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Public health perspective of public abattoirs in Nigeria, challenges and solutions

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Abstract

Abattoirs play a vital role in the supply chain of meat in society. However, the processing of meats in these facilities can lead to the spread of pathogenic bacteria and fungi, posing a significant public health and food safety concern. According to a report by the Food and Agriculture Organization of the United Nations, global meat production generates about 20 billion tons of animal waste annually, with developing countries accounting for the largest share of this waste and, a significant portion of which comes from abattoirs. This waste contains high levels of nutrients such as nitrogen and phosphorus, as well as organic matter, pathogens, and other contaminants that can have negative impacts on the environment and human health. In Nigeria, slaughterhouse effluents have been found to be a significant source of environmental pollution, containing food-borne pathogens and greenhouse gases such as carbon dioxide, methane, and nitrous oxide. This is particularly worrisome in a growing country like Nigeria which heavily relies on meat as a source of protein. The lack of standard waste management facilities in many abattoirs in Nigeria further exacerbates the problem, exposing inhabitants to harmful pathogens and gases. Despite these risks, little attention has been paid to curbing the menace of unhygienic abattoir waste disposal. This paper aims to raise awareness of the public health and environmental implications of unhygienic abattoir waste disposal in Nigeria and recommends solutions to this challenge. Specifically, the paper explores the potential for commercializing bio-waste into energy production as a sustainable solution. The wider significance of this work is that it highlights the urgent need to address the challenges of public abattoirs to ensure public health and environmental sustainability. Furthermore, the wider implications of this work are that the findings and recommendations can be adapted to other countries facing similar challenges. Overall, this paper contributes to planetary health by addressing a critical public health and environmental issue and recommending sustainable solutions.

Keywords: Abattoirs; Food-borne Pathogens; Effluents; Public health; Biogas; Waste disposal

1. Introduction

Globally, the number of domesticated animals raised every year exceeds a staggering 70 billion, with over 6 million of them being slaughtered for food purposes annually ¹. Additionally, an estimated 56 billion birds and mammals are killed each year to meet the demand for meat¹. According to a report by the Food and Agriculture Organization (FAO)¹, this trend is projected to continue, and by 2050, global meat consumption could soar to a range of 295 to 465 million tons¹. Unfortunately, this increase in meat consumption also leads to a surge in waste production, which has the potential to cause various diseases

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An abattoir, also known as a slaughterhouse, is a place designed and licensed for receiving, holding, slaughtering, and inspecting meat animals and meat products before releasing them to the public². Aside from serving as a building for butchering which houses facilities to slaughter animals, and inspects meats, refrigerate cures in a sanitary condition to ensure safety for human consumption. It also provides an avenue for surveillance of disease in animals by examining the animals for the expression of illness-like symptoms³.

Considering the fact that animals consumed as food in the form of meat are killed and processed in abattoirs, it is pertinent, that close surveillance is administered, to ensure food safety, security, and sufficiency in developing countries like Nigeria^{4,5}

Livestock production in abattoirs serves as a potential source of food for the world's needy people of which a huge amount of abattoir waste is generated from them during the meat processing's. According to the Food and Agriculture Organization (FAO), the global meat industry generates about 20 billion tons of animal waste annually, with developing countries accounting for the largest share of this waste. In the United States alone, it is estimated that the meat and poultry industry produces over 1.4 billion pounds of waste annually, which is a significant source of pollution and environmental damage⁶. As the demand for meat increases, the slaughter rate of meat animals increases, ultimately increasing the amount of abattoir waste generated.

The development and growth of livestock production have been on the increase in Nigeria and have ensured the steady supply of animals meant for slaughter and processing for human consumption. Dr Akinwunmi Adesina, a former Minister of Agriculture and Rural Development in Nigeria, released a figure in 2014 showing that Nigerians consumed 360,000 tonnes of beef in a year, as of May 2014, with a projection that in 2050 the figure would likely increase to 1.3 million tonnes. Thus deliberate attention ought to be paid by the government representative, to ensure that abattoir workers follow standard operational practices and conduct including, personal hygiene and the use of PPE in carrying out their activities in Nigeria abattoirs to prevent the country from a food-borne outbreak and illness. However, this has not been the case in Nigeria, as the government representatives are only interested in the proceeds that come from the abattoir⁷. This negligence has resulted in the disreputable state of abattoirs in different parts of the nation, caused by the unsanitary method of meat processing and waste disposal⁸. In this vein, the state of abattoirs in all the six geo-political zones across the country is described as ugly and not up to international standards as reported by⁸⁻¹² Some of the problems associated with the abattoirs in Nigeria include; poor drainage system, lack of proper education of the butchers, poor waste management system, inadequate storage facilities, lack of proper inspection of animals and meat product, lack of proper demarcation of slaughter area, lack of proper light supply, usage of cruel methods for animals restricting methods, resulting to injuries of the animals^{4, 9, 10, 13, 14}. This problem implies that it exposes consumers to toxic meat presumably infested with food-borne pathogens such as bacteria, parasites, and viruses among others¹⁵⁻¹⁷.

The wastes generated from abattoirs in Nigeria, usually comprise blood, oil, mineral, and organic solids, salts, and chemicals added during the handling operations¹⁸, as shown in Figure 1. The lack of facilities for the handling of solid waste and wastewater generated is a major -characteristic of most abattoirs found in Nigeria. This wastewater generated from the abattoir could increase the amounts of nitrogen, phosphorus, and total solids in the receiving water body significantly causing water pollution. Abattoirs are known globally to contaminate the environment directly or indirectly from several procedures and may be responsible for the cause of river deoxygenation and groundwater pollution, and climate change among others¹⁹, these debilitating occurrences pose environmental safety concerns and reflect a public health concern.

Despite the fact, that several studies have accessed the state of abattoirs in Nigeria over the past two decades⁴. The truth still holds that the abattoirs in Nigeria, the states, and the standard of operations of abattoirs in Nigeria is poor as there is a knowledge gap among livestock stakeholders, and thus there is a need to educate and re-educate butchers about the good practices that must be observed in the abattoirs. This includes but not limited use of personal protective equipment, good manufacturing practice, proper handling of animals, and also the important role abattoir plays in the food chain of a growing country like Nigeria with increasing demand for meat. There is also a need for the government to set up laws guiding abattoir operations enforcing absolute compliance with a good standard of operations. In other to increase awareness, these studies review the public health importance of Nigeria abattoirs; implicating them as a source of Multidrug-resistant organisms, examining the environmental impacts of abattoirs in the country, and recommended solutions on how the challenges associated with abattoirs in Nigeria could be drastically reduced.



Figure 1 A typical Abattoir environment in Nigeria

Source: Okorohohi Micheal, Independent Newspaper, 2020



Figure 2 A typical Abattoir In Lagos, Nigeria

Source: Omotosho et al., (2016)¹⁴.

2. Methodology

2.1. Literature search strategy

Literature search for articles on Abattoir in Nigeria and other parts of the world was performed in Google Scholar, Science Direct, PubMed, and Frontier journals using the search terms; State of Abattoirs in Nigeria, to find articles published from the year 1990 till date. Also, some articles published by WHO, UN, and Food and Agricultural Organization were used in the analysis.

2.1.1. Eligibility criteria (inclusion and exclusion criteria)

Identification of studies meeting the criteria for inclusion was done by 3 authors who reviewed them by screening for titles, and abstracts of all articles retrieved. After these selected articles were read, a conclusive decision was made for each study.

The inclusion criteria include studies based on experimental data, and reviews on the subject associated with abattoirs in Nigeria. A total of 100 articles were screened on the inclusion criteria, but 75 were selected and used for the review. Studies with old data that were not pertinent to the aim of the study were excluded. Studies not including Nigeria were excluded. Studies in Africa but not including Nigeria were excluded.

2.1.2. Data extraction

Data were extracted from all selected articles independently by the reviewers based on the main research objectives. All findings and statements in this study are based on published information as listed in the references.

3. Results

3.1. Public health implications of Nigerians abattoirs

3.1.1. Abattoirs in Nigeria as sources of pathogens and multidrug-resistant (MDR) bacteria

Over the years, effluents from abattoirs have been major reservoirs and sources of environmental contamination of pathogens. Pathogenic bacteria such as *Clostridium perfringens*, *Vibrio cholera*, *Pseudomonas aeruginosa*, *Proteus mirabilis*, *Escherichia coli*, *Klebsiella pneumoniae*, *Salmonella* spp., *Staphylococcus aureus*, *Shigella* sp., and fungi such as *Penicillium*, *Saccharomyces* spp., *Mucor*, and *Aspergillus* have been isolated from slaughterhouse effluents in Nigeria²⁰⁻²¹. Some of these bacterial pathogens have been implicated in many food- and water-borne infections²³. Also, animals that come in contact with these pathogens can serve as vectors for their transfer to humans leading to zoonotic infections²⁴. The waste management practices in many Nigerian slaughterhouses are poor, posing excellent public health and environmental hazards to inhabitants. Open dump waste disposal and direct disposal of effluents into water bodies are still common practices found in many abattoirs in Nigeria, thus exposing neighbouring communities to pathogens²⁵.

Table 1 Reports of multidrug-resistant bacteria from Nigerian abattoirs

Location of abattoir	Multidrug-resistant pathogens	Abattoir material	Reference
Ogbete, Enugu	<i>Pseudomonas aeruginosa</i> , <i>Salmonella</i> sp., <i>Escherichia coli</i>	Abattoir effluent	33
Kwata, Anambra	<i>Salmonella</i> sp.	Cattle carcass and contact surface	35
Edo, Benin	<i>P. aeruginosa</i>	Abattoir effluent environment	36
Oghara and Sapele, Delta and Ikpoba, Edo	<i>Vibro</i> sp.	Abattoir effluent	37
Abuja and Lagos	<i>E. coli</i>	Abattoirs workers	38
Ibadan, Oyo	<i>E. coli</i> , <i>Listeria</i> sp., <i>Salmonella</i> sp.	Abattoir meat tables	39
Edo, Benin	<i>Enterococcus</i> sp.	Abattoir Environment	40
Edo, Benin	Methicillin-resistant <i>Staphylococcus aureus</i>	Abattoir facilities	41

The high organic content of abattoir effluents supports the proliferation of pathogenic microbes; hence they pose great risks to public health. Bacteria and fungi break down these organic materials to produce biomass leading to cellular multiplication. Studies have related high bacterial load in water with waterborne diseases²⁶. Most abattoir effluents are channelled to surrounding water bodies, thereby leading to water pollution. Water is essential in our daily activities; some communities in Nigeria get their drinking water directly from rivers and streams that receive effluents from abattoirs²⁷. These water bodies also serve as sources of water for farming activities, as a result, exposing plants and animals to pathogenic microbes from abattoirs. Consequently, leading to outbreaks of foodborne infections. Infections resulting from animal wastes can range from mild to severe and life-threatening, especially in immune-compromised individuals²⁷.

The use of antibiotics in animal husbandry either in the treatment of animal diseases or as growth promoters has increased the prevalence of multidrug-resistant (MDR) zoonotic pathogens²⁸. Livestock animals serve as vectors for the World Health Organization's antimicrobial-resistant priority bacteria (*Enterococcus*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, *Enterobacter* spp (ESKAPE)^{29,30}. These organisms have been implicated in life-threatening clinical infections all over the world. There have been many reports of MDR pathogens including ESKAPE pathogens from abattoirs in Nigeria and other parts of the world³¹⁻³³, some of which are shown in Table 1. Antibiotic resistance genes, especially those resulting from mobile genetic elements (MGE), from MDR bacteria in untreated abattoir effluents are transferred to other bacteria in the receiving soil or water bodies leading to their spread in the environment³⁴.

3.1.2. Abattoirs in Nigeria as sources of environmental contaminants

A study of slaughterhouses in Nigeria revealed that abattoir poses huge environmental and health hazards due to substandard hygienic practices and waste disposal methods⁸. One of the largest impacts of slaughterhouses on the environment is the issue of wastewater and water contamination through the disposal of effluents as shown in Table 2.

Effluents generated from abattoirs in Nigeria are broadly categorized into solid (carcass, hides, hairs, hooves, launch content, condemned organs, dungs, etc.) and liquid effluents (blood, urine, and internal fluids)^{42, 43}. These effluents are improperly disposed of in various ways (by piping it directly into waterways, spraying it on land, burning the solid effluents, or sending it to a nearby town or county sewage treatment plant) which may seep into water drains, local rivers, streams, and other water sources and cause extensive damage to waterways⁴⁴.

Table 2 Abattoirs as sources of environmental contaminants in Nigeria

	Receiving Environment	Key Findings	Disposal, Treatment, and Processing Method	References
Pollutant	Surface and underground water, soil.	Contains a higher amount of Nitrogen, Phosphate, and organic Carbon.	Proper disposal; burning, incineration; or composting into fertilizers.	45, 46
Animal blood	Surface and underground water, soil.	Animal blood effluent possesses high BOD	Waste reduction; recycling for composting; or blood processing into stock feed or fertilizer.	47
Paunch manure	Soil, water, and air.	Contains the greatest microbial load	Rendering; Proper disposal; burial, or incineration of paunch content.	48
Fresh abattoir effluent	Soil, fresh and underground wastewater.	Generally contains high content of solids, minerals, metals, and micro-organisms.	Primary screening; rendering and disposal.	49
Animal hides, and skins	Air, soil, and water.	The high content of suspended solids and other organic matter.	Proper disposal; Transportation to tanneries for processing into leather, offcuts, glue, gelatine, and other valuable byproducts.	50
Wastewater	Soil, underground, and surface water.	The high content of biodegradable organic compounds, suspended solids, nutrients, and toxic compounds	Reuse, recycling, and anaerobic wastewater treatment.	51, 52

Despite the huge amount of effluents generated from the abattoirs in Nigeria, there are no provisions made for a special waste disposal system or treatment plants. Regrettably, these have major health and environmental implications, as a study by Adeyemi and Adeyemo revealed that slaughterhouses constitute a major source of air and water pollution in Nigeria and the world⁴³. Another study by Kaynat *et al* indicated that the negative implications of abattoirs can result in food poisoning through the contamination of foods with pathogens like *Salmonella* and *Shigella* species⁵³.

Beyond the wastewater problems they constitute, abattoir waste disposal sites also contribute to climate change through the emission of greenhouse gases⁵⁴. Studies have shown that the main source of these emissions is linked to the electricity used to run the slaughterhouses. Additionally, effluents from the abattoir have also been pinpointed as a possible source of greenhouse emissions. This is due to the usually high organic load of effluents since 70-75% of abattoir waste largely reflects wastewater with a considerable amount of suspended material and organic load⁵⁵. Adeyemo reports show that when these effluents are piled up and not properly disposed of, they not only cause environmental pollution but also produce methane gas which intensifies the greenhouse effect⁹. Activities such as packing, cooling, and transporting dead animals are also possible sources of gas emissions. The greenhouse gases are emitted from these sources when fossil fuels are burnt for energy, cooling, or transportation⁵⁶.

Of the three major gases (Methane, carbon dioxide, and nitrous oxide) being emitted, methane and nitrous oxide are released partly by the livestock. Essentially, nitrous oxide emissions occur when organic and inorganic fertilisers are applied to the soil while methane occurs in the digestive system of ruminant animals, and to a lesser extent, monogastric animals. In both cases, manure acts as an emission source⁵⁷. However, the emitted quantity is dependent on factors such as environmental conditions, type of management, and the composition of the manure⁵⁷.

On the other hand, carbon dioxide emissions are largely due to soil carbon dynamics (e.g., decomposing plant residues, mineralization of soil organic matter, land-use change, etc.), the manufacturing of synthetic fertilisers and pesticides, and the use of fossil fuel in on-farm agricultural operations⁵⁸. Results show that CO₂ has a sheer volume of its emissions and due to this, is considered the most powerful greenhouse gas owing to its most significant direct-warming impact on global temperature⁵⁹.

These emissions lead to global warming, which is responsible for a range of climate-related events, such as more extreme weather occurrences including increased flooding and drought, as well as melting of Arctic ice and the loss of plant and animal biodiversity; all of which are as a result of changes in temperature⁶⁰. To human health, the negative implications of global warming are even more atrocious as several studies have shown the direct and indirect health results of such a global imbalance to include excessive heat-related illnesses, vector- and waterborne diseases, increased exposure to environmental toxins, exacerbation of cardiovascular and respiratory diseases due to declining air quality, and mental health stress among others⁶¹. With these, it is, therefore, becomes pertinent that several effective strategies are adopted to curb the various health and environmental implications of slaughterhouses in Nigeria.

3.2. Recommendations

3.2.1. Transformation of Abattoirs effluent to Biogas via Anaerobic digestion

Even though management of abattoir effluent poses to be a big problem in Nigeria and other developing countries with poor waste management facilities, other countries have been harnessing these effluents for various industrial applications through the process of Anaerobic digestion and Aerobic digestion. Budiyo *et al*⁶² stated that all forms of abattoir waste including liquid or solid can be treated anaerobically for biogas production.

Anaerobic digestion refers to the systematic decomposition of organic matter by microorganisms in the absence of oxygen to produce CH₄ as a by-product as shown in Fig 3. However, reports have shown that anaerobic digestion, is better for the following reasons; a minimal amount of sludge is produced which is about 15% lesser than that produced in aerobic digestion; increased efficacy to lower both soluble and insoluble COD; no aerobic energy required to drive to the process; the generation of methane which can be used as a source of energy (biogas); no chemical requirement for handling^{62,63}. More recently, Abdeshahian *et al* reported that anaerobic digestion also offers some advantages such as; cheapness, generation of organic fertilisers as waste products, and reduction of pathogens⁶⁴. The usage of anaerobic digestion in abattoirs has not only proven to serve as a good source of sustainable non-renewable energy but also a means of controlling environmental pollution. In this vein, several countries including Indonesia, Thailand, Malaysia, and Myanmar amongst others have been embracing this technology for the generation of biogas as there are researchers who have accessed the biogas potential of abattoir wastes in their countries⁶⁴⁻⁶⁷. This is really not the case in Nigeria. Although several types of research have implicated Nigerian abattoirs as a source of environmental issues such as pollution, and the greenhouse effect. However, there is a dearth of studies that have accessed the amount of abattoir waste generated in different abattoirs in the country and their biogas potential. Thus it is pertinent for researchers, engineers, and governmental stakeholders to embrace this technology.

Typically, Nigeria depends solely on energy generation from Natural gases mostly methane. This energy generated is not even adequate to supply energy to the urban areas, leaving the rural areas where the abattoirs are located without energy and a large landfill. Thus it is of utmost importance that this technology is made available in the country to

augment the available energy generation technology to ensure adequate and equal generation and supply of energy in Nigeria.

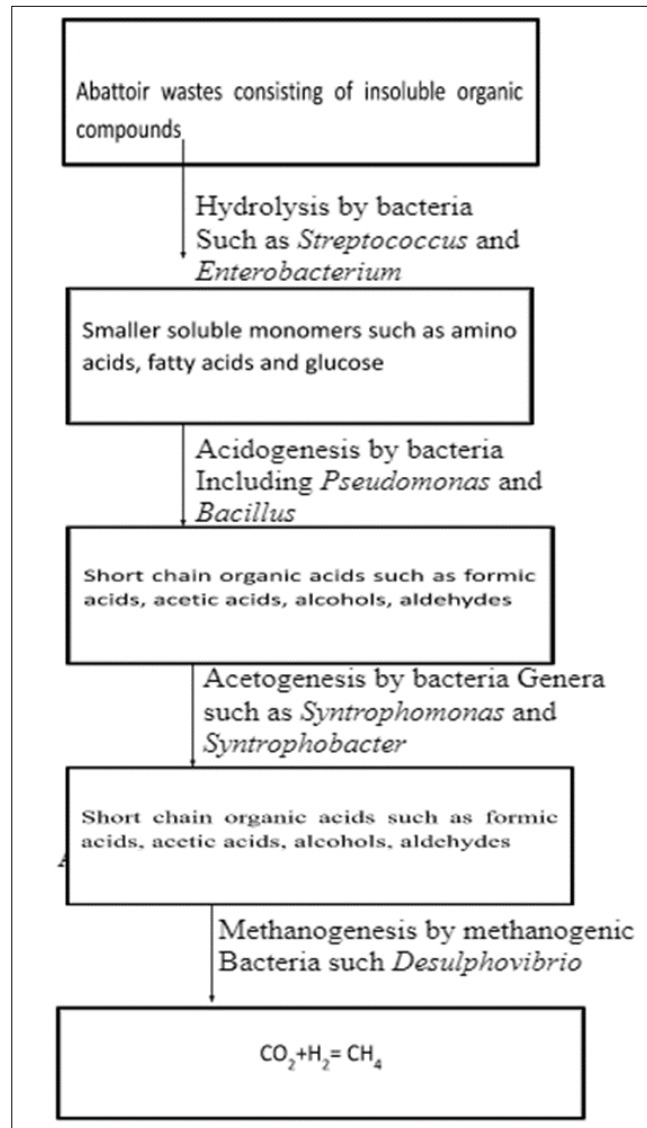


Figure 3 Flow chart of the anaerobic pathway for the anaerobic degradation of Abattoir wastes

3.2.2. Regulatory Actions and Government Interventions

In light of the foregoing, the need for improved sanitary conditions and optimal waste management in abattoirs across Nigeria cannot be overemphasised. To this end, there is an urgent need for a robust and holistic review of the policies and legislative framework guiding abattoir activities and management, based on research facts and figures. Active meat inspection began as early as 1967 in Northern Nigeria and by 1970, the meat hygiene legislation prepared with the assistance of the Federal Livestock Department and Pest Control Services (FLD and PCS) was passed by the state government⁶⁸. Although there exist several legislative provisions guiding the activities of abattoirs by state governments, some of which are modified versions of the FLD and PCS models, most of them fail to sufficiently capture and address waste management⁸. To achieve a globally acceptable status in food safety, it is pertinent to review the current laws to emphasise the relevance of waste management to wholesome meat production. A One-Health approach provides a realistic solution and should be considered⁶⁹. This concept involves a multisectoral approach to designing and implementing management agencies that should be consciously explored. Efforts must be made to expedite the passage, and enforcement of the Meat Inspection and Hygiene Act, currently before the National Assembly⁸. The said Act must however be reviewed to accommodate expert views on contemporary methods of waste management.

New policies must reflect and enforce modern standards of waste treatment and disposal in line with global best practices. Traditional practice involving floor slaughter and carcass dressing which is currently widespread must be effectively replaced by the rail system which ensures minimal carcass contamination. As highlighted by Adeyemo⁹ in her paper, clean technologies that will serve the purposes of waste treatment and energy conversion towards improved efficacy and profitability must be incorporated into modern designs. Fortunately, the FAO, being proactive in its food safety efforts has provided a simple and inexpensive modular design, which could be adopted for the upgrade of existing facilities, and the setting up of new abattoirs of an acceptable standard, suitable for developing countries⁷⁰. To attract private investment to the meat processing space, the government must incentivize the industry, this will drive healthy competition and ultimately improve the overall outlook including waste management and hygiene.

As defined by the Rockefeller Foundation-Lancet Commission on Planetary Health, “*Planetary Health is the achievement of the highest attainable standard of health, well-being, and equity worldwide through judicious attention to the human systems—political, economic, and social—that shape the future of humanity and Earth’s natural systems that define the safe environmental limits within which humanity can flourish*”. The flourishing of humanity and planet Earth will require dealing with interrelated threats to planetary health, including arbovirus infections⁷⁴. The application of both a planetary health approach and the Stockholm paradigm in tackling the menace created by the slaughterhouses in Nigeria can be achieved through the implementation of well-established policies coupled with adequate monitoring of the slaughterhouses to ensure that good health practices are being put in place. Since the planetary health approach advocates for intersectoral collaboration and global partnership, this will allow for cost-effective protocol as well as and knowledge sharing across related translational fields within the concerned stakeholders at human and environmental interfaces

3.2.3. Awareness and training of butchers and abattoir staff members

It is impossible to over-stress the importance of education and quality knowledge in achieving an acceptable level of hygiene and sanitation in the abattoir. This was supported by Alhaji *et al*⁷¹ who showed that a low level of education and training among abattoir workers was responsible for their poor knowledge of good abattoir operations. Similarly, Adelan⁷² attributed the pollution of natural and artificial waters and the environment to a low level of awareness of the dangers of waste pollution. The government and public health authorities must continually engage butchers and meat sellers on the importance of sanitation and hygiene, the use of personal protective equipment, and the consequences of inappropriate waste disposal. Veterinary officers and other abattoir staff members should be trained on current trends in waste management. As suggested by Nwanta⁸ personnel should be encouraged to take joint visitations to standard abattoirs to improve their knowledge. Finally, to attract individuals with a good level of formal education to the sector, the government and major players must make abattoir jobs socially and economically appealing.

4. Planetary health and public abattoirs in Nigeria

Humans and nature are intertwined, and the state of the planet's natural systems affects our health and well-being⁷⁵. Planetary health is a rapidly developing and rising field. According to Planetary Health, the advancement of human health and well-being should take into account the environmental effects of our anthropogenic footprint⁷⁶.

On Monday, July 17, The Federal Ministry of Agriculture and Rural Development (FMARD) confirmed one case of Anthrax disease in a mixed livestock farm in Niger State, Nigeria. This is the first animal case to be reported in Nigeria since the beginning of the West Africa outbreak in Ghana in June 2023. On 13th July 2023, the sudden deaths of livestock in this farm with eight (8) mortality was reported on a farm in Suleja, Niger State. People who handle animals stand tremendous a risk of being infected with the causative agent. Improper handling at the slaughterhouses thus poses a huge public health threat.

There are various chances to answer significant problems regarding human health in the Anthropocene by utilizing knowledge from fields outside of health. First off, applying a Planetary Health perspective to public health applications opens up new possibilities for cross-disciplinary cooperation and information and talent sharing. Second, research and application of data from numerous sources can be broadened to other fields, such as public health, ecology, and climate science. Last but not least, adopting a Planetary Health approach can boost the advantages of nature for a sustainable quality of life by increasing understanding of the dynamic two-way link between people and nature⁷⁷.

5. Conclusion

The importance of abattoirs in providing a source of protein for the growing Nigerian population can not be overemphasized. However, this sector has also contributed to the pollution of many Nigerian communities and water

bodies through their inappropriate waste disposal methods. Wastes from these abattoirs are good sources of multi-drug-resistant bacterial pathogens and greenhouse gases. The lack of environmental and personal hygiene in many abattoirs in Nigeria has made them subjects of public health concern over the years. Education and enlightenment programs for personnel in abattoirs, the creation of policies that will control the operating procedures of many abattoirs, and the construction of waste recycling plants are possible solutions to mitigate the public health risks associated with abattoir effluents in many Nigerian communities.

It is important to note that the issues surrounding abattoirs in Nigeria not only have significant public health implications but also contribute to planetary health concerns. Planetary health is a relatively new field that emphasizes the interdependence of human health and the health of the environment. The health of the planet is essential for human health and well-being, and the way we interact with the environment has a direct impact on our health. Additionally, the concept of One Health recognizes that the health of humans, animals, and the environment are interconnected and that addressing health issues in one area can have positive effects on others. However, many people are not aware of the importance of planetary and One Health, and as a result, the significance of the issues surrounding abattoirs may be overlooked. Therefore, it is crucial to highlight how addressing the challenges associated with abattoirs in Nigeria is not only essential for public health but also for the health of the planet and all its inhabitants. By implementing proper waste management systems, educating abattoir workers on good practices, and enforcing regulations to ensure compliance with international standards, we can contribute to the promotion of both public and planetary health.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflict of interest.

Author Contributions

All authors contributed equally to the paper. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The authors confirm that the data supporting the findings of this study are available within the article.

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