

**ASSESSMENT OF THE CURRENT STATUS OF SLAUGHTERHOUSES
AND THEIR WASTE MANAGEMENT PRACTICES IN SELECTED
ABATTOIRS IN SOUTH-EASTERN NIGERIA**

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ABSTRACT

Personal observation and a structured questionnaire were used to assess the current status of slaughterhouses in southeastern Nigeria. The study revealed that the slaughterhouses in southeastern Nigeria are generally in deplorable condition. Most of them are poorly constructed and without adequate layouts and equipment for standard slaughterhouses. Veterinary services are virtually absent, suggesting that the inspection of meat and meat products are never carried out in these slaughterhouses. Consequently, meat and meat products from these slaughterhouses may not be wholesome for human consumption and thus liable to constitute public health hazard to their receiving communities. It was also observed that waste generated from daily slaughterhouse operations are disposed of within the abattoir environment without adequate consideration for their harmful effect on the environment and human health.

Keywords: Slaughterhouses, facilities, hygiene, waste management, southeastern Nigeria.

INTRODUCTION

Meat processing is usually carried out in a specialized environment known as abattoir or slaughter house [1]. “Abattoir” in terms of The Meat Safety Act, 2000 [2] means a slaughter facility in respect of which a registration certificate has been issued in terms of section 8 (1) and in respect of which a grading has been determined in terms of section 8 (2). The major activities involved in the operations of an abattoir are: receiving and holding of livestock; slaughter and carcass dressing; chilling of carcass products; carcass deboning and packaging; freezing of finished carcass and cartooned product; rendering processes; drying of skins; treatment of wastes and transport of processed material. However, meat processing activities in Nigeria are mostly carried out in unsuitable buildings and by untrained personnel or butchers who are mostly unaware of sanitary principles [3].

The purpose of an abattoir is to produce hygienically prepared meat by the humane handling of animals using hygienic techniques for slaughtering and dressing [4]. The construction, layout and equipment must all be geared to promote efficient and hygienic operations [5].

Apart from religious considerations, regulations governing animal slaughter are aimed at assurance of good public health. This is because contaminated meat can be a source of zoonotic diseases like salmonellosis, campylobacteriosis, listeriosis as well as *Escherichia coli* 0157:H7, clostridial and staphylococci infections and other diseases transmissible between animals [6,7].

Mohammed and Musa [8] reported that the improper disposal of abattoir effluent could lead to transmission of pathogens to humans which may cause outbreaks of water borne diseases that may manifest as diarrhea, pneumonia, typhoid fever, asthma, wool sorter diseases, respiratory and chest diseases. It had also been reported that abattoir activities may be responsible for the pollution of surface and underground waters, air quality as well as reduction in the quality of health of residents within the surrounding environment [9,10,11].

The dilapidated condition of abattoirs may be attributed to the absence of proper physical structures for effective meat inspection and production, or lack of use of available standard facilities or their maintenance [12].

The aim of this study was to assess the appropriateness of some existing slaughter houses for hygienic slaughter, production of safe and wholesome meat/meat products and the management of waste generated from daily activities by investigating the conditions of the physical structures available in these slaughterhouses.

MATERIALS AND METHODS

Study Area

Seven major slaughter houses in the southeast of Nigeria were used for this study. They included slaughterhouses in Abia, Enugu, Imo and Akwa Ibom States. The slaughterhouses were purposefully selected.

Study Design

Structured questionnaires were administered during the abattoir visitations for the assessment of daily operations, availability of adequate processing facilities and management of waste generated. The questionnaires were also structured to provide information on the ownership of the slaughter houses, year of establishment, scale of operations, presence and functional status of physical facilities and other management issues. A total of seven questionnaires were used in the seven different abattoirs visited. These questionnaires were administered to the administrative staff of the abattoir were available and the second part of the questionnaire were filled by the authors through the observations they made while in the abattoir.

Careful observations and assessments were made of the entire abattoir environment including the drainage system, the lairage, slaughter slabs, sources of water, waste disposal facilities etc and still photographs of the same taken where necessary. The available physical facilities in each slaughterhouse were noted and their functional status graded as either 'good' (present and functioning properly), 'satisfactory' (present but not in good condition thereby not fully functional), or 'poor' (present but dilapidated).

Data Analysis

Data generated with the questionnaires were analyzed using IBM SPSS version 20. Descriptive statistics was used for the analysis.

RESULTS

Ownership, Holding Capacity, Location and Construction of Slaughter Houses

The year of operation of the seven slaughterhouses investigated dated from 1978 – 2008 with a holding capacity of between 20 - 500 cattle. Three of the sampled slaughterhouses are owned by the State Government while the Local Government and private individuals owned two each.

Most (57.1%) of the slaughterhouses visited were not fenced. The physical structures located near the slaughterhouses/slabs are residential buildings (15.4%), mosques (23.1%), schools (7.7%), shops/stores (30.8%), restaurants (7.7%), hotels (7.7%) and morgues (7.7%). Three (42.9%) of the slaughterhouses visited had no space for future expansion.

Hygienic Slaughter and Processing of Food Animals

More than eighty five percent (85.7%) of the slaughterhouses slaughtered only cattle while 14.3% slaughtered both cattle and goats (Table 1). Almost half (42.9 %) of the slaughterhouses had no veterinary superintendent or a veterinarian attached to them; indicating that no form of ante mortem or post mortem inspection or supervision takes place there.

All the slaughterhouses sampled did not stun their animals before slaughter. Majority (85.7%) of the slaughterhouses use the *halal* method of slaughter while others (14.3%) use the kosher method for slaughtering goats. A good number of the slaughterhouses (28.6%) had no measure/ structure in place for bleeding their animals.

Water supply in the slaughterhouses varied greatly and the sources of water included deep wells, boreholes, pipe-borne and alternate sources such as streams and dams (Figs. 6, 7, 8). The streams used for abattoir activities also had other functions such as washing and bathing. Intestinal contents and condemned carcass parts/organs were also thrown into the streams. Three of the slaughter houses visited had no power supply; three used electricity from the national grid while one used generators for their daily activities (Table 2). None of the slaughterhouses visited had any sterilization/disinfection facility.

Carcasses were not packaged in any way before transportation (Figs. 9 and 10). Carcasses were transported from the slaughterhouses to market outlets using wheelbarrows (42.9 %), motor cycles (28.6 %) and cars and lorries (28.6 %) (Table 2).

Waste Management Practices and Slaughter House Environment

Investigation into the method of disposing condemned carcass parts or organs in the slaughterhouses visited revealed that 42.9%, 28.6%, 14.3%, 14.3% of the slaughter houses dispose their waste by burial, burning, throwing into streams/soak-away pits and nearby bushes respectively. Intestinal contents were either fed to scavenging pigs and dogs (14.3%), dumped around the abattoir (42.9%) and nearby farm lands (28.6%) or buried (14.3 %) (Table 3). In some cases, solid waste was seen disposed of around the slaughterhouse environment (Figs. 11 and 12).

Effluents generated from slaughterhouse activities were released into gutters or soak-away pits (57.2%) while some slaughterhouses (42.9%) had no definite way of disposing effluents (Table 3). It was also observed that the slaughterhouse environment was generally very poor and not conducive for hygienic slaughter of food animals (Figs. 1, 2, 3, 4 and 5).

Physical Facilities and Equipment for Hygienic Slaughter

Majority of the basic facilities required in an ideal slaughterhouse for hygienic slaughter of food animals were absent or in a deplorable condition (Table 1).

Table 1: Assessment of the current status of 7 slaughter houses in southeastern Nigeria

COMPONENTS OF THE ABATTOIR	AVAILABILITY AND FUNCTIONAL STATUS OF THE ABATTOIRS						
	A	B	C	D	E	F	G
Administrative block	Absent	Absent	Absent	Absent	Absent	Absent	Satisfactory
Laboratory	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Potable water	Absent	Absent	Absent	Poor	Good	Satisfactory	Satisfactory
Lariage	Satisfactory	Poor	Absent	Poor	Poor	Satisfactory	Poor
Slaughter hall/slab	Poor	Poor	Poor	Satisfactory	Good	Satisfactory	Good
Bleeding section	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Flaying room	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Carcass splitting room	Absent	Poor	Absent	Absent	Absent	Absent	Absent
Cold room	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Condemned meat room	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Detained meat room	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Evisceration room	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Tripe and Gut room	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Hides/skin room	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Waste disposal system	Absent	Absent	Absent	Poor	Satisfactory	Absent	Satisfactory
Drainages	Poor	Absent	Poor	Satisfactory	Satisfactory	Absent	Poor
Central steam boilers	Absent	Absent	Absent	Absent	Absent	Absent	Absent
First aid room	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Sterilizers/Disinfection facilities	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Electricity supply	Absent	Absent	Absent	Satisfactory	Good	Satisfactory	Poor
Ownership of abattoir	State Govt.	FG	LG	Private	State Govt.	Private	LG
Animals processed	Cattle	Cattle	Cattle	Cattle/Goats	Cattle	Cattle	Cattle
Veterinary services	Absent	Present	Absent	Absent	Present	Present	Present
Perimeter fencing	Present	Absent	Absent	Absent	Present	Absent	Present
Structure for bleeding animals	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Method of slaughter	Halal	Halal	Halal	Kosher	Halal	Halal	Halal

If available, the physical structures were graded as being in ‘good’, ‘satisfactory’ or ‘poor’ conditions; Key to States studied: A = Abia, B = Akwa Ibom, C = Akwa Ibom, D = Enugu, E = Enugu, F = Enugu, G = Imo.

DISCUSSION

Ownership, Holding Capacity, Location and Construction of Slaughterhouses

The overall observations made during visits to the slaughterhouses revealed that most of the slaughterhouses were in deplorable condition and in need of reconstruction. Many lacked basic equipment and facilities that are necessary for production of wholesome meat and meat products fit for human consumption. If these slaughterhouses are allowed to continue operations in their current state, the quality of meat and meat products produced from them may constitute serious public health hazard [13,14,15].

The results of this study also suggested that consultations with public health experts and regulatory agencies were not made before the construction of some of the slaughterhouses/slabs visited. Such consultations are very necessary for the production of wholesome meat and meat products [16].

Most of the slaughterhouses visited lacked perimeter fencing and are located close to residential and worship areas, stores, markets, schools etc. In such situations, unauthorized individuals and scavengers frequently enter the premises and this may result to contamination of facilities and cross infection [17].

Hygienic Slaughter and Processing of Food Animals.

The lack of veterinary services in most slaughterhouses visited implies that ante mortem inspection is not carried out before slaughter as recommended by the *codex alimentarius* Commission [19]. The absence of veterinary services in slaughterhouses results in unwanted practices such as slaughtering of dead/moribund, diseased and pregnant animals, improper bleeding of animals, washing of carcasses with dirty or contaminated water, addition of dangerous chemicals to meat, soaking of meat and rubbing of pale carcasses with blood become very common. Such situations eventually lead to the release of unwholesome meat and meat products to the receiving population thereby constituting a public health hazard [17,18,20,21].

There were no over-head rails in any of the slaughterhouses visited such that animals are slaughtered on the floor inside the slaughter halls or on slabs outside the slaughterhouses. Over-head rails are essential requirements for hygienic and efficient slaughtering of food animals [18].

Table 2: Frequencies of the different variables for hygienic slaughter and processing of food animals

VARIABLES	FREQUENCY	PERCENTAGES
Source of water supply		
Pipe borne water	1	14.3
Bore holes	3	42.9
Streams and dams	1	14.3
Wells	2	28.6
Sub-total	7	100
Source of power supply		
National Electricity Grid	3	42.9
Generators	1	14.3
None	3	42.9
Sub-total	7	100
Post mortem inspection		
Yes	5	71.4
No	2	28.6
Sub-total	7	100
Washing and treatment of equipment before slaughter		
Yes	0	0
No	7	100
Sub-total	7	100
Packaging of meat before transportation		
Yes	0	0
No	7	100
Sub-total	7	100
Methods of transporting meat to retailers		
Wheel barrow	3	42.9
Bikes	2	28.6
Lorries and cars	2	28.6
Sub-total	7	100

Table 3: Frequencies of the different variables for waste management practices and slaughter house environment.

VARIABLES	FREQUENCY	PERCENTAGES (100%)
Methods of disposing condemned carcass/parts or organs		
Burial	3	42.9
Burning	2	28.6
Thrown into streams/soak away pits	1	14.3
Thrown into nearby bushes	1	14.3
Sub-total	7	100
Methods of disposing intestinal contents		
Dumping around the abattoir	3	42.9
Dumping in nearby lands	2	28.6
Burial	1	14.3
As food for pigs and dogs	1	14.3
Sub-total	7	100
Methods of disposing effluents		
Gutters/Soak-away pits	4	57.2
No definite way	3	42.9
Sub-total	7	100

The source and availability of water supply in any abattoir has a lot of effect on the resultant meat and meat products. Majority of the slaughterhouses did not use portable water in their operations. Therefore meat and meat products produced from these slaughterhouses/slabs are liable to bacteriological and toxicological contamination [18]. Water supply in most of the slaughterhouses visited was insufficient. Therefore, the workers use the little water available to wash the meat and knives. Subsequently, the used water was discarded around the slaughterhouse premises, forming a good breeding ground for micro-organisms and mosquitoes while encouraging the re-circulation of contaminants. Some of the slaughterhouses/slabs use nearby streams as sources of water and these subsequently become contaminated and blocked with abattoir wastes and effluent. As reported by earlier studies [12,21,22,23], boilers were also not present in the slaughterhouses visited; suggesting that the water used to wash the slaughter slabs and equipment is not usually heated such that they may not be well disinfected or sterilized after the day's activity.

Waste Management Practices and Slaughter House Environment

For efficient waste management, slaughterhouses must be properly constructed [18]. The wrong methods of disposing both solid and liquid wastes in the slaughterhouses visited could be attributed to the fact that they were poorly constructed.

Animals are slaughtered every day in all the urban and rural slaughterhouses in Nigeria and the meat and meat products sold to the public for consumption. Meat wastes originate from killing, hide removal or dehairing, paunch handling, rendering, trimming, processing and clean-up operations [24,25]. Abattoir wastes include animal blood, fats, horns, bones, feces, paunch manure, inorganic solids, organic solids, salts, chemicals added during processing operations and abattoir effluents [24,25,26]. All the slaughterhouses/slabs did not have efficient methods of disposing effluents. Accordingly, effluents produced as a result of the daily activities of slaughterhouses/slabs must be safely disposed of because these effluents have a complex composition and can be very harmful to the environment [18,27].

Abattoir wastes also have the potential to pollute surface and underground waters, abattoir/market environment, and consumables around the abattoir, especially when these wastes are not properly treated and disposed. Therefore, abattoir wastes should be managed to achieve allowable effluent standards, odour control, or to exploit the benefits locking in the wastes before safely and economically disposing the ultimate wastes [26,28,29,30,31].

Physical Facilities and Equipment for Hygienic Slaughter

Slaughterhouses should be equipped with facilities necessary for efficient meat inspection. This was not the case observed in our study as most of the slaughterhouses did not have the basic facilities or equipment. Consequently, most of the slaughterhouses visited may not be fit to produce wholesome meat and meat products for human consumption.

CONCLUSION

The results of this study suggest that the meat and meat products produced from abattoirs/slaughterhouses in southeastern Nigeria appear to be unhygienic and unwholesome for human consumption. This is likely to continue unless laws regarding the location, design, construction and the provision of basic facilities and equipment for slaughter and environmental hygiene in slaughterhouses are enforced. Similarly, appropriate guidelines for slaughtering and processing food animals should be established where they do not exist. Therefore, adequate veterinary services should be provided in slaughterhouses/abattoirs in order to ensure strict compliance to all aspects of meat inspection.

Solid and liquid abattoir wastes should be managed in such a way that they do not pollute the abattoir environment or surrounding water bodies.

Hygiene problems are not limited to slaughtering but are also associated with incorrect processing and marketing practices. Therefore, proper hygiene should be maintained at all levels of production in slaughterhouses. Public education on the relevance of hygiene in the processing of food animals should be re-emphasized and all personnel involved in any level of processing meat and meat products for human consumption should be educated on the effects of unhygienic practices on human health.



**Fig 1. Stagnant gutters/
drainages**



**Fig 2. Stagnant gutters/
drainages**



Fig 3. Abattoir environment



Fig 4. Unfenced waterlogged Lairage



Fig 5. Scavengers in the slaughter house premises



Fig 6. Storage of water in earthen pots



Fig 7. A stream that has become stagnant due to improper use



Fig 8. A well used as a source of water



Fig 9: Transporting meat to retailers using a motor bike



Fig 10: Using lorry to transport meat to retailers



Fig 11: Improper disposal of waste between two slaughter slabs



Fig 12: Improper disposal of bones in the abattoir

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