

The Challenges In Slaughterhouses And Their Potential Environmental Impacts In The Upper East Region Of Ghana

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Abstract: The study of the challenges of butchers in the Upper East Region of Ghana was conducted in five (5) districts where slaughterhouses were available with butchers belonging to the butchers association. The study was conducted from January 2019 to June 2019 by the use of both qualitative and quantitative methods. Data for the study were obtained from primary sources such as conducting survey involving 200 butchers, interviews with environmental health officers, assembly members, and environmental protection agencies, planning officers and engineers of the respective district assemblies by using interview guides, observation and stakeholder meetings. Secondary data for the study was obtained from books, internet and periodicals from departments and agencies. The sample frame was 416 butchers in all the five districts. One hundred and sixty-six respondents representing 83% respondents indicated that their abattoirs had an open drainage systems whilst thirty-four representing 17% said they had sock away to empty their wastewaters. One hundred and thirty-seven representing 68.5% said they had no storage facilities for their wastewater and the rest had plastic tanks where their wastewater is stored and later emptied by the district assemblies. At least 166 (83.0%) of the respondents indicated that the emptying of the waste was done on weekly and regular basis. All the respondents indicated that, the wastewater was not used by them for any economic gains but were discharged either on farmlands or open spaces by the district assemblies. Again, all respondents indicated that, their animals were inspected regularly before slaughter by a combined team of the district environmental health officers and the veterinary services division of the Ministry of Food and Agriculture. The source of water for dressing meat was either from standing pipes or boreholes but there were times there is no flow of water in either of them. Among the challenges indicated by the study were no means of transport to carry their meat from the abattoirs to their sales points or places of storage. They also reported that, they had no storage facilities and had to store their meat at private refrigerators for a fee or smoke them to avoid spoilage. The study recommends that butchers should try and process their meat into finished products such as, sausages and kebab to add value to them and avoid keeping left over's which they cannot store.

Keywords: Abattoir, Slaughterhouse, Butchers, Upper East Region, Challenges

I. INTRODUCTION

Animal production and the operation of veterinary establishments such as slaughterhouses are significant contributors to land degradation, air and water pollution, loss of biodiversity, and climate change (Rojie et al., 2008). Slaughterhouses are the primary establishments that prepare animals for food consumption. Its facilities enable the slaughtering, dressing, cutting and inspecting of meats, and refrigeration, curing and manufacturing of by-products

(Adzitey et al., 2010). Traditionally, slaughterhouses are managed by local government units (LGUs), however, because of limited financial capability, the law allows LGUs to sell, lease or franchise the operation of slaughterhouses to private entities (MoFA, 2011). As a result, government regulations must be followed in all operations done in abattoirs including the construction and building of abattoirs along with the drainage, water supply and waste disposal systems (Rojie et al., 2008).

The accreditation of these slaughterhouses in Ghana is normally handled by the Ministry of Health, Veterinary Services Department, an Agency under the Ministry of Food and Agriculture (MoFA) and the Environmental Protection Agency (EPA). These agencies ensure that guidelines and policies regarding the proper handling, inspection, processing, storage and preservation of meat and meat by-products are strictly adhered to. To ensure compliance with the policy guidelines, meat inspectors are detailed to various slaughterhouses on daily basis by these regulatory bodies to monitor and supervise the slaughtering and preparation of all kinds of animals. However, slaughter methods in Ghana are dictated by religious beliefs and local customs without inspection by qualified veterinary officers (Adzitey et al., 2011).

Abattoir waste consists mainly of bones, undigested ingest and occasionally aborted fetuses (solid waste) while the liquid wastes comprise of blood, urine, water, dissolved solids and gut contents (Fearon et al, 2014). Wrongful discharge of blood and animal faeces into streams may cause oxygen-depletion as well as nutrient over-enrichment of farmlands and surrounding water bodies resulting in eutrophication (Nwachukwu et al., 2011). Humans may also be affected through outbreak of water borne diseases and other respiratory and chest diseases (Adeyemo et al., 2009; Adzitey et al., 2010). According to studies, abattoir waste disposal is responsible for the pollution of surface and underground waters as well as air quality which indirectly affect the health of residents living within the vicinity of such facilities (Oruonye, 2015).

Abattoir waste disposal in many developing countries including Ghana has been a major challenge for years. In most cases, waste materials are disposed of without regard to sound environmental management practices, thus making them harmful to humans and other terrestrial and aquatic life (Fearon et al., 2014). Studies from Nigeria and Ghana show that many abattoirs in the respective countries either deposit waste materials in the immediate environs or dispose of them directly into water bodies, some of which serve as sources of water for the abattoirs (Adelegan, 2002; Osibanjo and Adie, 2007; Weobong and Adinyira, 2011). In Ghana, increasing demand for animal products, especially meat, has led to increase in the volume of abattoir waste generation which is highly polluted (Fearon et al., 2014).

The operation and management of slaughterhouses in Northern Ghana is ethnic-based depending on the location in which the facility is sited (Fearon et al., 2014). Unlike the Northern Region where the management is clan base, in the Upper East Region it is managed by the dominant tribe of the location of the abattoir. In view of this development, it is important to conduct an in-depth investigation into the operations and activities of waste management and its systems in some selected slaughter houses in the Upper East Region. It is envisaged that, the outcome of this investigation would unravel the challenges posed by waste disposal of slaughterhouses and the threat they poses to residents in their immediate vicinities. The research work will also provide information on the environment and public health concerns in relation to the operations and waste management systems of slaughterhouses in the region.

II. PROBLEM STATEMENT

Abattoir operations result in the generation of numerous waste and microbial organisms that pollutes the environment and pose serious threat to human health and quality of life (Oruonye, 2015). The upsurge in the prevalence of communicable and zoonotic diseases such as tuberculosis in our communities today makes abattoir waste a disease surveillance point.

The abattoir waste materials are entirely organic that can either be composted or recycled and used for various activities, yet they are left to degrade, producing bad stench. Degrading heaps of gut contents at the site serve as breeding grounds and sanctuary for pests that become a nuisance for abattoir workers, visitors as well as residents around the facility. Bone waste is currently not a problem because they are often sold together with the meat (Fearon et al. 2014).

In spite of the major roles played by slaughterhouses much focus and relevance has not been placed on the proper waste management practices in the slaughter houses. There is a general lack of relevant data on the operations and waste management practices of the slaughter facilities in the Upper East Region. It has been observed that, operations and management of slaughterhouses in the region, are manned mostly by the local people whose mode of acquisition to these facilities are through a well laid traditional ethnic-based inheritance system.

The ownership of slaughterhouses in the region is by the Ministry of Local Government and Rural Development, through the Municipal and the District Assemblies. These municipal slaughterhouses are very old and are often in a very poor condition (Adzitey et al., 2011). Equipment used in these facilities are obsolete and do not meet modern abattoir standards. There are no privately-owned slaughter houses in the region to augment the operation and management of the public ones. This has resulted in no competition in the industry. The absence of this competition among them has further exacerbated the poor operations and management of the facilities.

It is also observed that not all animals are slaughtered in the abattoir even though; butchers are all over the place selling meat products. It is clear, the industry offers opportunities to the socio – economic development of the Upper East Region but successive governments have done little in terms of policy interventions in ensuring effective and efficient operations of the slaughterhouses. The operations and managements of these facilities have been left mostly in the hands of people with little or no formal education; consequently, this in a way has contributed to the poor operations and management in various slaughter houses under review. The paper therefore sought to investigate the challenges and their potential environmental impacts on residents in the Upper East Region.

III. STUDY AREA AND METHODOLOGY

The population of the Region is 1,046,545, which is less than one twentieth (4.2%) of the national population (Batse et al., 2013). The Upper East Region is located in the north-eastern corner of the country, between longitude 00 and 10

West and latitudes 100 30”N and 110N. It is bordered to the north by Burkina Faso, the east by the Republic of Togo, the west by Sissala District in Upper West and the south by West Mamprusi District in North Eastern Region of Ghana (Figure 1). The land is relatively flat with a few hills to the East and southeast. The total land area is about 8,842 sq km, which translates into 2.7 percent of the total land area of the country (Batse et al., 2013). Crop production, livestock and poultry production are the main occupation of the region. There are two main irrigation projects, the Vea Project in Bolgatanga covering 850 hectares and the Tono Project in Navrongo covering 2,490 hectares. Altogether they provide employment to about 6,000 small-scale farmers. Other water-retaining structures (dugouts) provide water for agricultural purposes (Batse et al., 2013).

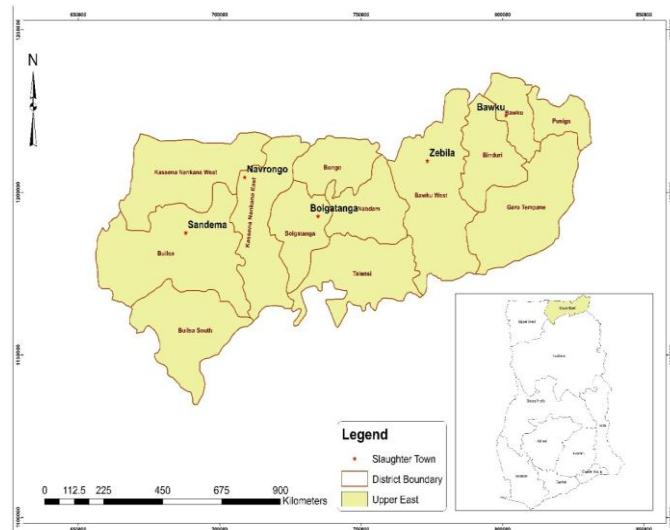


Figure 1: Administrative map of the Upper East Region

IV. RESEARCH DESIGN

A multi stage sampling technique was employed in the selection of the respondents for the study. In the first instance, a Purposive sampling was used to select districts with slaughterhouses within the region. These were Bawku Municipal, Zebila, Bolgatanga Municipal, Kasena- Nankani Municipal and the Builsa-North District Slaughterhouses. The second stage of the sample procedure was a simple random sampling procedure to select members (butchers) of the slaughterhouses to respond to survey questionnaires. Interviews were also conducted with leaders of the slaughterhouses, Environmental Health Officers (EHO), Veterinary Services Division (VSD) and the Ministry of Food and Agriculture (MoFA). Snowballing method was used to identify persons who have ever suffered from zoonotic and or sanitation related disease in the course of their work.

The number of respondents was determined by using a formula proposed by Krejcie and Morgan (1970). According to them, $S = X^2NP(1-P)/d^2(N-1) + X^2P(1-P)$(1)

where:

S=Required sample size?

X^2 = The table value of Chi-square for 1 degree of freedom at the desired confidence level (3.841 or 1.96 *1.96)

N=The population size=416
P=The population proportion (Assumed to be 0.5 since this would provide the maximum sample size)
d=the degree of accuracy expressed as a proportion (0.05)
From the information above;
 $S = 3.841(416)(0.5)(1-0.5)/(0.05)^2(416-1) + (3.841)(0.5)(1-0.5)$
 $S = 399.464/1.99775$
 $S = 199.95695$
 $S = 200$

The sample size was then distributed proportionally to the districts depending on the number of butchers present in each slaughter house (Table 1).

NO	District/Municipality	Population of butchers	Sampled Respondents
1	Bawku Municipal	91	44
2	Zebila District	80	38
3	Bolgatanga Municipal	100	48
4	Kasena- Nankani Municipal	85	41
5	Builsa-North District	60	29
6	Total	416	200

Source: Field survey, 2019

Table 1: Selected District/Municipal Slaughterhouses and Sampled Respondents

SOURCES OF DATA

Data were both primary and secondary. Primary data was obtained from survey of butchers using questionnaire, interview of environmental health officers, Staffs of Ministry of Food and Agriculture, Veterinary Officers and leaders of the butchers association of the Upper East Region. Secondary data was obtained from periodicals, reports, internet and books.

V. DATA ANALYSIS

Analyses of data were done both qualitatively and quantitatively. Analysis of variance (ANOVA) was performed for primary data using IBM SPSS (version 20) at 95% confidence level. Results from the analysis were presented in tables and graphs using Microsoft Excel.

VI. RESULTS AND DISCUSSION

DEMOGRAPHIC AND SOCIAL DATA

The study revealed that butchers in the Upper East Region were adults and generally above 20-years (Table 2).

Age	Frequency	Percent (%)
Less 20	1	0.5
20-29	80	40.0
30-39	64	32.0
40-49	38	19.0
50-59	17	8.5
Total	200	100.0

Source: Field survey, 2019

Table 2: Age of respondents

The results indicate that master butchers were adults but have teenagers to support them in their activities either as apprentices, sales boys or related activities. Some of the activities that were engaged by butchers are slaughtering, pumping, skinning, washing, splitting, transporting and selling meat. Child labour (boys who were less than 16-years) was noticed among the sales boys. Some of these boys were either not in school or were school dropouts. There were some who also went to school and engaged in the sale of meat after school had closed. Of all children in Ghana aged 5 to 17 years, about 21 per cent are involved in child labour and 14 per cent are engaged in hazardous forms of labour. This is twice as common in rural areas than in urban areas (World Development Report, 2007).

The study also showed that, sixty-four respondents representing 32.0% had no formal education (Table 3). The rest either had basic education (37.5% representing 75 respondents) or secondary education (30.0% representing 60 respondents). Only one respondent (0.5%) had a tertiary education.

Level of education	Frequency	Percent (%)
None	64	32.0
Basic	75	37.5
Secondary	60	30.0
Tertiary	1	0.5
Total	200	100.0

Source: Field survey, 2019

Table 3: Level of education of respondents

Literature indicates that, to be able to meet the challenges of the world and become productive in society depends upon the knowledge and skills one has acquired. At the basic school level, learners are presented with the opportunity to become literates and numerates, to develop inquiring minds and to gain awareness of social values such as sanitation and hygiene (Taylor & Mulhall, 1997 citing Elstgeest, 1987). In the Upper East Region, despite the educational innovations introduced by successive governments, many of the butchers who enroll at school hardly complete before the first terminal point (Akinpelu, 2007 citing Fobih, 1987). It was therefore not surprising that most of them either had no formal education or stopped at the basic educational level. Inadequate education implies that, basic ideas on sanitation and hygiene would not be acquired by practicing butchers.

Majority of the respondents (134) representing 67.0% were married (Table 4) and fifty (50) respondents representing 25.0% were single. The rest were either widowed (4.5%) or divorced (3.5%).

Marital status	Frequency	Percent (%)
Married	134	67.0
Single	50	25.0
Widow	9	4.5
Divorced	7	3.5
Total	200	100.0

Source: Field survey, 2019

Table 4: Marital status of respondents

The study indicates that butchering in the Upper East Region was a male dominated occupation. Since there were no reasons preventing women from practicing the occupation it

will be interesting for butchers to allow their wives to help them especially in dressing and the sale of meat.

VII. STATE OF SLAUGHTER HOUSES IN THE UPPER EAST REGION

On the average animals slaughtered per day in the abattoirs was estimated according to the type of animals brought to the various facilities daily. In all three kinds of animal were brought for slaughtering, they are cattle, sheep and goat. The regional chairman of the butchers association reported that on average, 35-cattle, 40-sheep and 40-goats were slaughtered daily in each district. He also noted that, the peak of the festive seasons such as Christmas and the Moslem Id festivities accounted for greater slaughtered animals in the abattoirs. Bolgatanga Municipal abattoir recorded the highest number of animals brought for slaughtering. This is because, Bolgatanga is the regional capital with a bigger elite population and also due to a large commercial transactions and mining activities.

It was observed that firewood and grass were the main source of fuel used for dressing slaughtered animals in the abattoirs. Even though, some abattoirs used car tires for dressing carcass, the practice was unacceptable by the regulatory authorities. It was also observed that animals being dress were monitored by meat inspectors for the right hygienic condition of the dressing vicinity. Respondents reported that their leaders played major roles in ensuring that meat prepared at all the abattoirs in the region were safe for human consumption. They also said there is a strong collaboration between the butchers association and officers of the Veterinary Services Department of the Ministry of Food and Agriculture (MoFA) in enforcing the needed regulatory requirement for meat safety in the region.

It was observed that all the drains in their slaughter houses are open. The containments for wastewater were also open dugouts. The respondents reported that, they have no storage facilities for their leftover meat and have to resort onto refrigerators belonging to private community members for a fee. Some of them smoke their meet to prevent them from spoiling. It was observed that, some of the butchers use car tires to process their slaughtered animals (Figure 2a). Even though, they wash the carcass, the handling of the meat products is poor and was exposed to contamination (Figure 2b).



Figure 2a. Filthy environment showing a car tire used for making fire

Figure 2b. Butchers displaying their dressed animals on the floor

Source: Field survey, 2019

VIII. GOVERNMENTAL POLICY INTERVENTION TO BUTCHERS

Participants reported that there has not been any form of governmental policy intervention to support abattoir operation in the region for the past five to ten years. The respondents revealed that most often, agriculture supportive resources provided by successive governments considered only farmers in crop production and livestock production to the detriment of butchers who also play an important role in the supply chain. Butchers add value to the animal production in the form of meat processing for consumption and preservation. The butchers lamented about a total neglect by government on the prospects and the importance of butchering business. Table 5 shows the services that are given to butchers in the Upper East Region.

Services obtained	Frequency	Percentage (%)
Extension service	180	90.0
New technology	36	18.0
Space acquisition	5	2.5
Credit facility	15	7.5
Meat inspection	200	100.0

Source: Field survey, 2019 N=200

Table 5: Services obtained by butchers

The Veterinary Services Department of the Ministry of Food and Agriculture inspects meat before they are sold to the public. They also conduct ante-mortem and post-mortem inspection on animals. Ante-mortem is conducted on animals yet to be slaughtered while post-mortem is done on animal carcass. These inspections are necessary to the sustainability of their business and a provision of wholesome meat supply to consumers.

IX. CHALLENGES FACED BY ABATTOIRS IN THE REGION

It was revealed by the respondents that untimely disposal of waste products, resulting in filthy and stanching atmosphere in the vicinity of most slaughterhouses was worrying and greatly affecting their operations. Table 6 shows the challenges encountered by butchers in the Upper East Region.

Challenge	Frequency	Percent
No frequent flow of water	120	60.0
No storage facilities	150	75.0
Poor infrastructure	184	92.0
Poor information flow	56	28.0
Poor waste collection	145	72.5
No policy	110	55.0
No vehicle for conveying meat	200	100.0
Stench from waste	160	80.0
Limited access to credit	170	85.0

Source: Field survey, 2019 N=200

Table 6: Challenges at abattoirs in the Upper East Region

Another challenge faced by the butchers was lack of financial support in the form of credit facility. Even though, majority of these butchers have been in the business for a long time, they do not have any form of collateral to enable them

access loans from financial institutions. Lack of modern abattoir equipment, governmental policy interventions and new technologies in abattoir operations and management were among the challenges.

In addition, it was revealed that most of the butchers in the region do not have formal education. This hampers the implementation of interventions which are based on reading or writing. Lack of a data base of all butchers in the region also hinders supervision by leaders and regulatory authorities. This is because some butchers are not registered members of the butchers association of the Upper East Region. There are growing concerns about the welfare of livestock due to poor transport and handling. Vehicle design, stocking density on vehicles, journey duration, time of feeding, mortality and weather conditions affects slaughter animals' welfare in the region (Edge and Barnett (2009).

In the animal supply chain the slaughter animals' are transported for long hours without rest from distant countries such as Niger. This has negative implication for animal welfare leading to economic loss. The European Union regulation concerning animal welfare prescribes that no animal should stay more than 8 hours on a vehicle without rest (Gebresent et al., 2011). All the butchers interviewed confirmed that they do not offer any form of protection for animals against unfavorable weather for their animals. During transport and handling, animals are exposed to unfavorable conditions such as food and water deprivation, unfavorable temperature or ventilation, aggressions and physical shocks which cause hunger and thirst, heat stress and pain. These unfavorable conditions may compromise meat quality (Gebresent et al., 2004; Deiss et al., 2009).

The study further revealed that, death of animals were common due to overcrowding and falling on trucks (mostly as a result of poor driving behavior of drivers and poor road conditions), hunger, disease, and unfavorable weather the animals were exposed to. Participants at focus group discussion reported that they sometimes receive dead animals on arrival to the abattoirs which indicates economic loss. The number of animals that died during transport or shortly after being delivered to an abattoir is an indication of poor animals' welfare conditions (Malena et al., 2006). The loading and unloading procedures observed in the study were very poor and should be improved since such activities deteriorate the welfare of animals and reduce the economic benefits (Broom, 2005; Gebresent, 2002).

The drivers and animal handlers should be trained in slaughter animals' welfare and increase awareness to all stakeholders in the animal supply chain. A well educated handler can often move animals through difficult situations efficiently as cattle have ability to learn quickly how to move through facilities and cope with changing environments when managed by competent handlers (Atkinson, 2005). It was observed that most butchers were willing to buy animals without much worry about the health status of the animals. This results in the purchase of sick animals that dies before they are slaughtered.

In addition to this it was learnt that none of these butchers used approved meat vans to transport the meat from abattoir to their shops. This means that there is a serious public health concern, since the meat meant for public consumption

sometimes sourced from sick animals and the meat is always transported in unhygienic vehicles. According to Immonen et al., (2000), physical stress by hunger, fatigue, lesions, besides the physiological stress, can lead to depletion of muscle glycogen reserves and propitiate the incidence of dark, firm and dry meat.

X. IDENTIFICATION OF ZOO NOTIC DISEASES IN THE UPPER EAST REGION

Zoonotic diseases mostly found among animal brought to the abattoirs includes, Bonne TB, Brucellosis and Anthrax. The focus group participants reported that for Anthrax, usually signs are seen at death of the animal. It is therefore difficult to identify a live animal that has contacted Anthrax. Expert advice from the veterinary services division of the Ministry of Food and Agriculture is therefore necessary. Table 7 shows the signs and symptoms of diseases that guide butchers to identify sick animals.

Bonne TB	Brucellosis	Anthrax
<ul style="list-style-type: none"> ✓ Progressive anaciation ✓ Coughing ✓ At post-mortem Tension on internal organs 	<ul style="list-style-type: none"> ✓ Swollen joints 	<ul style="list-style-type: none"> Usually signs are seen at death of the animal ✓ Blood from all openings(dark) ✓ Enlarged spleen if carcass is opened ✓ Unclotted blood

Table 1

On how butchers handled animals with zoonotic diseases, the carcass is either totally or partially condemned. Deep buried of all affected carcass under the supervision of veterinary officers is required. Unfortunately, some butchers and shrine operators hide under cover to slaughter animals without the supervision of veterinary officers. This unacceptable practice is mostly the cause of the spread of zoonotic related diseases in the Upper East Region. It is always very difficult to locate their operations resulting in non-enforcement of guidelines regarding abattoir management and operations. Shrines are located across the region where animals are mostly slaughtered daily for sacrifice.

XI. ENVIRONMENTAL PERSPECTIVES OF THE CHALLENGES IN ABATTOIRS

It was observed that the slaughterhouses in the Upper East Region generate both wastewater and solid waste. The wastewater is usually emptied into drains or open dugouts. These wastes generate methane and nitrogenous gases which contributes to climate change. Also, the gases emanate foul smell thereby polluting the air. The solid wastes are usually not collected on time and are littered around the vicinity of slaughterhouses. This observation is in sync with Adzitey et al., (2011) that slaughterhouses contributes to land degradation, air and water pollution, loss of biodiversity, and climate change (Rojie et al., 2008). According to studies, abattoir waste disposal is responsible for the pollution of

surface and underground waters as well as air quality which indirectly affect the health of residents living within the vicinity of such facilities (Oruonye, 2015). The use of car tires to dress animals at the slaughtering houses could lead to lead poisoning. According to Benard (2008) and Martin and Griswold (2009) the burning of car tires generate hazardous gases that affects human health.

In addition, slaughtering in the region is dictated by religious beliefs and local customs. As a result, most animals are not inspected by veterinary officers before they are killed and consumed by unsuspecting consumers. This is a public concern since some animals may contract diseases before they are brought to the butchers.

Abattoir waste according to the study consists of bones, undigested ingest and occasionally aborted fetuses (solid waste) while the liquid wastes comprise of blood, urine, water, dissolved solids and gut contents. These findings agreed with the findings of Fearon et al, (2014). Wrongful discharge of blood and animal faeces into streams may cause oxygen-depletion as well as nutrient over-enrichment of farmlands and surrounding water bodies resulting in eutrophication (Nwachukwu et al., 2011). Humans may also be affected through outbreak of water borne diseases and other respiratory and chest diseases (Adeyemo et al., 2009; Adzitey et al., 2010).

Most of the slaughter houses depend on boreholes except in Bolgatanga where they use treated piped water. Some of the piped water does not flow regularly and the butchers have to depend on surface wells and dugouts which are not treated (Issahaku et al., 2013). In the process of washing and cleaning the meat is contaminated with pathogenic bacteria. This could lead to the spread of water related diseases such as cholera; dysentery and typhoid.

XII. CONCLUSIONS AND RECOMMENDATION

It is concluded that there are challenges in slaughterhouses of the Upper East Region. These challenges include poor discharge and disposal of waste, open drains and dugouts, un approved methods of meat processing and storage and poor transporting systems of meat. These challenges if they are not well managed could lead to public health concerns such as the spread of water related and zoonotic diseases. The study therefore recommends that, butchers should add value to their slaughtered animals into finished products such as, sausages, kebab instead of selling on fresh. The services of veterinary officers must also be explored to ensure that only healthy animals are slaughtered. The environmental health officers must also step up inspection at the premises of slaughterhouses to ensure that the environments are clean and tidy. The government through the municipal and district assemblies must provide waste storage facilities at all abattoirs and the collection of waste monitored to ensure that waste generated are not left to pile up. There is the need for microbial studies of surface waters that abattoir wastes are discharged into.

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