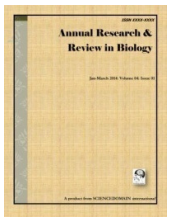

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Public Health Risk of Abattoir Operation in Zango Abattoir Zaria, Kaduna State Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Authors OGR, ECO and DAA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors DFA, MPP and AVO managed the analyses of the study. Authors DFA, MPP and AVO managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Background: Abattoir activities are known to pollute the environment, posing significant public health concerns. These activities can predispose abattoir workers and individuals living close to abattoirs to certain infections.
Aim: To determine the public health risk of abattoir operation in Zango Abattoir Zaria, Kaduna State Nigeria.
Methodology: The abattoir was visited for a period of 1 week within the hours of 6.30 a.m to 9 a.m to determine various activities at the abattoir and to access public health concerns during its operation. Pre-tested structured questionnaires were distributed to all individuals processing

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various abattoir by-products to obtain relevant data. Photographs of the various observations made were taken and recorded.

Results: Slow moving abattoir effluents in drainages leading from the slaughter hall to the soak-away pits undergoing microbial degradation encouraging proliferation of flies were observed. There were unutilized ruminal contents heaped just at the entrance of the slaughter hall producing foul odour and attracting flies. Soakaway pit with partially opened concrete top consisting of decomposing foetuses/condemned carcases was seen with the presence of flies, rodents and other disease carrying vectors. The presence of lettuce vegetable farm around the soakaway pit exposes the product to contamination with pathogenic microorganisms and by extension constitutes a serious health hazard to consumers who use lettuce to prepare fresh salad. The abattoir had no toilet facilities and residential buildings were in close proximity to the abattoir. Food vendors, meat sellers and meat buyers were seen within the abattoir carrying out their daily activities unchecked. Only two (18.2%) out of the eleven individuals processing abattoir by-products utilize personal protective gears.

Conclusion: The daily operation at Zango Abattoir predisposes the public to health hazards and there is need to maintain accepted international practices in abattoir operation.

Keywords: Abattoir; disease; zango-abattoir; public-health.

1. INTRODUCTION

Abattoirs are known all over the world to pollute the environment either directly or indirectly during various daily operations [1]. The numerous waste and microbial organisms obtained during abattoir operation not only pose a significant challenge to effective environmental management but also are associated with decreased quality of life of human population living close to these abattoirs [2]. Where abattoir effluent-polluted waters are used to grow salad crops and vegetables, transmission of infections are bound to occur because animal wastes are known to contain pathogenic organisms, causing Salmonellosis, Leptospirosis, Tularemia, Foot and mouth disease e.t.c [3]. The numerous wastes produced by abattoir operation not only pose a significant challenge to effective environmental management but also are associated with decrease air quality of the environment, potential transferable antimicrobial resistance patterns, and several infectious agents that can be pathogenic to humans [1,2,4]. Abattoir activities and management have direct and indirect effects on the built-up environment and health of people especially residents in abattoir vicinity. There is a negative impact of abattoir activities on air and water qualities of residential areas within abattoirs; especially where special or effective waste disposal system is not practiced [5].Very poor meat inspection facilities and uncooperative attitude of butchers has also been reported in Nigerian abattoirs [6]. It has been observed that most animals slaughtered for human consumption in Nigeria are not inspected by veterinary surgeons [7].

Pathogens present in animal carcasses or shed in animal wastes may include rotaviruses, hepatitis E virus, *Salmonella spp*., *Escherichia coli* O157:H7, *Yersinia enterocolitica, Campylobacter spp*, *Cryptosporidium parvum*, *Mycobacterium spp* and *Giardia lamblia* [8,9], these zoonotic pathogen can exceed millions to billions per gram of faeces and may infect humans through various routes such as contaminated air, contact with livestock animals or their waste products, exposure to potential vectors (such as flies, mosquitoes, water fowl, and rodents), or consumption of food or water contaminated by animal wastes[10].The consequences of infection by pathogens originating from animal wastes can range from temporary morbidity to mortality, especially in high-risk individuals [11]. The purpose of this study is to ascertain the public health risk of daily operation in Zango abattoir, Zaria Kaduna state, Nigeria.

2. MATERIALS AND METHODS

2.1 Study Location

The study was conducted in Zango abattoir located in Samaru, Zaria Kaduna state, Nigeria. The abattoir is owned by the Kaduna state government. Animals slaughtered daily at the abattoir include Cattle, goat and sheep.

2.2 Data Collection at the Abattoir

The abattoir was visited for a period of 1 week, observations were made daily between 6.30 a.m to 9.00 a.m. The various activities and environment management problems at the abattoir that pose serious danger to public health were observed. Pre-tested Structured questionnaire were also distributed to eleven (11) individuals processing various abattoir by-products (Skin/hide, bones, blood, horns and hooves and ruminal content) to obtain relevant information concerning activities at the abattoir. The respondents included all individuals processing abattoir by-products at the time of study. The respondents were included in the study because they were readily available to provide necessary information about the abattoir in comparison to other busy abattoir workers that work mainly as butchers and meat sellers. Photographs of the various observations made were taken and recorded where necessary.

3. RESULTS AND DISCUSSSION

3.1 Activities inside the Main Slaughter Hall of the Abattoir

Abattoir workers were seen carrying out various activities in the slaughter hall, with very few wearing lab coats and rain-boots as form of protective wears, others were seen without any protective wears. The processes of bleeding, decapitation, evisceration and splitting of carcasses were carried out on the floor of the slaughter hall. Parts of the slaughtered animal carcasses were seen being carried out of the slaughter hall in most unhygienic practice to potential buyers and sellers leaving trails of blood on the floor and outside the abattoir (Plates 1 and 2). These abattoir workers are exposed to several infectious agents and hence can serve as potential vehicles of transmission of zoonotic infections outside the abattoir environment [2,12]. Meat and meat products are also prone to contamination with enteric pathogens as part of the gastrointestinal tract were seen being processed within the slaughter hall. Inappropriate waste disposal facilities at the abattoir also constitute a major problem. Decomposing foetuses/condemned carcasses from the slaughter hall were seen in exposed soak-away pits at the abattoir. The dilapidated drainage system leading from the slaughter hall to the soak away pits within the abattoir vicinity allows for slow movement of abattoir effluents encouraging bacterial activities which can lead to the spread of diseases through vectors that can find the slow moving effluents as a good habitat (Plate 3). Studies have indicated that abattoir effluent contains lots of disease causing organism as reported by [13] and can also contaminate ground water [14].

3.2 Activities Occurring Within the Vicinity of the Abattoir

Lettuce farm was seen close to the soak-away pit containing decomposing carcasses and abattoir effluent exposing the produce to contamination by pathogens (Plate 4). Vegetables grown within abattoir vicinities have been known to be prone to contamination [13]. Ground water within the growing beds of the vegetables can be contaminated by the seepage of abattoir effluent from the soak-away pit. Lettuces harvested from these farms are used basically to prepare salads that are eaten fresh without cooking. The presence of various food sellers, meat buyers and meat sellers within the abattoir environment poses significant public health concerns as their shoes and clothings can serve as potential vehicle in transferring pathogenic microorganism from the abattoir environment to their various homes (Plate 5). Control of people moving in and out of the abattoir is difficult because there are no well defined fences surrounding the abattoir. Pets and livestock animals owned by occupants of nearby residential areas were seen moving in and out of the abattoir. These animals serve as disease carrying vectors and thus exposing the occupants to diseases. The adverse effects of abattoir activities is of public health significance as there have been reports of decrease in health and quality of life of individual's resident around intensive livestock operations [15]. Various unused abattoir by-products were seen within the abattoir environment undergoing bacterial decomposition. The unhygienic environment of the abattoir exposes meat and meat products sold for human consumption to contamination.

3.3 Information of Individuals Processing Abattoir By-products

Eleven (11) Individuals processing different abattoir by-products were interviewed using structured questionnaire to obtain certain information about the operation at the abattoir (Table 1). The respondents were males mostly within the age group of 26-40 years (81.8%). They all stated that they were unaware of

diseases that can be contacted within the abattoir vicinity and never go for routine medical check-up except when they fall ill. The poor knowledge of dangers associated with abattoir operation exhibited by these individuals make them carry out their daily activities without the need to protect themselves and go for regular medical checkups. They also stated that there were no toilets facilities within the abattoir vicinity, hence making it difficult to maintain proper personal hygiene.

Plate 1. Blood spillage at the entrance of the slaughter hall

Plate 2. An abattoir worker at work in the slaughter hall of the abattoir

Plate 3. Slow moving effluent in one of the drainages at the Abattoir

Plate 4. Lettuce vegetable being grown within the vicinity of the Abattoir

Plate 5. Individuals loitering the vicinity of the abattoir

Table 1. Data from Zango abattoir workers processing abattoir by-products

Variables	Frequency	Percentage
Ages in years		
26-40	9	81.8
41-65	2	18.2
Sex		
Male	11	100
Female	-	-
Educational status		
Primary	4	36.4
Secondary	2	18.2
informal	5	45.5
How often do you go for medical check up		
Monthly	-	-
Quarterly	-	-
Yearly	-	-
Only when ill	11	100
Do you know diseases you can contact by handling the by-products you work with		
Yes	-	-
No	11	100
Are there toilets and rest room available for use in the abattoir		
Yes	-	-
No	11	100
Do you use any form of personal protective wears		
Yes	2	18.2
No	9	81.8
Abattoir products processed by individuals		
Horns/hooves	3	27.3
Skin	3	27.3
Bone	1	9.0
Blood	3	27.3
Ruminal content	1	9.0

4. CONCLUSION AND RECOMMENDATION

The mode of operation at Zango Abattoir, Zaria Kaduna State Nigeria predisposes abattoir workers and individuals living in close proximity to the abattoir to infections. Most abattoir workers had poor knowledge of the health risk they are exposed to and very few make use of personal protective wears. Meat and meat products are further exposed to poor handling and contamination as a result of unhygienic environment, thus, affecting the quality of meat and meat products. The growing of vegetables within the abattoir exposes the product to various pathogenic microorganisms.

It is recommended that appropriate legislation by the state/ local governments be made to ensure that the daily operations at the abattoir are properly managed by veterinarians and environmental health workers to ensure proper hygiene at the abattoir. The abattoir should be properly refurbished and adequate waste disposal/abattoir by-products processing plants be constructed to ensure proper waste disposal and effective processing of abattoir by-products.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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