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KILLING MORE THAN JUST ANIMALS: THE UNINTENDED CONSEQUENCES OF ABATTOIR ACTIVITIES ON HUMAN HEALTH AND ENVIRONMENT IN JOS SOUTH LOCAL GOVERNMENT AREA.

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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. The research was designed using both qualitative and quantitative method to investigate the health and environmental impact of abattoir operations on surrounding communities by assessing the environmental impact, investigating the health impact of the Abattoir/slaughter house amongst the people, and examining their perception on the health and environmental impact and correct wrong assumptions. The research adopts the use of simple percentage of frequency imputation of data through the use of bar charts and pie chart respectively, this was done to give a clearer picture and understanding to the readers. The findings of the research revealed a significant community awareness and concerns about the consequences of abattoir activities. A large proportion of respondents (45.6%) reported daily perception of offensive odors, indicating persistent air pollution. Additionally, nearly half (48.6%) observed water pollution suggesting possible water contamination from the abattoir. On the health front, 18.1% of participants associated were associated with various ailments, constituted by respiratory (43%), skin (26.6%), gastrointestinal (13.3%) and vulnerable particularly children and elderly are perceived to be affected by 32.1% of the respondents. Risk perception was high with 66.4% of the respondent expressing serious concern, major risks identified included air and water pollution as well as disease transmission. The study results underscore the urgent need for improvement in the abattoir regulation and public health intervention to help safeguard community well-being.

Keywords: *abattoir, health impact, slaughterhouse, community, Jos, Plateau state*

BACKGROUND:

Abattoirs, also known as slaughterhouses play a crucial role in the meat industry, providing a source of livelihood for many people. However, their activities have been linked to various environmental and health problems, including air and water pollution, soil contamination and the spread of disease (Ogunrinde, 2014, Adebayo, 2015). These problems often occur particularly when waste disposal and sanitation measures are inadequate. In developing countries such as Nigeria, many abattoirs operate with little or no compliance with environmental regulations, leading to pollution, public health risks, and general environmental degradation (Adeolu et al., 2017). The surrounding communities of Abattoir are often vulnerable; this impact is due to their proximity to the facilities.

Developing countries, inability to effectively and efficiently manage the vast amount of waste generated by continuous drive to increase meat production for the protein need of the ever-increasing population has created environmental problems (Adesemoye, Oper and Makiwe, 2006). Globally, regulatory oversight of abattoirs is often split between health, environmental, and agricultural agencies. In the United States, the USDA's Food Safety and Inspection Service (FSIS) regulates slaughterhouse operations under the Federal Meat Inspection Act (FMIA). In the European Union, Regulation (EC) No 852/2004 governs hygiene standards for foodstuffs, including slaughterhouse operations. In many African countries, such as Nigeria and Kenya, public health acts and environmental protection guidelines form the basis for slaughterhouse regulation (Federal Environmental Protection Agency (FEPA). (1991). An abattoir is a food operator that carries out slaughter and processing of animals for human consumption. Abattoirs must comply with strict hygiene and safety regulations to ensure the production of safe and wholesome meat production (EFSA, 2020). Studies have shown that the health impact of the abattoir activities can be significant. For example, a study conducted in the United States found out that workers in Abattoir were at higher risk of developing respiratory problems and mental health issues (International Labour Organization 2019). The abattoir activities can also have significant health impact on the surrounding communities such as waterborne diseases, airborne diseases and occupational health risks. Air pollution can contribute to the spread of air borne disease such as respiratory infections (Ogunrinde, 2014) and also contaminated water from Abattoirs according to WHO (2019) can lead to the spread of water borne diseases such as cholera and typhoid fever.

The environmental impact of the Abattoir activities can lead to environmental pollutions through various pathways, including; soil contamination, water pollution and air pollution. According to Adebayo (2015), Abattoirs generate large amounts of waste water, which can

contaminate nearby water sources if not properly treated. Abattoir can generate large amounts of solid waste which can contaminate the soil if not properly disposed (EPA, 2019). Ogunrinde, (2014) stated that Abattoirs can emit harmful gases such as ammonia (a gaseous compound of hydrogen and nitrogen, "NH³") and hydrogen sulfide which can contribute to air pollution.

The study came up as result of improper burning of materials, improper dumping of animal waste products and lack of continuous working drainage systems for both rainy and dry season in the Abattoir.

The study is aimed at investigating the health and environmental impact of the abattoir activities on people residing in Abattoir environment of Jos south LGA.

The significance or benefits of this study is that it will contribute to existing body of knowledge. The findings of the study will be useful to health officials, community leaders and members, workers in the slaughter house/abattoir to lessen the negative impact of the Abattoir activities and also improve positive activities on surrounding communities. Public Health Benefits of the study will help identifying key health risks, the study can help in implementing interventions to improve the health conditions of residents in the abattoir community.

This study focuses on the Abattoir community in Jos South LGA, Plateau State. It will assess the health and environmental impacts of abattoir activities within the surrounding areas. The study will examine waste management practices, environmental pollution, and health issues among residents. The research will rely on field surveys, interviews, and secondary data from relevant health and environmental agencies.

METHODOLOGY:

Study Area.

The study area for this research is Jos south local government area of plateau state with a focus on the surrounding areas of abattoir facility.

The abattoir facility lies on latitude 9.8822323 ^{0} N and longitude 8.8865908 ^{0} E and rises to an average elevation of about 1,200 to 1,400 meters (3,900-4,600 feet) above sea level. The terrain is undulating to gently sloping, typical of the broader Jos plateau state.

The climate in the area is temperate tropical, with a relatively cooler temperature than much of Nigeria due to the high elevation. The region experiences a distinct wet season (April – October) and a dry season (November – March) with the harmattan wind affecting the area in the dry months.

Study Population.

The population of the study will include residents of the surrounding communities of Abattoir,

abattoir/slaughter house workers, community leaders and health officials.

Inclusion Criteria

Inclusion criteria for the study required participants to be within the age range of 11-45 years and to have resided in Jos South LGA for at least six months prior to the study. Exclusion criteria included individuals outside the specified age range, those who were non-residents of Jos South LGA, and individuals with cognitive impairments that could interfere with their ability to understand and respond to the questionnaire

Sample Size calculation

A research work carried out by Ibimode et al., Department of geography and planning, faculty of environmental sciences, University of Jos on "impact of abattoir waste on water quality and public health around slaughter houses in Jos metropolis, Plateau state, Nigeria" published in December 2024 has a prevalence of 91.654[a].

To determine the sample size, we used the Cochran`s formula, which is a statistical method used to determine sample size required, to estimate a population proportion or mean from the prevalence (91.654) obtained from the research above. The formula is:

Cochran's Formula:

$$n = \frac{z^2\, p\, q}{d^2}$$

where:

n = sample size**,** Z = Z-score corresponding with the desire confidence level, P = estimated proportion of the population (or mean), Q = 1 – p (i.e., the proportion of the population not having the characteristic), and "d" = desire margin of error.

GIVEN:

- n =?
- q = 1 – 91.654 = 0.91654

let`s assume

- d = 0-05 (5% margin error)
- Z = 1.96 (95% confidence level)

Plug into formula:

$$n = \frac{(1.96)^2 \times 0.91654 \times (1-0.91654)}{(0.05)^2}$$

$$n = \frac{3.8416 \times 0.91654 \times 0.08346}{}$$

0.0025

$$n = \frac{3.8416 \times 0.076481}{0.0025}$$

$$N = \frac{0.294241}{0.0025} = 117.70$$

The required number of the sample size for this research is 118, this will include residents (male and female, young and older persons) living in the abattoir communities and those working within the research area for this study.

Sample and Sampling Technique.

A cluster sampling technique was adopted for this research work to select the samples this involves selecting group or cluster of people in the Abattoir communities.

Data Collection Method and Instrument.

A well-structured questionnaire was administered to the residents of the said communities to gather information along with a few focused interviews, served as the primary tools for data collection. The questionnaire was divided into four sections: Section A gathered demographic information (bio-data), Section B abattoir activities and environmental impact, Section C health impacts, Section D perceived risks and concern and section E, suggestions for improvement. Face and content validation was also done by experts in the field to ensure that the questionnaire measures what should it should measure (validity). A pilot study was also conducted and all identified shortcomings were rectified.

Ethical Considerations

Before administering the questionnaire, participants were fully informed about the study's purpose, procedures, potential risks, and their right to withdraw without any repercussions. Confidentiality was adequately maintained aiming at protecting participants' personal information, especially when discussing behaviors or health-related issues. Additionally, the study was conducted with cultural sensitivity, ensuring that questions are respectful and non-judgmental. The results will be used purposely for the benefit of the community, such as through public health interventions or education, rather than for any exploitative purposes.

Study Design

The researcher employed a descriptive cross sectional research design approach. This was accomplished by distributing questionnaires to participants in order to obtain data used for the

research work. Additionally, interviews were conducted using the questionnaire to facilitate the collection of information from a range of sources.

Data Presentation

The researcher utilized pie charts, and bar charts to present the data collected. This approach was chosen to provide a clear and comprehensible presentation for the readers.

Data analysis

The collected data were entered into Microsoft Excel and subsequently exported to the Statistical Package for Social Sciences (SPSS) software for analysis. Simple percentage and frequency imputation methods were used to analyze the data, utilizing pie charts and bar chart for presentation using. This approach was intended to provide readers with a clear and comprehensive understanding of the results.

The formula used to calculate the percentage is as follows:

$d/n \times 100/1$

Where d = number of respondents

Where n = total number of questionnaires

RESULTS

All results of data analyzed were based on the 110 retrieved questionnaire out of 118 distributed, therefore the 110 responses received was used to analyze and interpret the findings. The purpose was to understand the health and environmental impact of abattoir activities in relation to environmental degradation and health issues. The data has been categorized into various thematic sections such as demographic details, environmental concerns, health impacts, and community recommendations.

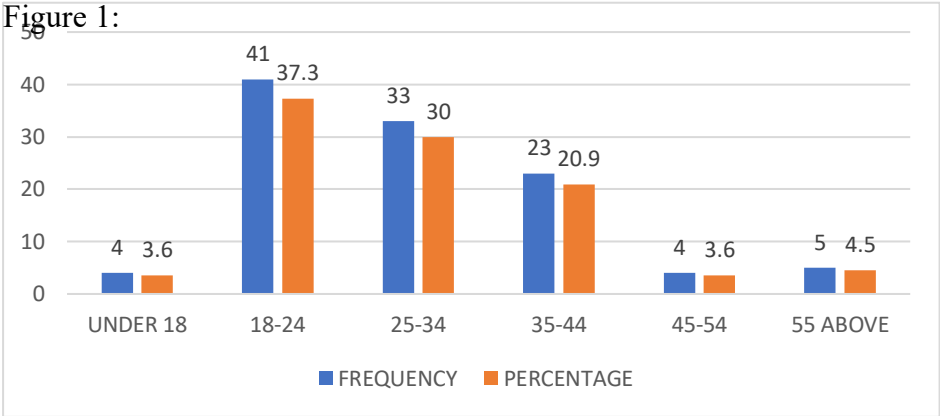
DEMOGRAPHIC INFORMATION OF RESPONDENTS.

Age Distributions of the Respondents

Figure 1 shows that the majority of respondents (37.3%) fell within the age bracket of 18–24 years, followed by (30.0%) aged 25–34 and 35–44 years' accounts for (20.9%). A smaller portion of respondents were under 18 years as well as those aged 45-54 accounts for only (3.6%), while only (4.5%) were 55 years and above. This suggests that younger individuals,

especially those within the youth demographic, are the most responsive and likely the most impacted by or aware of abattoir operations in their environment.

Figure 1:

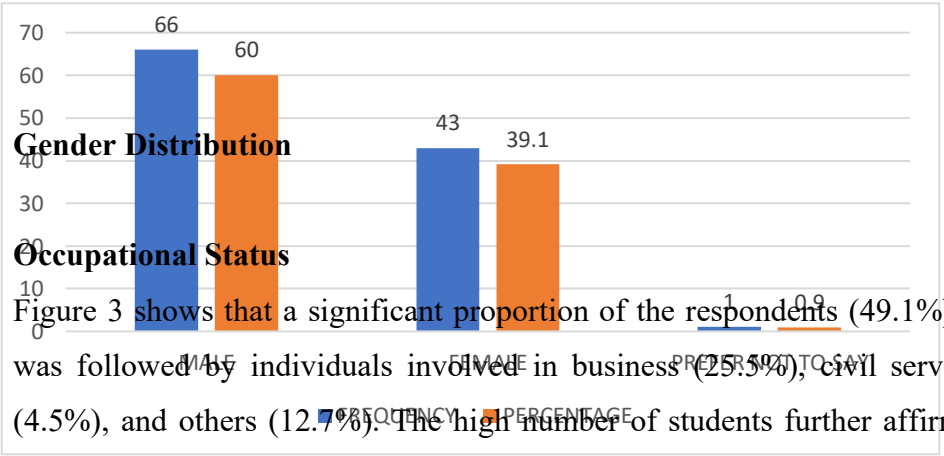


Age Distributions of the Respondents

Gender Distribution

Figure 2 shows that Out of the total responses, 60.0% identified as male, 39.1% identified as female, while 0.9% preferred not to disclose their gender. This relatively balanced gender distribution enhances the representativeness of the findings.

Figure 2

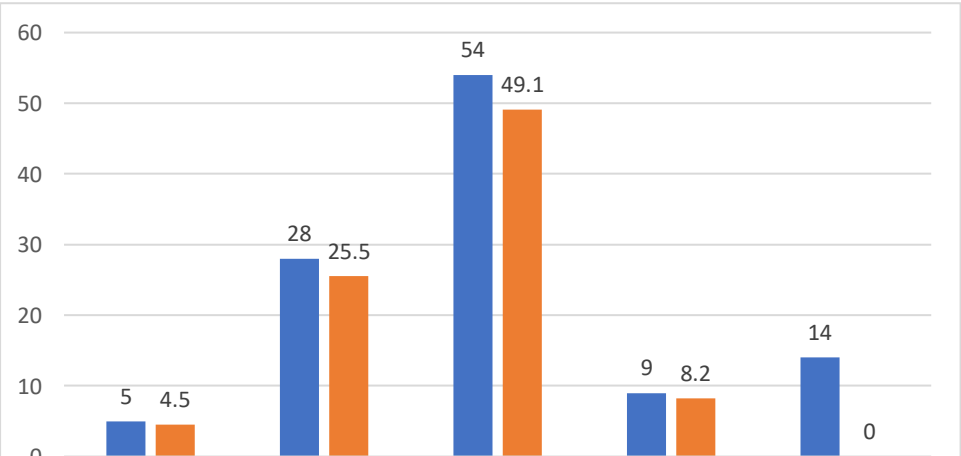


Gender Distribution

Occupational Status

Figure 3 shows that a significant proportion of the respondents (49.1%) were students. This was followed by individuals involved in business (25.5%), civil servants (8.2%), farmers (4.5%), and others (12.7%). The high number of students further affirms the dominance of youth participation in the study.

Figure 3

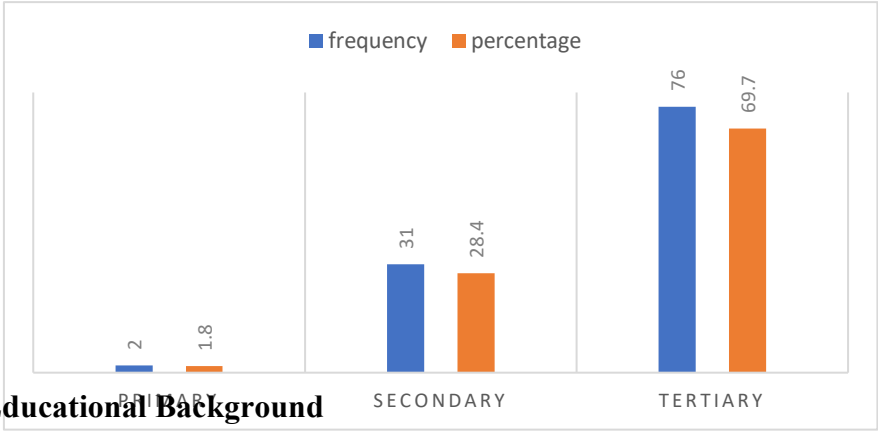


Occupational Status

Educational Background

The data revealed that most respondents (69.7%) had tertiary education, while 28.4% had attained secondary education. Only 1.8% had primary-level education. This indicates a highly literate sample population, which supports the credibility of their responses.

Figure 4

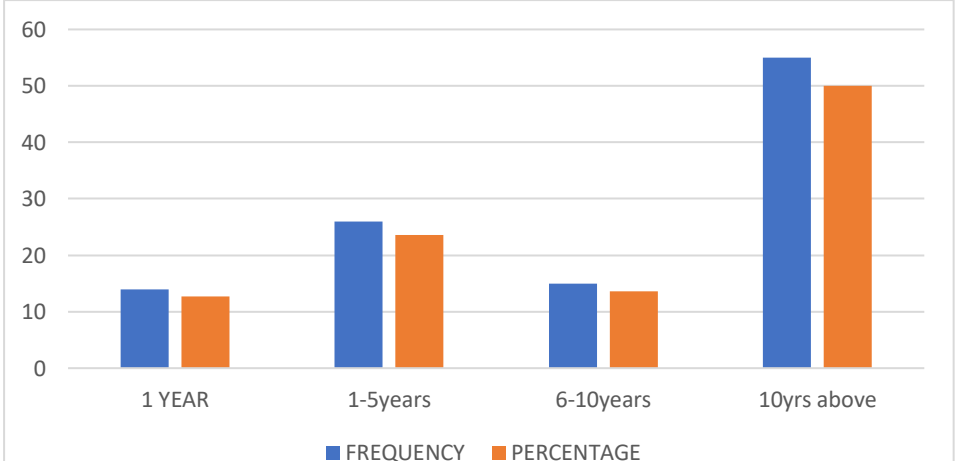


Educational Background

Duration of Stay in The Community

Figure 5 shows the length of stay of the respondents with up to (50.0%) had lived in the community for more than 10 years. This is followed by 23.6% who had stayed between 1–5 years, 13.6% between 6–10 years, and 12.7% who had lived in the area for just one year. The data suggests that many respondents have a longstanding familiarity with the community and abattoir operations, thus providing reliable insights.

Figure 5



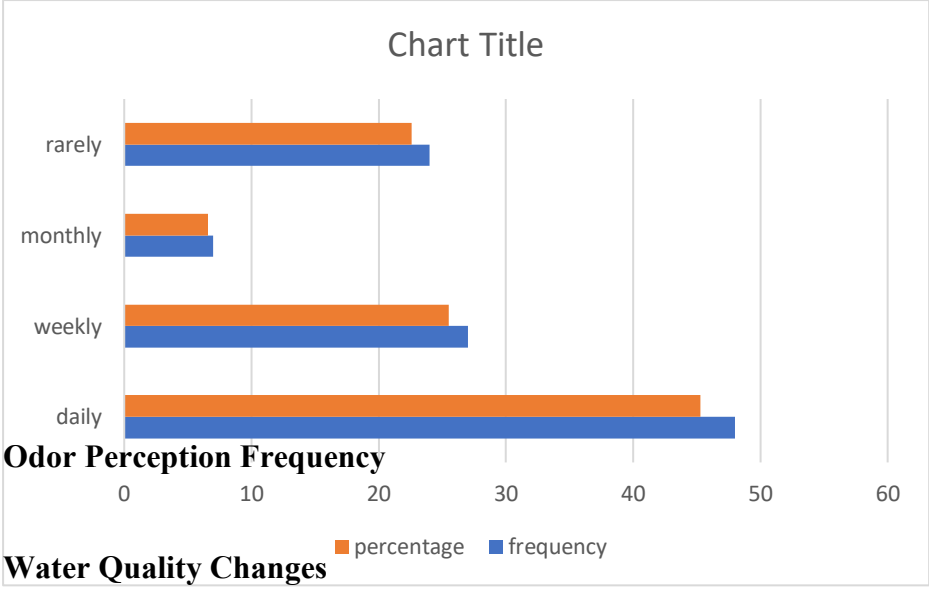
Duration of Stay in the Community

ABATTOIR ACTIVITIES AND ENVIRONMENTAL CONCERNS.

Odor Perception Frequency

Figure 6 shows that a majority of people (45.3%) of the respondents reported perceiving unpleasant odors from the abattoir on a daily basis. Weekly odor was noted by 25.5%, and rarely (22.6%) while only a small proportion experienced it monthly (6.6%). This suggests persistent and possibly uncontrolled emissions from abattoir activities.

Figure 6

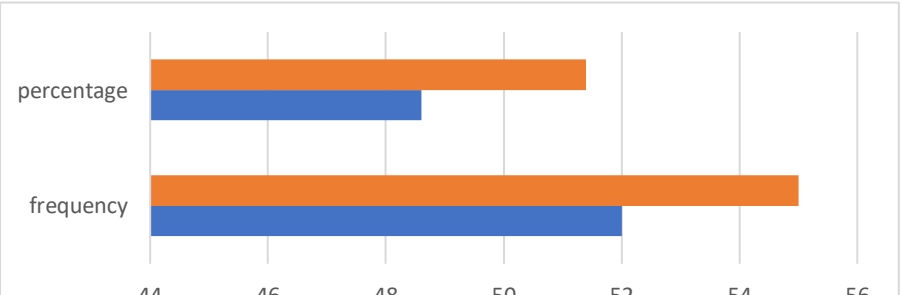


Odor Perception Frequency

Water Quality Changes

Less than half of the respondents (48.6%) observed changes in water quality within the community and the majority which was 51.4% did not observed changes in the nearby water sources in the community. Responses were nearly equally split This balance suggests variability in environmental conditions across different parts of the community. This points to possible water pollution, potentially from abattoir runoff or waste discharge within some communities' sand others communities not being affected.

Figure 7

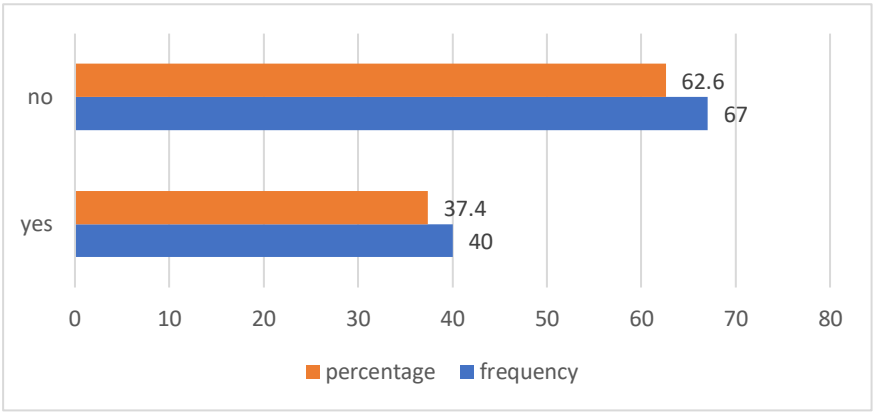


Changes in water quality

Plant and Trees Health

Figure 8 shows that approximately 63% of respondents did not notice changes in plant growth or tree health, which could be linked to soil or air pollution from the abattoir, though 37.4% did report such changes.

Figure 8



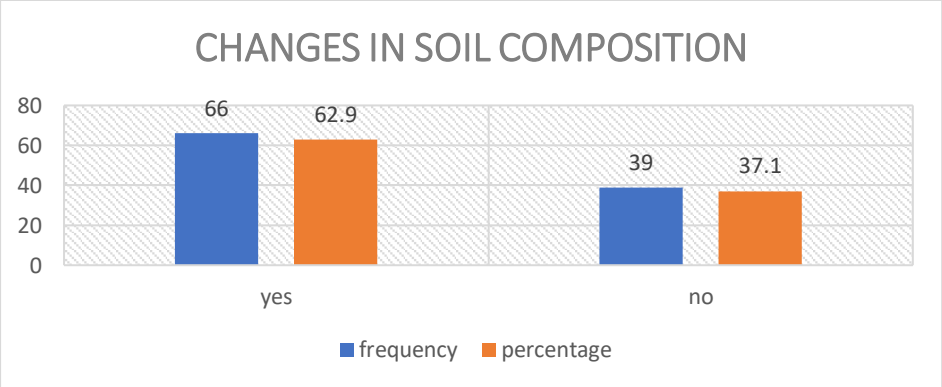
Plant and Trees Health

SOIL AND ENVIRONMENTAL OBSERVATIONS

Changes in Soil Composition

Figure 9 shows that up to 62.9% of the respondent did not indicate changes in soil composition. A total of 37.1% indicated changes in the soil composition.

Figure 9

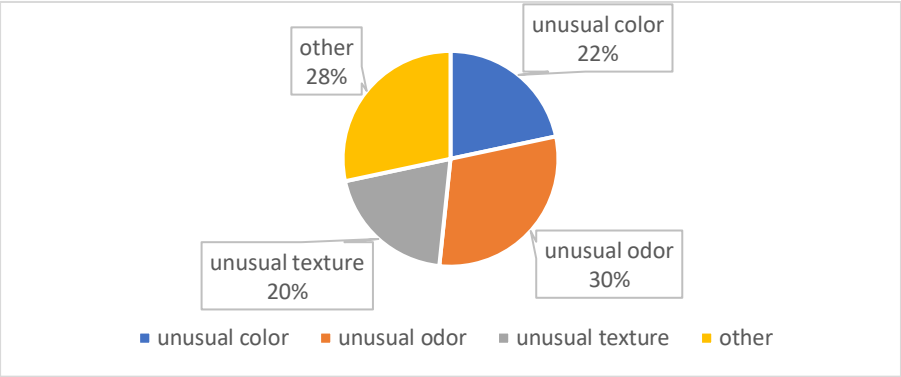


Changes in Soil Composition

Signs of Soil Pollution

Among those who perceived soil changes 36.7% reported unusual odors, 26.5% mentioned discoloration, and 24.5% cited abnormal textures. 34.7% mentioned other types of changes. These indicators are consistent with contamination typically associated with organic waste.

Figure10



Signs of Soil Pollution

HEALTH IMPACT OF THE ABATTOIR ACTIVITIES

Reported Health Problems

Figure 11 shows the percentage as well as the frequency respondent who experienced health issues that might be attributed to the abattoir. About 18.1% of respondents believed that they or others had experienced health problems as a result of abattoir activities. On the contrary, a higher population 81.9.7% did not make such an association.

Figure 11

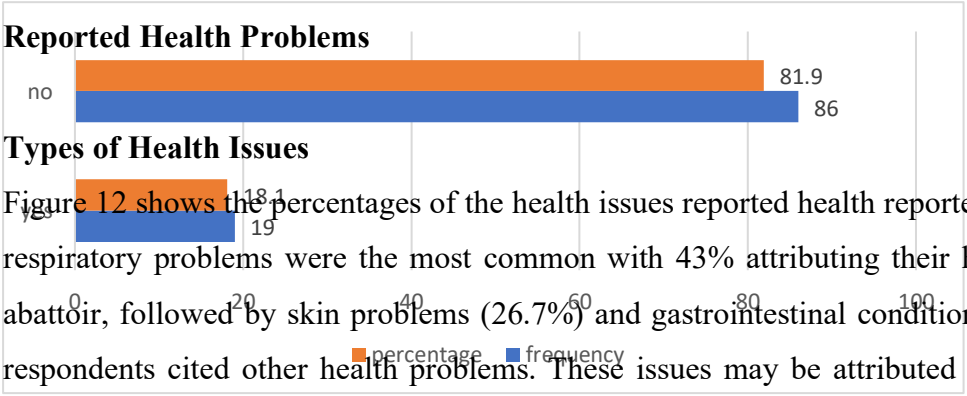
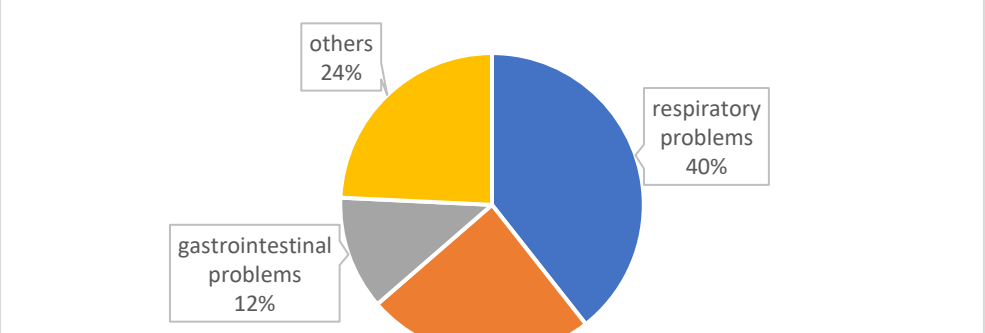


Figure 12 shows the percentages of the health issues reported health reported the respondents, respiratory problems were the most common with 43% attributing their health problems to abattoir, followed by skin problems (26.7%) and gastrointestinal conditions (13.3%). 26.7% respondents cited other health problems. These issues may be attributed to poor sanitation, airborne contaminants, or waterborne diseases.

Figure 12

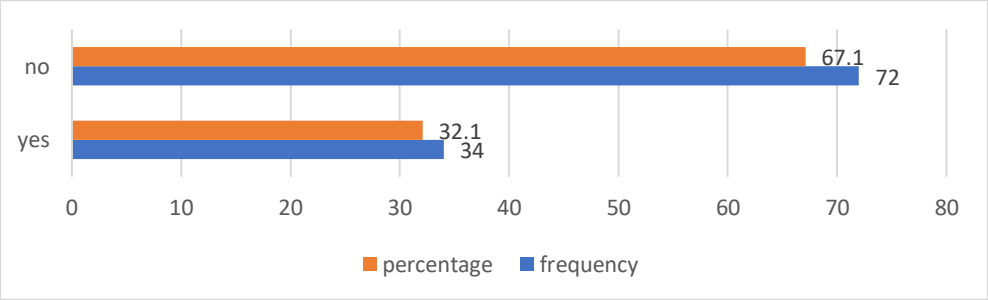


Types of Health Issues

Impact On Vulnerable Population

A considerable 67.9% did not notice any change in the health of children and elderly people living within the communities while 32.1% of the respondent believed that children and older persons are more affected by abattoir activities. This aligns with known health vulnerability patterns among these groups.

Figure 13

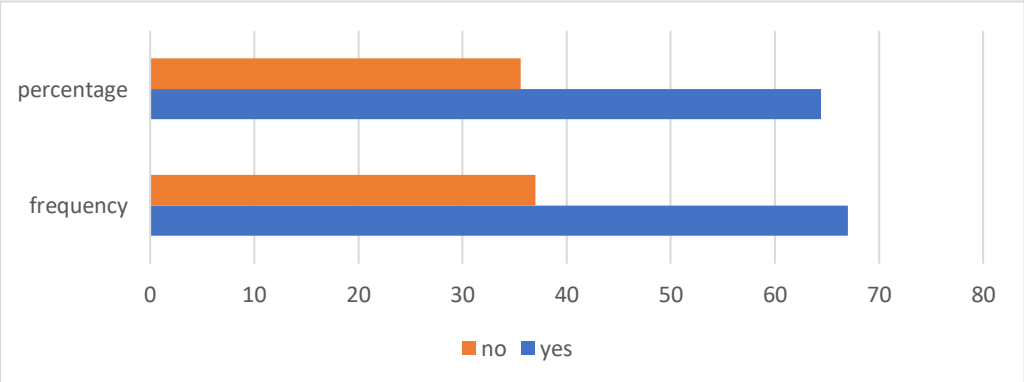


Impact On Vulnerable Population

Increase in Insects Vectors

64.4% of the respondents observed an increase in disease-carrying insects such as flies and mosquitoes while 35.6% did not observe an increase in disease carrying insects within the communities which may proliferate due to poor hygiene or waste mismanagement around abattoir sites.

Figure 14



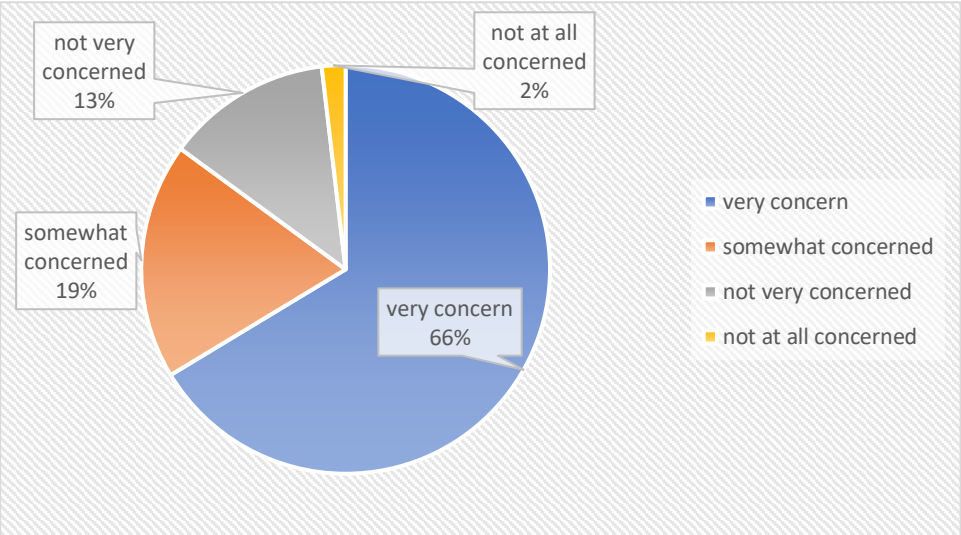
Increase in Insects Vectors

PERCEIVED RISK AND CONCERNS.

Level of Concern

A majority of respondents (66.4%) expressed being very concerned about the environmental and health risks posed by abattoir operations. Another 18.7% were somewhat concerned, while 13.1% showed minimal concern and 1.9% showed no concern at all. This reflects widespread apprehension among community members.

Figure 15

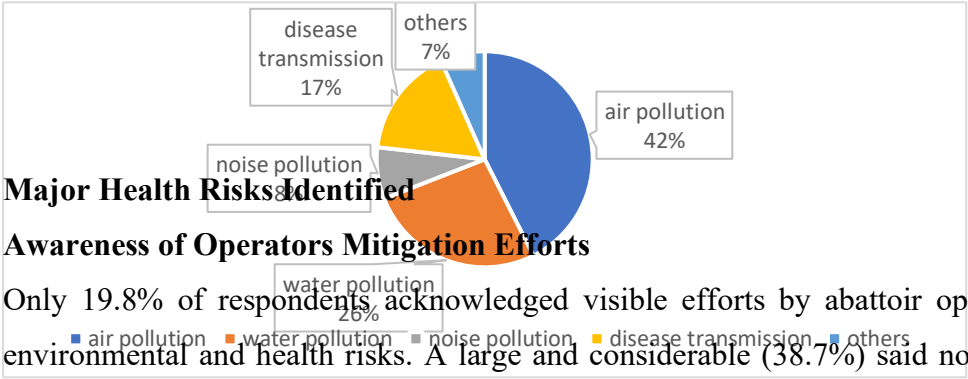


Level of Concern

Major Health Risks Identified

Respondents identified multiple perceived risks, with air pollution (77 responses) topping the list, water pollution (48), and disease transmission (30). Noise pollution (14) and other unspecified risks (12) were also noted.

Figure 16



Major Health Risks Identified

Awareness of Operators Mitigation Efforts

Only 19.8% of respondents acknowledged visible efforts by abattoir operators to manage environmental and health risks. A large and considerable (38.7%) said no such efforts were evident, while 41.5% were unsure. This suggests a communication or implementation gap in risk mitigation strategies in the slaughter house and the abattoir communities.

SUGGESTIONS FOR IMPROVEMENT.

Community Recommendations

The respondents provided various suggestions aimed at improving both the environmental and health standards of the abattoir operations. Common themes of suggestions raised by the respondents included:

- Proper waste disposal and drainage systems
- Fencing or relocating abattoirs to isolated areas
- Adoption of environmentally friendly methods such as regulated burning
- Regular sanitation and stronger government oversight
- Community sensitization and public health education
- Modernization and mechanization of abattoir practices

Discussion of Findings

DEMOGRAPHIC PROFILE AND IT INFLUENCE ON PERCEPTION

The demographic profile of respondents in this study, particularly the predominance of youth aged 18–34 (67.3%) and the high percentage of students (49.1%) with tertiary education (69.7%), significantly influenced the level of environmental and health awareness. This aligns with Ajani and Ogunlade (2012) who argued that educated youths are more likely to recognize and engage with community environmental issues due to exposure to academic discourse, technology, and social media. Similarly, Olaniran et al. (2017) observed that communities with a higher proportion of literate individuals showed greater concern and responsiveness towards environmental degradation from abattoirs. Education enhances the ability to identify risks, demand accountability, and propose practical solutions.

Moreover, the finding that 50% of respondents have resided in the community for more than a decade indicates that many are long-term observers of abattoir impacts. As Eze et al. (2018) emphasized, length of stay in a locality improves observational reliability regarding gradual environmental and health changes.

Air Pollution and Odour Nuisances

The finding that 45.3% of respondent's experience foul odors daily confirm the studies by Adelegan (2002) and Nwachukwu & Ume (2013), which identified abattoirs as persistent sources of offensive odors due to inadequate waste management and lack of emission control systems. In their study of Ibadan municipal abattoir, Ogunyemi et al. (2014) observed that residents within 500-meter radius experienced odor disturbances daily, leading to complaints

of headaches, nausea, and reduced quality of life. Odors emanating from abattoirs are largely the result of anaerobic decomposition of blood, offal, feces, and wastewater, which release gases such as hydrogen sulfide (H_2S) and ammonia (NH_3)—both of which are classified as air pollutants by the World Health Organization (WHO, 2006). On the other hand, nearly half of respondents (48.6%) reported changes in water quality strongly indicates localized water pollution, especially in communities close to the abattoir. This is consistent with Adelegan (2004) who found that slaughterhouse effluents significantly increased biological oxygen demand (BOD) and coliform counts in nearby streams, rendering the water unfit for domestic use.

Akomolafe et al. (2019) studied the impacts of abattoirs on water sources in Akure and revealed that E. coli and Salmonella spp. were consistently found in wells within 1 km of abattoir locations. The authors concluded that abattoirs contribute directly to microbial and chemical contamination of both surface and groundwater.

Given that 51.4% did not report such changes, it suggests variability due to distance from pollution sources, local geology, or type of water supply (e.g., protected boreholes vs. open wells), as explained in Oluwande et al. (2015). The study's finding that 37.1% of respondents observed changes in soil is indicative of ongoing soil degradation, likely resulting from the direct discharge of abattoir waste onto the land. Yusuff and Sonibare (2004) confirmed that soils near abattoirs show increased levels of organic nitrogen, phosphorus, and pathogenic organisms, which degrade soil quality and pose risks to human health through agricultural products.

Changes such as foul smell (36.7%), discoloration (26.5%), and abnormal texture (24.5%) as reported by respondents mirror the findings of Adeyemo et al. (2002), who documented similar symptoms of biological contamination in soils near the Bodija abattoir in Ibadan. These changes are consistent with the infiltration of organic-rich effluents, which reduce oxygen availability in soil and disrupt normal microbial balance.

Direct Health Concern

While only 18.1% of respondents in the study reported abattoir-related health problems, the types of ailments which are respiratory (43%), skin (26.7%), and gastrointestinal issues (13.3%)—are strongly supported by existing literature.

Odeyemi (2015) demonstrated that residents near Lagos abattoirs suffer increased cases of respiratory infections, asthma, and skin rashes, linked to bioaerosols, ammonia emissions, and poor hygiene standards. Additionally, Etim et al. (2013) confirmed that abattoir contamination of community water sources correlates with higher rates of diarrhea, typhoid, and skin diseases,

especially among children and the elderly. Similarly, the data obtained showed that 32.1% of respondents observed increased illness among children and the elderly. This aligns with findings by Adeoye and Adebayo (2014), who noted that these vulnerable groups experience heightened exposure to abattoir-related risks due to weaker immunity, increased time spent at home, and closer contact with contaminated environments. Their research in Ilorin found that such groups were three times more likely to contract abattoir-associated infections than the general population.

The seemingly low reporting rate in the study may result from underdiagnosis, poor access to healthcare, or a lack of awareness of the link between abattoir activities and disease, as noted by Agbede & Akinwumi (2011).

Insect Vector Proliferation

The observation that 64.4% of respondents reported an increase in flies and mosquitoes aligns with Olanike (2012), who emphasized that open dumping of animal waste, stagnant blood, and uncovered water sources around abattoirs form ideal breeding sites for flies, mosquitoes, and rodents. These vectors can transmit diseases such as cholera, dysentery, and malaria, especially in areas with poor waste containment.

Akinnubi and Oloruntoba (2016) found that areas within 200 meters of abattoirs in Ogun State had vector densities 2–3 times higher than control zones, linking poor sanitation to vector outbreaks.

Public Concern

The study found that 66.4% of respondents were very concerned about environmental and health risks. This is comparable to Bello and Oyedemi (2010), who reported similar levels of public concern in Osogbo, where residents demanded better enforcement of environmental sanitation laws around abattoirs. The level of Concerns were directly associated with education and proximity, confirming Eze & Eze (2016)'s theory that risk perception increases with awareness and direct exposure.

Lack of Mitigation Awareness

The low recognition (19.8%) of abattoir operator efforts to mitigate health and environmental risks suggests either poor implementation or poor communication. This mirrors findings by Olugasa et al. (2012), who stated that most Nigerian abattoirs lack functional waste treatment systems, and where measures exist, stakeholder engagement and transparency are minimal.

This gap contributes to public mistrust and hinders collaborative environmental management, emphasizing the need for community-inclusive environmental health strategies, as recommended by the National Environmental Standards and Regulations Enforcement Agency

(NESREA, 2017).

Therefore, haven pointed out the lack of mitigation processes, the Respondents' recommendations including modernization, waste regulation, abattoir relocation, and public education are consistent with best practices outlined by the Food and Agriculture Organization (FAO, 2019). They advocate for:

- Slaughterhouse decentralization, especially in dense residential areas.
- Standardized drainage and treatment systems.
- Hygienic handling, mechanization, and periodic sanitation audits.

study affirms that affected communities possess practical knowledge and willingness to engage in problem-solving. A valuable insight also reported by Ishaya and John (2020) in their participatory research on urban sanitation.

Conclusion

The findings of this research confirm that abattoir operations, if poorly managed, pose substantial environmental and health challenges to surrounding communities. Its highlights the community's awareness and responsiveness to environmental degradation and pollution arising from abattoir activities. Its impact on air, water, and soil quality, as well as public health especially among vulnerable populations like children and the elderly—reflects the need for immediate attention by authorities and stakeholders. And Its general lack of visible mitigation efforts by abattoir operators and limited government intervention indicates gaps in enforcement and environmental health management. Despite this, the community's willingness to suggest viable solutions indicates a strong potential for participatory governance and public-driven environmental reform.

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