and frequent hand-washing will definitely reduce contamination. Therefore hand-washing facilities with sufficient water supply must always be provided for use by the workers.

Basically, the mess room and the working area is where there should be several hand-washing points. If it is situated away from working places, the risk that they will not be used is higher and would probably result in contamination of the meat (Tove, 1985). It is important that members of staff wash their hands regularly, especially;

- a) Before they begin the slaughtering of animals.
- b) After visiting to the toilets.

- c) After coming into contact with dirty objects and materials.
- d) After smoking and eating.

The staff should understand that the hands are prone to contamination if used for scratching the skin, the hair, clothes and picking the nose. Such acts may cause bacteria to be transmitted to the hands and thereafter infect the meat, which is handled by the same hands. The management of slaughterhouse should provide antiseptic soap or germicidal, coupled with the use of brush for washing of hands since bacteria are often under the nails (FAO, 1985).

i) Cleaning Operations

For the purpose of sanitation clean water is usually required for the cleaning of equipment, tools floors and walls. Such operation normally starts with the removal of solid waste of meat and fat trimmings and pieces of bones from the area. Blood clots and other waste materials on the floor may be dealt with by scrubbing them off the floor. High pressure water cleaning begins from the walls and finally ends with the floors. Hot water hosing under pressure would be ideal for removing sticky waste from corners and drains. For scrubbing of other surfaces such as tables, and tools, the use of hard fiber brushes and detergents is suggested. Liquid detergents are more effectual than ordinary soaps, since they dissolve easily in water while absorbing dirt, which is finally removed by flushing. Powdered soap may also be dissolved in water and used. Knives also should be sterilized or boiled in water (FAO, 1985).

2.10. Waste Management

The easiest disposal method is to divert effluents into existing pools, rivers or lakes. However, this method cannot be recommended in view of the consequent contamination of water sources for humans, and domestic and wild animals. For the safe disposal of liquid and solid waste, the following action should be taken: separation of blood; screening of solids; trapping of grease.

- a. The blood from slaughtered animals will coagulate into a solid mass, which may block up both open and closed drains. It is therefore recommended that the blood is collected and used for human consumption, stock feed production or fertilizers, if the religious and cultural traditions allow the use of blood.
- b. Solids (meat or skin trimmings, hair, pieces of bones, hooves, etc.) must be screened. This may be done by providing the drains with vertical sieves.
- c. Effluents from slaughterhouses always contain small amounts of fat (melted fat or small pieces of fatty tissues). Grease traps should be installed in the drains. The fat solidifies, rises to the surface and can be removed regularly (Ockerman & Hansen 2000)

2.11 Diseases Associated with Unhygienic Slaughtering

There are many different ways by which an infectious organism can make its way through the slaughtering process of animals and cause very subsequent diseases. Below are some of the common diseases related to slaughterhouses:

a) Anthrax

Anthrax is a naturally-occurring bacterial disease of animals caused by *Bacillus anthracis*, which forms spores that generally survive for years in the environment. Cattle, sheep, and goats are at the highest risk but humans can also contract the disease. Most animals are infected by oral ingestion

of soil contaminated with the spores. People may acquire anthrax when they come in contact with infected hides or hair of animals. The organism is inhaled from contaminated dust, or eaten in undercooked meat from infected animals. It may also penetrate any exposed wound on the skin. Animals that died of anthrax may have blood secreted from the mouth, nose, and anus (Kirby *et al.*, 2003). During the slaughtering process, the bacteria can be transferred from hides of infected animals to the hides of the healthy ones during the immediate pre-slaughter phase in lairage (Small & Buncic 2009). As such if no particular precaution is taken when removing the hides, the probability of contaminating the carcass is very high.

b) Brucellosis

Brucellosis is an infectious disease caused by contact with animals carrying bacteria called *Brucella* which affects a wide variety of animals including dogs, cattle, pigs, sheep, goats and horses. The disease has been known as Malta fever, Bang's disease, Mediterranean fever, rock fever, and goat fever (Goldman & Salata, 2007). Humans can be infected if they come into contact with infected meat or placenta of infected animals.

The slaughter of a diseased animal is a threat since contamination may result if, for instance, blood from the infected carcass came into contact with the knife of the slaughter-man and the same knife is used for processing another uninfected carcass during the slaughtering. In case of ingestion of infected meat, symptoms in humans are undulating fever, headache, joint pain, weakness, and night sweats (Nørrung *et al.*, 2009). People who handle meat should wear personal protective gear such as protective glasses and clothing for protection of wounds from infection. Detecting infected animals prior to slaughter controls the infection at its source. Vaccination is actually available for cattle, but not humans (Goldman & Salata, 2007).

c) *Escherichia coli*

Escherichia coli are bacteria which are normally found as normal flora in the intestines of man and animals. One can get infected after handling or being exposed to faeces of a carrier animal (Buncic & Avery, 1998). Animals usually carry the bacteria without being symptomatic to its effects. However, when humans are infected, the toxins cause serious illness which ranges from diarrhoea to kidney failure. Personal hygiene is very important, particularly after contact with animal faeces, since very few organisms are required to cause infection in humans (Buncic, *et al.*, 2009).

E-coli can easily contaminate the carcass in the slaughtering process if;

- i. The workers do not wash their hands after visiting the toilet, the bacteria will be transferred when handling the meat.
- ii. Care is not taken at the evisceration step when disemboweling the carcass, as such if the intestines get perforated and intestinal matter comes into contact with the meat (Buncic, 2006) Prevention focuses on hand washing and proper hygiene. Hands and all equipment should be properly disinfected after touching or handling raw meat (Nørrung *et al.*, 2009).

d) *Salmonellosis (Gastroenteritis)*

Salmonella sp. are bacteria that live in the intestinal tract of carrier animals. The bacteria are shed into the faeces, of animals which are particularly stressed during steps such as being yarded and transported (Small *et al.*, 2002).

As in *E-coli* contamination, salmonella can be transferred to the carcass in the slaughtering line by:

- i. Slaughtermen who are handling meat after being to the toilet without proper hand washing,
- ii. Fecal matter being in contact with the meat at the evisceration process, if the anus is

not bagged properly, and

- iii. Also if the intestines get punctured upon removal and intestinal matter is in contact with the meat. If hands are not properly washed after contact with infected feces, the accidental ingestion of bacteria may occur (Nørrung *et al.*, 2009). Infection also occurs as a result of equipment that are unsanitary. Symptoms generally include fever, foul smelling diarrhea, and severe dehydration, especially in young children and infants. Life-threatening diseases like meningitis and septicemia may also occur (Reid *et al.*, 2002).

e) Q-fever (Query fever)

Q fever is a bacterial infection that can affect the lungs, liver, heart, and other parts of the body. It is found around the world and is caused by the bacteria *Coxiella burnetii* (Jim & Herbert, 1991). The bacteria affect sheep, goats, cattle, dogs, cats, birds and rodents as well as some other animals (Buncic, 2006).

Humans normally acquire fever, night sweats, and pneumonia and hepatitis in the worst cases (Reid *et al.*, 2002). Abattoir workers (particularly those dealing with foetuses), veterinarians and farm workers are the people who are most at risk of contracting this disease (Hutchison *et al.*, 2007). In slaughtering, meat can be contaminated in the process of evisceration whereby feces of contaminated animals have been transferred to the hands of the slaughter men, which in turn contaminates other healthy carcasses. To prevent further spread of Q fever, dead fetuses and reproductive tissues should be buried or burned. Wearing of protective equipment such as gloves and eyewear (PPE) when assisting in birthings and washing of hands thoroughly afterward are highly recommended (Reid *et al.*, 2002).

CHAPTER THREE

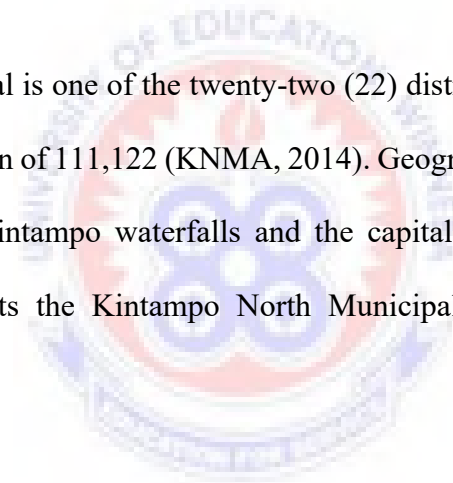
METHODOLOGY

3.0 Introduction

This chapter describes the profile of the study area and general research design employed in conducting the study. It covers a research design, population and sampling procedure instrumentation, procedure for collecting data, the pilot study and how data is analysed.

3.1 The study Area

The Kintampo North Municipal is one of the twenty-two (22) districts of the Brong Ahafo Region of Ghana with a total population of 111,122 (KNMA, 2014). Geographically Kintampo is the center of Ghana with the famous Kintampo waterfalls and the capital of Kintampo North Municipal Assembly. Figure 3.1 presents the Kintampo North Municipal Assembly and the Kintampo township.



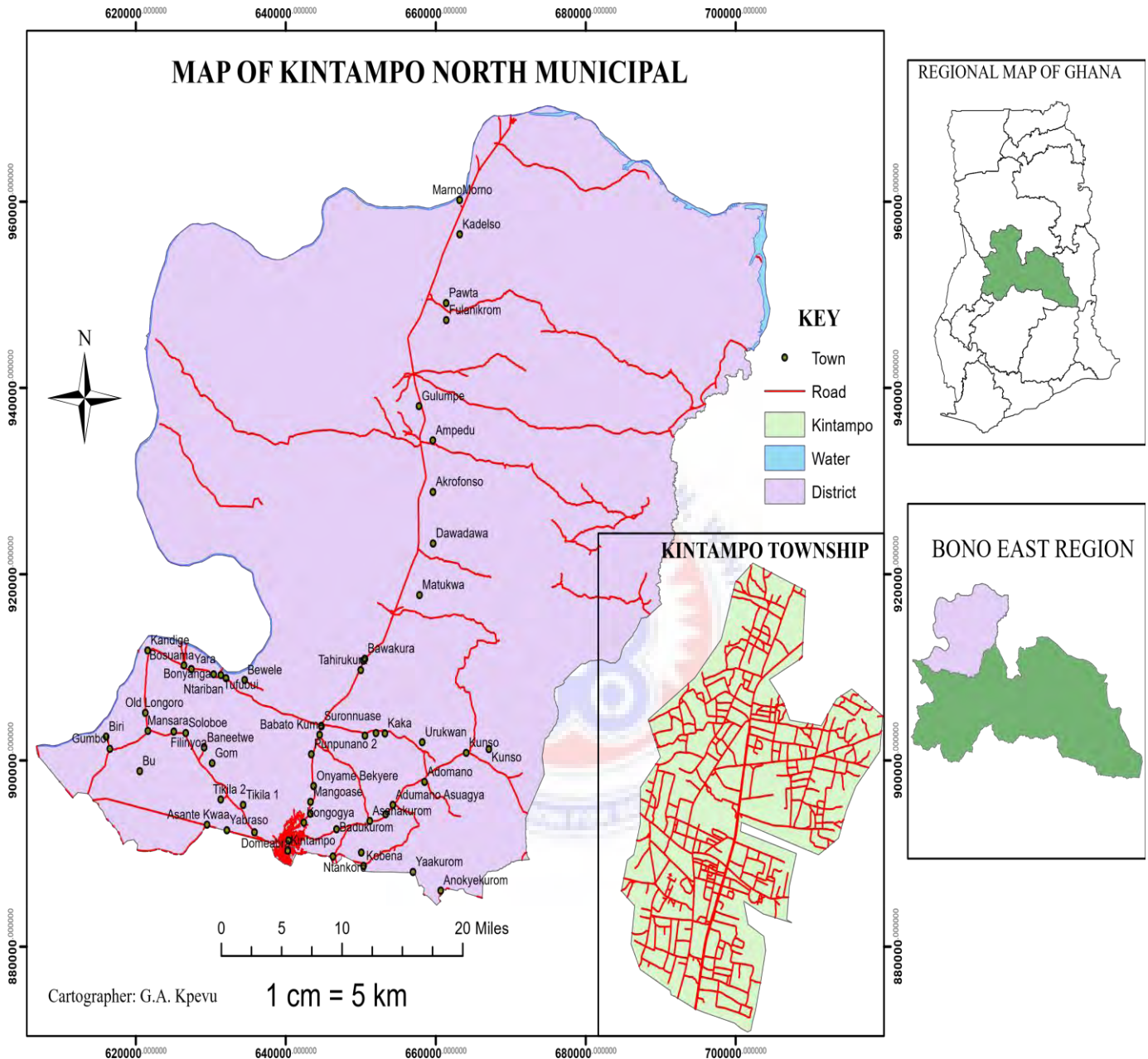


Fig 3.1 Kintampo North Municipal Area

Source: KNMA, (2014)

The Kintampo slaughterhouse is communally owned, and located on the Kintampo main market. It is situated about 100meters East of the Municipal main market, Kyeremankoma Area. It slaughters about fifty to seventy cattle a day. The slaughterhouse is not well equipped to meet international

standards due to the absence of running water and appropriate equipment. The slaughterhouse has two veterinary personnel and two personnel from the Environmental Health Unit of the Local Government Ministry were responsible for inspecting meat. However, these personnel had no training in meat inspection. The ensuing plates show the Kintampo township slaughterhouse from different views.



Plate 3.1: The structure of the slaughterhouse in Kintampo North Municipal.



Plate 3.2: The frontal view of slaughterhouse in the Kintampo Municipal.

3.2 Research Design

A descriptive survey design was used for this study. A descriptive design describes the characteristics of a phenomenon or variable under study without statistically testing for the relationship that exist among the variables (Bhat, 2019). Thus, a descriptive design provides a picture of a phenomenon. This design is ideal for this study because it provided an opportunity for the researcher to describe the working conditions and public health risks in the slaughterhouse.

The collected data was analyzed using frequencies, percentages, charts and tables.

3.3 Population

The target population for the study consists of all slaughterhouses in Ghana. In this study however, the focus is on the slaughterhouse located at Kyeremankoma since the researcher could not effectively handle all the slaughterhouses in the Municipality.

3.4 Sample Size

A sample size of 150 respondents, comprising; twenty (20) workers of the slaughterhouse, and hundred thirty (130) residents from the community was purposively chosen for this study.

3.5 Sampling Technique

The Municipality has three slaughterhouses. However, purposive sampling was used to select the slaughterhouse located at Kyeremankoma. This slaughterhouse was selected for the reason being that it is located close to the community's and the market as well. Further, the size of this

slaughterhouse implies that their operations generate a significant amount of waste and public health risk, which needs to be effectively managed to reduce pollution.

The purposive sampling was used to sample staff of slaughterhouse. Management staff, and operational staff were the ones purposively selected. Specific attention was paid to conservancy labourers because the nature of their work brings them into contact with the slaughterhouse.

3.6 Methods of Data Collection

The researcher employed three main instruments for the collection of relevant data. These instruments include questionnaire, interview and observation. Participants with formal education answered the questionnaires themselves while for those with no form of formal education, questions were read out and their responses recorded accordingly. Observation was used to acquire data to corroborate that obtained from questionnaire and interview and specific information, which were not readily available through questionnaire and interviews.

A tour of the Kintampo North slaughterhouse was made to examine the processes involved at various sections of the slaughterhouse and waste disposal systems among others. Visits were made to the slaughterhouse to assess its operations and to establish whether its operations conformed to the general code of good practice for abattoirs. Individual observation checklists were used at each section of the facility to identify existing practices. The checklists were divided into two parts. The first part covered the general information on the sections that was being observed. This was common for all the sections of the facility. The second part was designed specifically for each of the sections as the work environment and the activities of the sections were unique to each of them. The questions were based on the literature review and covered two major headings;

- a) **Infrastructure-** These involved observations on the location of the facility, the materials for construction, water supply, sanitary facilities, lairage etc.
- b) **Practices-** These involved observations at the various segments on the activities that are carried out there. For example slaughtering, skinning, evisceration, cleaning activities, etc.

3.7 Data analysis

Quantitative data were analysed with the aid of SPSS version 20. Frequencies and percentages were used to analyse data while the results were displayed with tables and charts.

Qualitative data on the other hand were recorded and transcribed. The transcript was read carefully to identify emerging themes. These themes were therefore used for analysis.

3.8 Ethical Considerations

A study of this nature involved a number of ethical considerations. To access the slaughterhouse, the researcher had to seek informed consent of owners, workers and customers. The researcher met these stakeholders and explained the objectives of the research. The meetings were also used to demonstrate that the study had no intention to cause physical, emotional or psychological harm to respondents. Besides, respondents were informed that they were free to withdraw from the process at any time. This made participation in the study essentially voluntary and devoid of any form of coercion.

Another important ethical concern was respondents' need for confidentiality. This was the case because such information was considered sensitive, the spread of which can negatively affect the meat industry. Given this, respondents were reluctant to participate in the study. However, the

researcher assured respondents particularly operators of slaughterhouses that the data being sought was for the specified purpose and that additional informed consent will be sought before any further publication.

Given the sensitive information involved, respondents expressed concern about disclosing their identity to the public and this raised another ethical issue. For active participation, respondents requested not disclosing their identity in the write up. To achieve this objective, the researcher adopted pseudonyms to make respondents invisible in the reporting of the data.



CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

In this chapter, results of the data collected from the respondents are reported and discussed. The study aims at finding out working conditions and public health risk in slaughterhouse in Ghana (Case study in Kintampo North Municipality). Responses obtained from the respondents were analyzed.

4.1 Demographic Characteristics of the respondents

The demographic characteristics of the respondents (staff of slaughterhouse) comprises of gender, age, level of education and years worked in the slaughterhouse for the staffs at the slaughterhouse, while that of the residents of the community comprised of gender, age and years lived in the community. The gender distribution of the staffs of the slaughterhouse was male dominated representing 88.1% with only 11.9% being females as shown in Table 1. With regards to age, majority (48.8%) of the abattoir workers were between 20 – 25 years. This was to be expected due to the nature of work in slaughterhouse. In Ghana, it is assumed that workers of an abattoir are not very well educated and this was evident in the findings of this study which showed that 49.2% of the workers of the slaughterhouse had only basic education, 34.9% had attained secondary education with just 15.9% having attained tertiary education. The demography characteristics of the residents on the other hand were different as compared to that of the staff. The questionnaires were administered to a total number of 130 people but 120 were completed and returned, out of this, 65% were males while the other 35% females. The age distribution of the respondents was very good

because there were more matured people representing 29.2% which will help review the real impact of the operations of the Kintampo slaughterhouse on the residents as shown in Table 1. Most (50%) of the residents had secondary education, also 45% representing majority of the resident who have lived in the community above 6 years.

Table 1: Summary of Response on Demographic Characteristics of the Staff of the Slaughterhouse and residents of Kintampo

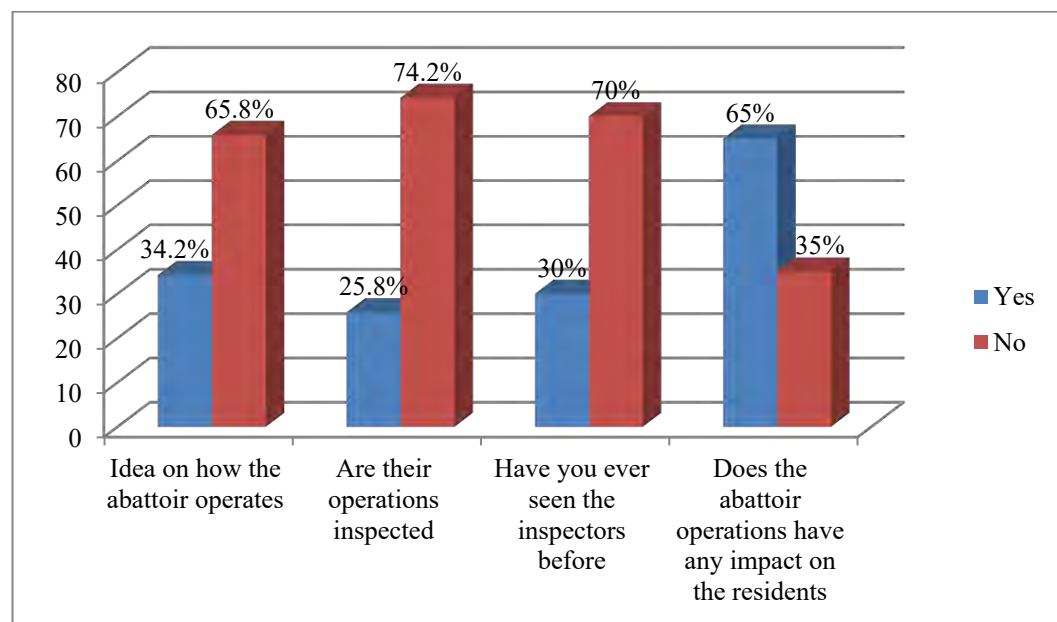
Characteristics	Frequency	Percentage (%)	Frequency	Percentage
Gender				
Male	18	88.1	78	65.0
Female	2	11.9	42	35.0
Age				
20-25	4	48.8	35	21.7
26-30	4	20.2	27	22.4
31-35	2	10.8	32	26.7
36 and above	10	20.2	26	29.2
Level of Education				
Basic	10	49.2	37	30.8
Secondary	7	34.9	60	50.0
Tertiary	3	15.9	23	19.2
Years worked with slaughterhouse				
1-3 years	3	15.9	30	25.0
4-6 years	7	34.9	36	30.0
Above 6 years	10	49.2	54	45.0

Source: Field survey, May, 2019

4.2 Operations of Slaughterhouse and it effect on Residents

The study sought to assess the effect of the operations of the slaughterhouse on the residents of the community as part of its objective. It was revealed that most (65.8%) of the residents in the Kintampo community did not have an idea of how the slaughterhouse operates. Approximately 74.2% of the residents representing majority answered no when they were asked if the operations

of the slaughterhouse were inspected. This was expected because most (70%) the residents indicated in a follow up question that they have never seen an inspector before. 65% of the residents responded positive to the fact that the operates of the slaughterhouse affected them, as indicated in Figure 1. It can also be concluded from fig. 4.2 that, the residents of Kintampo are aware of the negative impact the operations of the slaughterhouse is having on them, (resident) and the country at large.



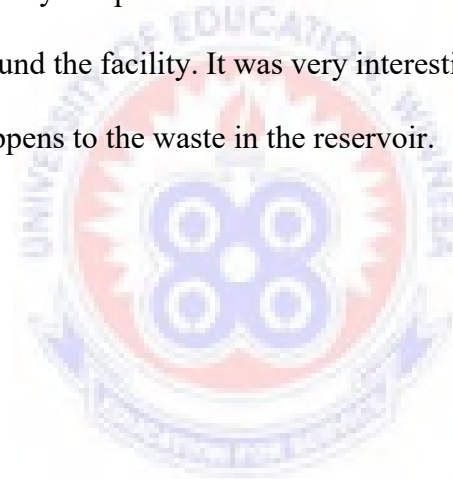
Source: Field survey, 2019

Figure 1: Response of Residents on the Operations of the Slaughterhouse

From Figure 1, respondents (residents) were asked on how waste is disposed off by the slaughterhouse. They indicated that 64% and 36% representing the amount of wastewater and blood respectively generated by the slaughterhouse operations were usually disposed off into gutters or reservoirs. Almost all the respondents (residents) also said that unwanted offal and faeces were disposed off at the refuse dump and given to farmers respectively. This is in agreement with a study by Adelegan (2002), where it was found that in many developing nations, many abattoirs and

slaughterhouse dispose off their waste directly into streams or rivers and also use water from the same source to wash slaughtered animals. The situation is not any different in Ghana, where, most liquid and gaseous wastes are released into the immediate environs of the abattoir. In some instances, the solid wastes are deposited with other urban wastes some distance from the abattoir, as indicated by Weobong (2001) that the Kumasi Abattoir for instance dumps its solid wastes into the Subin River about a kilometer upstream of Asago, a small peri-urban community.

It was also observed that the unwanted offal which are disposed off at the refuse dump were responsible for the bad stench in the community. Degrading heaps of gut contents at the site served as breeding grounds and sanctuary for pests that become a nuisance for slaughterhouse workers, visitors as well as residents around the facility. It was very interesting to note that, even most of the workers did not know what happens to the waste in the reservoir.



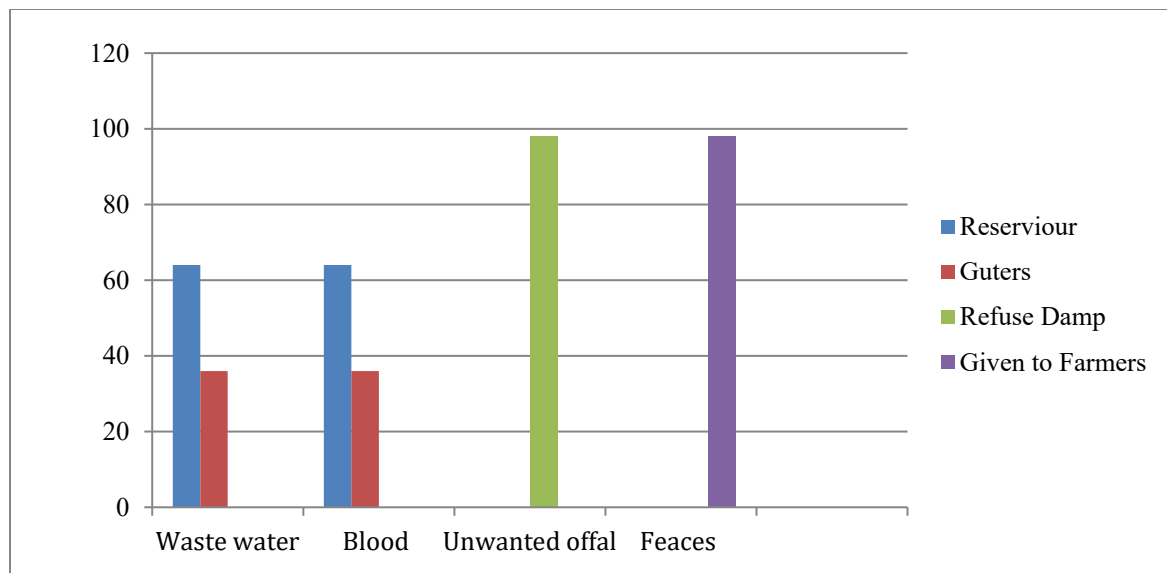


Figure 2: Response by Residents on the Disposal of Waste from the Abattoir

Concerning the staff, they said that the abattoir operates were inspected on a monthly bases, which was contrary to what the residents said. It can however be argued that the resident may not know the inspectors so they were likely not to know when the inspectors come for inspections. It was further indicated by the staff that the slaughterhouse have regulations regarding its operations and the agency that conducts these inspections is the Environmental Protection Agency (EPA).

With respect to the impact of the slaughterhouse operations on the residents, the staff affirmed to the fact that the abattoir operations have an impact on the residents.

During the period for the research, there was a nauseating stench that greeted anyone who visits the vicinity and this was as a result of the Ghana Water Company cutting of water supply to the abattoir.

Prior to that, the waste collection company that serviced the area had not collected the refuse over a period, resulting in a pile-up. The recent rains, therefore, provided a catalyst for the production of that stench. This means that the regulations on the operation of the slaughterhouse is not adhered to and the inspectors are not doing their work well.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 Introduction

This study was conducted in the Kintampo North Municipal, Ghana to investigate the working conditions and public health risk in slaughterhouses. The objectives guiding this study included; to analyze the working condition, infrastructure and public health risk in slaughter houses; to bring out the challenges associated with butchers in the slaughtering of the animals; to find out the perceived effects of poor working conditions, infrastructure and public health risk in general. In other to achieve these objectives, the study used a sample size of 150 respondents comprising 20 workers of the slaughterhouse, 130 residents from the community. All 20 questionnaires for the slaughterhouse were completed and returned while for the residence of the community, 120 questionnaires were completely filled and returned. The remaining 10 questionnaires for the residents were either not completed or returned. A simple random sampling technique was adopted for selecting respondents to represent the entire target population and was carried out at the researcher's own discretion.

5.1 Summary of Findings

- On working conditions of the slaughterhouse, it was found that the facility does not possess good sanitary requirements that are essential for these facilities. Concerning infrastructure, observations indicated that the facility was below the requirements and that much improvement was needed. Regarding ventilation and illumination, the slaughterhouse was in a very good condition. The size and the location of the slaughterhouse was not in a good

condition.

- On challenges encountered by staff of the abattoir, the study found that infrastructural inadequacies pose risks to the activities of workers. Of particular importance is the unavailability of water and sanitary facilities like toilets. Transportation of animals to the facility emerged as a major challenge to workers.
- Findings on health risks show that activities of the Kintampo slaughterhouse have a negative impact on the residents, as confirmed by both the staff of the abattoir and residents. The operations of the slaughterhouse regarding how wastewater, blood, unwanted offal and faeces are disposed off all affect the residents and the environment at large. The stench emanating from the slaughterhouse waste is highly repulsive.

5.2 Conclusions

Results revealed that the facility does not possess the good sanitary requirements that are essential for these facilities. Concerning the infrastructure, more has to be done to improve the facility. Regarding ventilation and illumination at the facility, it was observed that the slaughterhouse was in a good condition. The size and the location of the slaughterhouse however was not in a good condition.

On water supply and sanitary facilities like toilets, the slaughterhouse was not up to standard. In terms of transportation of animals to the facility and the materials used for the construction of the facility, the slaughterhouse was barely satisfactory. The space for housing the animals prior to slaughter was also below standard.

The slaughtering and skinning processes needed an improvement. In general, although the workers were hardworking, they were not sensitive to health and sanitary concerns and they exposed themselves to health risks in their operations. Concerning microbial analysis at the facility, test on the meat from the facility showed that it was not contaminated with Salmonella. It was also observed that although the sanitary practices were not always acceptable, it did not mean that the meat would be contaminated with Salmonella. The microbial tests conducted on the water revealed that, it was contaminated with E. coli and faecal coliforms and was therefore unsafe for use as food. Based on the findings, it can be concluded that the activities of the Kintampo slaughterhouse has a negative impact on the residents, which was confirmed, by both the staff of the abattoir, as well as the residents. Discharge of wastewater, and disposal of blood, unwanted offal and faeces affect residents and the environment. The stench emanating from the slaughterhouse waste is highly repulsive.

Concerning the regulations on the operations of the slaughterhouse, it can be concluded that the observations made were below the requirements and that much was needed to be done to improve the system at the facility. The workers should also be trained in the general rules and regulations regarding EPA-Ghana standards.

5.3 Recommendations

Based on the outcomes and results of this study, the study makes the following recommendations for stakeholders in the meat industry.

- a) The Municipal Assembly must ensure that slaughterhouses meet the requirements set out by regulations before they start operations. Besides, there must be periodic monitoring to

ensure that operators conform to the rules.

- b) The Municipal Health Directorate must ensure that operators of slaughterhouse observe personal hygiene at the workplace. This should include wearing appropriate protective clothing and sterilization of equipment.
- c) The Environmental Protection Agency must carry out periodic pest control activities at slaughterhouses to curb the threat of pest infestation.
- d) The Kintampo North Municipal Assembly must enforce regulations that ban the construction of slaughterhouses in unauthorized places.

5.4 Suggestions for Further Research

The concept of working conditions and public health risk in slaughterhouses is a multi-faceted and complex issue, many aspects of which lay beyond the bounds of this masters' thesis. In this regard, the researcher makes suggestions for further research which future researchers can consider;

- a) Studies should focus on working conditions and pollution in slaughterhouses.
- b) Research should examine in detail the poor working infrastructure and environmental health risk in slaughterhouses in the country.
- c) Future researchers should examine the impact of working conditions on activities of slaughterhouses.
- d) Finally, research is recommended in communities outside Kintampo township to provide a detailed picture of working conditions and public health risks in slaughterhouse in Ghana.

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APPENDIX A

**UNIVERSITY OF EDUCATION, WINNEBA
COLLEGE OF TECHNOLOGY EDUCATION, KUMASI
DEPARTMENT OF HOSPITALITY AND TOURISM**

This questionnaire is for a research on the working conditions and public health risks in slaughterhouses in Ghana (a case study of Kintampo North Municipal). All data collected are solely for the purpose of research and will be treated with confidentiality. Your maximum cooperation and support will help this research. Thank you.

QUESTIONNAIRE FOR SANITARY INSPECTORS

INTRODUCTION: As a complimentary supervisor of abattoir/slaughter home is the meat production/processing in our communities, kindly respond very objectively to the question as required.

SECTION A

BIOGRAPHICAL DATA (PERSONAL DATA)

1. Gender: Male [] Female []
2. Age 20 – 30 []
 31 – 40 []
 41 – 50 []
 51 – 60 []
3. Highest level of Education:
 Degree []
 Diploma []
 HND []
 Certificate []
 WASSCE []
4. Personal Rank:
 Director []

Assistant Director []

Supervisor []

5. How long have you been in the sanitation Department?

1 – 5 ears []

6 – 10 years []

SECTION B

ROLE OF SANITARY INSPECTORS IN SLAUGHTER HOUSE

6. How many of your slaughter house workers are professionally trained?

.....

7. How many of them are

a. MSLC holders

b. BECE holders

c. WASSCE holders

d. Diploma/certificate holders.....

e. First Degree certificate holders

8. How many of your field workers are non-professional?.....

9. State two ways by which you monitor inspection of meat in the slaughterhouse.

a.

b.

10. Do you conduct refresher courses for your slaughterhouse workers?

.....

11. How often do you organize such courses?

12. Do you discuss with workers their challenges? Yes/No

13. If yes, state how it facilitates effective slaughterhouse practices

.....

14. Does the location site of the slaughterhouse facilitate effective conduct if your work?

Yes/No

15. State any two (2) challenge that the site/location pose to effective delivery of the work at the slaughterhouse?

a.

- b.
16. As your slaughterhouse is located very close to residential areas, how do you manage.
- a. Pollution from slaughter waste?.....
.....
- b. Nuisance from noise?.....
.....
- c. Flooding?.....
.....
17. On the average, how many animals are slaughtered in a day?
.....
18. Does the number of animals slaughtered in a day in relation to the size of slaughter facility pose any problem (s)? YES/NO
19. If yes, what are they?
- a.
- b.
20. How do you manage such situation as stated in 19 (a), (b) above?
.....
.....
21. Does the slaughter facility has water supply? YES/NO
22. If yes, how hygienic is it?
.....
23. Does the facility has water storage vessels that properly covered? YES/NO
24. If yes, how regular are they cleaned to maintain the water in a potable state?
.....
.....
25. If No, why?
26. As hygiene practitioner, how do you ensure that both the external and internal environment of the slaughterhouse in protected against any infestation from insects, birds

- and rodents?
-
27. How are the end product (meat) protected against accidental contamination?
-
-
28. Has the slaughter facility lairage? Yes/No
29. If Yes, how effective in it?
-
30. What are some of the precaution measures do you maintain during slaughtering?
- a.
- b.
- c.
31. What are some of the diseases associated with unhygienic slaughtering?
- a.
- b.
- c.
- d.
- e.
32. How are infested/contaminated slaughtered animals handled?
-
33. Do you have rules and regulations that guide slaughter workers and customers in the slaughter house?
34. How do you sanction a sanitary/vertinary worker who does not comply with the rules/regulations?
35. How do you punish a slaughter worker who contravenes a slaughter house rule/regulations?
36. Are the slaughter house compartment, tools and equipment enough all the worker?
YES/NO
37. If Yes, explain.....
-
38. If no, explain.....

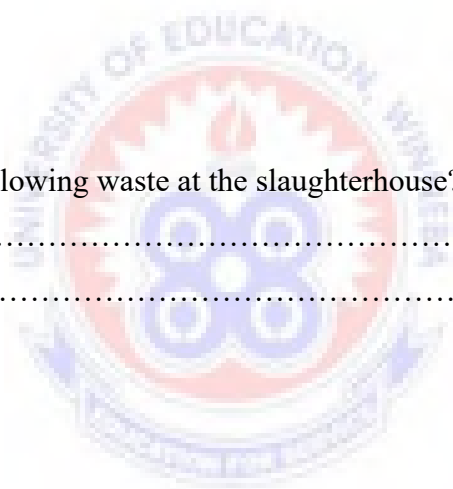
-
39. Do you encourage your workers to attend workshops organized by EPA and Hygiene institutions?
40. How does knowledge/skills gained in these workshops impact on slaughter house workers and sanitary/vertinery workers?
-
-
41. Do you have slaughter house attendance book signed by every reporting worker? Yes/No
42. If No, explain.....
-
43. Were you given training after appointment?
44. Do the slaughtermen/workers co-operate with you in administrating the slaughter house?
YES/NO
45. If yes, how have they been co-operate with you?
-
46. Do you delegate some of your duties to your subordinates? YES/NO
47. If yes, mention some of the duties you delegate to your subordinates?
- a.
 - b.
 - c.
 - d.
48. If No, give one reason.....
-
49. Do you like the support you get from the Local Government (Municipal Assembly)/ Environmental protection Agency (EPA)? YES/NO
50. If yes, explain
51. If No, explain
52. What do you suggest as a way of improving the performance of the slaughterhouse?
.....
.....

APPENDIX B

QUESTIONNAIRE GUIDE FOR SLAUGHTERHOUSE (WORKERS)

1. Sex Male [] Female []
2. How old are you?
3. Highest level of Education
MSLC []
BECE []
'O' LEVEL []
WASSCE []
'A' LEVEL []
4. Name of slaughterhouse.....
5. Do you have adequate tools and equipment for your work?
6. Do your sanitation/vertenary officers organize workshops for you? Yes/No
7. If yes, are they beneficial?.....
8. Are you satisfied with the location of the slaughterhouse? Yes/No
9. If Yes, why?.....
10. If No, explain
11. Do you have changing room(s) within the slaughterhouse?
12. If Yes, how helpful is it?
13. If No, how do you manage your changing of working clothing?
.....
14. Are your supervisors i.e. sanitation officers/vertenary officer punctual and regular at slaughterhouse? Yes/No.
If yes, explain
- If No, explain
15. How do you rate the slaughterhouse (building/facility) under the following?
.....
 - a. Walls and floors
 - b. Lighting system.....
 - c. Ventilation system

- d. Equipment
- e. Environment hygiene.....
- 16. a. Which of the stunning methods do you employ at the slaughter house?
.....
- b. Why?.....
- 17. How do you prevent/avoid contamination of the carcass through accidental punctures of the intestine and stomach?
- 18. What precautionary measures do you take to maintain during slaughtering?
.....
- 19. How do you carryout the following during slaughtering?
 - a. Disinfection on entering the premises.
 - b. Bleeding
 - c. Skinning
 - d. Offal handling
- 20. How manage the following waste at the slaughterhouse?
 - a. Liquid waste
 - b. Solid waste



THANK YOU

APPENDIX C

Observation of Structure at Various Sections at the Kintampo North Municipal Slaughterhouse.

- a. The working floor of the slaughterhouse was not smooth and did not facilitate cleaning.





Rough surfaces of the working floor

b. Slaughtering

The animals are mostly slaughtered and process on the ground/floor rather than been elevated.





c. Transport of meet from the slaughterhouse to other butchering/consumer joints.



Uncovered meat in a tricycle (motorking) transporting meat from the slaughterhouse

d. Sources of water



The only one tap water at the slaughterhouse



The supporting poor conditioned well.

e. Lairage

A temporal storage of the animals prior to slaughter



f. The abattoir waste disposal point.



