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Assessment of Sanitary Status and Practices in the Selected Abattoirs and Slaughter Houses in Anambra State, Nigeria

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Abstract: The sanitary conditions and workers practices within abattoirs and slaughterhouses are critical factors affecting public health and the quality of meat available in the markets. The problem is from lack of quality environmental health practice among abattoir workers. This study aims to assess the sanitary status and practices in selected abattoirs and slaughterhouses in Anambra State, Nigeria. The study adopted a cross-sectional study to determine the studied other objectives which include assessment of internal facilities, waste management practices, and overall sanitary conditions within these establishments. The sampling technique for the study was stratified random technique. Structured self-administered questionnaire was administered to 140 participants while observational checklist was used to collect data on sanitary conditions within the premises. The collected data was entered into computer software called Statistical Package for Social Sciences (SPSS version 20.0) and was analyzed using descriptive statistical analysis. The results were displayed in frequency tables while the relationship between variables were determined with chi square statistical test and the findings revealed that majority (82.9%) of respondents were male; 46.4% of the respondents were butchers, this implies that they were in constant contact with meat. Unfortunately, majority (87.1%) did not have any medical certificate of fitness, and workers were either wearing inadequate PPEs or no PPE. Also, findings showed that no hand washing station (0%) was availability for the workers, which discouraged their hand washing practices. A personal observation of the abattoir facilities indicated that Lairage was without roof and was flooded, slaughtering process was done on bare floor, without evisceration or bleeding area (0%). The hypothesis test conducted at P-value >0.05 indicated that there was a significant relationship between the level of education of abattoir worker and how often they wash their hands, in favor of the alternate hypothesis. Similarly, there was a significant relationship between the years of experience of abattoir worker and how often they wash their hands. In conclusion, the findings highlight critical deficiencies in sanitary practices, posing risks to both workers and consumers. Therefore, there is need to ensure food safety practices among abattoir and slaughter workers for the purpose of sustainable meat production.

Keywords: *Abattoirs, Anambra, Practices, Sanitary Status and Slaughter House.*

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I. INTRODCUTION

The sanitary conditions and compliance practices within abattoirs and slaughterhouses are critical factors affecting public health and the quality of meat available in markets. This is because inadequate infrastructure, poor waste management, and non-compliance with established standards persist in many facilities [1]. An issue of great interest and

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growing concern is the spread of infectious diseases that emerge or re-emerge from the interfaces between animals and humans and the ecosystems in which they live [2]. Because 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 [3,4].

An abattoir or slaughterhouse can simply be defined as a place where animals are killed in a sanitary condition to ensure its safety and wholesomeness for human consumption [5].

These problems range from: slaughtering on the floor, absence of stunning and ripening operations, inadequate slaughtering facilities, lack of proper sewage disposal systems, inadequate clean water supply, lack of refrigeration system, lack of proper ventilation and electricity, lack of adequate transport system for meat products and lack of quality environmental health practice among Abattoir workers [6].

The meat industry is a vital sector of Nigeria's economy, but its operations, especially at the abattoir level, pose substantial environmental and health risks if not properly regulated and managed. The World Health Organization (WHO) estimates that over 600 million people worldwide fall ill after consuming contaminated food, resulting in 420,000 deaths annually. Moreover, failure to observe good sanitation and hygiene practices such as washing of hands, wearing of protective clothing, cleaning and sanitization of butchery equipment and utensils, transportation of meat in clean containers and storage of meat at appropriately low temperatures can lead to microbial contamination, meat quality deterioration and post-harvest meat losses [7].

There are two major abattoirs in Anambra State namely Kwata Abattoir in Awka and Amansea Abattoir, both located in Awka South Local Government Area. Despite their importance, these abattoirs struggle with inherent hygiene and infrastructure issues that demand prompt resolution. These abattoirs lack necessary facilities for smooth and healthy operation, posing risks to consumers [8].

Globally, animal slaughter for communal consumption is an unavoidable reality in many regions. In most countries government at different levels enacts laws aimed at ensuring a healthy steady supply of meats and meat products, these laws may include the involvement of trained personnel such as veterinarians, butchers, meat inspectors and laboratory scientists in the abattoir, yet some problems abound with meat handling procedures in most abattoirs in developing nations [9]. While the slaughtering of animals results in significant meat supplies, a good source of protein and production of useful by-product such as leather, skin and bones; the processing activities involved sometimes result in environmental pollution and other health hazard that may threaten animal and human health [10].

Poor hygiene and sanitary conditions in abattoirs can contaminate meat products,putting consumers health at rising. The risk of contamination of livestock products exists across the entire supply chain, spanning production, processing, and distribution stage. By practicing good abattoir hygiene and slaughtering techniques, the levels of carcass contamination can be kept low[11].

Adequate and proper abattoir operations such as ante-mortem inspection, slaughtering, bleeding, evisceration, post-mortem inspection, and waste disposal are important in the production and supply of wholesome meat for human consumption [12]. This can only be achieved by the presence of adequate, standard and functional operating facilities, proper sanitary conditions and good hygiene practices [13].

Lack of standard facilities coupled with non-adherence to good manufacturing practices, good hygienic practices and sanitary practices in abattoirs and slaughterhouses in developing countries, especially in Nigeria, were attributed to meat contamination and poor waste disposal with resultant effects on the environmental and human health in general [13, 12]. This study focused sanitary conditions of the available infrastructure, environmental health regulations and practices in selected abattoirs and slaughter house in Anambra State, Nigeria.

II. MATERIALS AND METHODS

This study utilized a cross-sectional descriptive research design in which the researcher used two abattoirs to assess the sanitary status and practices in selected abattoirs and slaughterhouses in Anambra State. This study was carried out in two abattoirs such as Kwata abattoirs in Awka and Awka-etiti slaughterhouse in Idemili South both in Anambra State. The study population comprised of abattoir operators that is business owners and workers within the abattoir. They include abattoir managers, abattoir workers/staff (e.g., butchers, slaughterers, cleaners,), regulatory officials (e.g., veterinary officers), animal handlers/transporters. These abattoirs were selected based on their relevance such as responsible for ensuring compliance with regulations, enforcing regulations, monitoring compliance, play a crucial role in maintaining animal health, maintaining sanitary conditions, directly involved in daily operations, can provide insight into practices and challenges. Abattoirs that do not meet the inclusion criteria, such as those that are not operational, registered or licensed were excluded from the study. The Cochran formula was used to calculate a representative sample size for proportions as:

$N0 = (Z^2 * p * q) / E^2$

Where;

n0 is the sample size,

Z is the selected value of desired confidence level = 95%

P is the estimated proportion of an attribute that is present in the population = 0.5

Q = 1- p

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E is the desired level of precision (margin of error) = 0.05

$N0 = 1.96^2 \times 0.5 \times (1-0.5) / 0.05^2$

$N0 = 3.8416 \times 0.25 / 0.0025$

$N0 = 384.16 \sim 384$

Adjusting the sample size using the modified formula:

$N = 384 / ((1 + (384 / 236)) =$

$N = 384/2.627 = 146.17\ 58$

~146

Dividing the figure for the two Abattoirs under study;

146/2 = 73 workers per Abattoir.

The Sampling technique was a Stratified random technique to capture the diversity of the population in Anambra State. Stratification- the population was divided into subgroups (strata) based on relevant characteristics, such as: - Job role (e.g., slaughterers, processors, abattoir managers) - Department (e.g., meat processing, packaging etc.). Sampling: appropriate sample from each stratum was selected to ensure representation from all groups. The study area is Anambra State, named after the Anambra River (Omambala). It is located between Latitudes 50 40'N and 60 50'N, then longitudes 6035'E and 7025'E in the South-Eastern part of Nigeria. Anambra has boundaries with Kogi State in the north, Imo State in the south, Delta State in the west, Enugu State in the east. The indigenous ethnic group in Anambra state are the Igbo (98% of population) and a small population of Igala (2% of the population) who live in the Northwestern part of the state. The State has a land mass of about 4,416sq km with 4,182,022 populations. The state is drained by five major rivers and their tributaries. These are the River Niger, Anambra River, Mamu/Ezu River, Idemili River and River Ulasi (Johnson et al.., 2021). Two abattoirs were selected through randomly process.

The questionnaire and checklist used as an instrument for data collection were designed to contain six segments; section A: Demographic information of the respondents, section B: questioned the socio-physical attributes of the abattoirs, section C: contained questions on sanitary practices in the respective abattoirs. Section "D" was centred on hygiene practices of abattoir workers, while section "E" bordered on Waste management within the abattoir. A well-structured questionnaires were prepared by the researcher and face validity was assessed by the researcher experts together with an expert in public health and health statistician vetted it in relevance to the topic, coverage of content areas, appropriateness of the language used and clarity of the items. Appropriate corrections were made after suggestions from the experts. Test-retest method was used to establish the reliability of the questionnaire. A total number of of 146 questionnaires that were distributed, 140 were correctly filled and returned. This implies that the study enjoyed 96% return rate

Data collection was done by researchers while observational checklist was used to collect data on sanitary practices within the abattoir, including adequacy of facilities. The data obtained from the questionnaire was entered into computer software called statistical Package for Social Sciences (SPSS version 25.0) and was analyzed using descriptive statistical analysis. The results were displayed in frequency tables while the relationship between variables were determined with chi square statistical test. Ethical clearance was obtained from Department of Environmental Health Science and ethical approval board of Faculty of Health Science and Technology (FHST), Nnewi Campus.

III. RESULTS

The result concerning socio-demographic data of the respondents as shown in table 1 below discloses that 60(42.9%) of the respondents were at least 46 years, 49(35.0%) were within 36-45 years, 24(17.1%) within 26-35 years while 7(5.0%) were within the ages of 18- 25 years. Majority 116(82.9%) of the respondents were males while 24(17.1%) were female. Concerning the marital status; 96(68.6%) of the respondents were married, 20(14.3%) were single, 19(13.6%) were widowed while 5(3.6%) were divorced. Based on their job description; 65(46.4%) were butchers, 37(26.4%) were animal processor, 28(20.0%) were menial workers while 10(7.1%) were working with management. Religion aspect; 126(90.0%) were Christians while 14(10.0%) were Muslims. For educational level; 72(51.4%) had primary education, 36(25.7%) had secondary education, 28(20.0%) had no formal education while 4(2.9%) had tertiary education. Years of working experience; 36(25.7%) 6-10 years and above 20 years of working experience respectively, 34(24.3%) had 11-15 years of working experience while 21(15.0%) had between 16-20 years of work experience. Medical certificate of fitness; 122(87.1%) had no certificate of medical fitness while 18(12.9%) had. Selected abattoirs; 80(47.1%) of the respondents were from Kwata abattoir while 60(42.9%) were from Awka-etiti abattoir.

Table 1 Socio-demographic variables of respondents in selected abattoirs in Anambra state.

Item	Category	Frequency	Percentage
Age group (years)	18-25	7	5.0
	26-35	24	17.1
	36-45	49	35.0
	46 and above	60	42.9
Gender	Female	24	17.1
	Male	116	82.9

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Marital status	Single	20	14.3
	Married	96	68.6
	Divorced	5	3.6
	Widowed	19	13.6
Role in abattoir	Animal processor	37	26.4
	Butcher	65	46.4
	Management	10	7.1
	Menial worker	28	20.0
Religion	Christianity	126	90.0
	Islam	14	10.0
Highest level of education	No formal education	28	20.0
	Primary	72	51.4
	Secondary	36	25.7
	Tertiary	4	2.9
Years of working experience	1-5	13	9.3
	6-10	36	25.7
	11-15	34	24.3
	16-20	21	15.0
	Above 20	36	25.7
Do you have medical certificate of fitness?	No	122	87.1
	Yes	18	12.9
Selected Abattoir	Awka-etiti	60	42.9
	Kwata	80	47.1

Source: Researcher's fieldwork (2024).

The level of sanitation in the selected abattoirs was presented in table 2 where 110(78%) affirmed to having an employed cleaner while 30(21.4%) objected. Application of disinfectants in cleaning; 81(57.9%) use disinfectants in cleaning while 59(42.1%) responded that disinfectants were not used in cleaning. Moreover,76(54.3%) responded that cleaning and disinfection of the entire abattoir was carried out daily, being the majority response against 22(15.7%) that opined that it was done twice weekly and 42(30%) for thrice weekly. According to 140(100.0%) response, manual method was used in cleaning process. Equipment and tools used were cleaned and sanitized regularly according to 104(74.3%), while 36(25.7%) disagreed. Substances used; 93(66.4%) used only water for cleaning, 44(31.4%) used water and detergent, while 3(2.1%) respondents that water, detergent and sterilant were used. According to 89(63.6%), no separate tools and equipment for different stages of slaughtering process while 51(36.4%) affirmed to it.

Table 2 Assessment of level of Sanitation in the Selected Abattoirs in Anambra State.

Item	Response	Frequency	Percentage
Is there any employed cleaner?	No	30	21.4
	Yes	110	78.6
Are disinfectants used in cleaning?	No	59	42.1
	Yes	81	57.9
Frequency of cleaning and disinfection of entire abattoir	Daily	76	54.3
	Twice weekly	22	15.7
	Thrice weekly	42	30.0
What method is employed in the cleaning and disinfection of the abattoir?	Manual	140	100.0
Are the equipment and tools used cleaned and sanitized regularly	No	36	25.7
	Yes	104	74.3
What agents is used for cleaning?	Water only	93	66.4
	Water and detergent	44	31.4
	Water, detergent and sterilant	3	2.1
Are there separate tools and equipment for different stages of slaughtering process?	No	89	63.6
	Yes	51	36.4

Source: Researcher's Fieldwork (2024).

The table 3 shows the availability of sanitary infrastructure within the selected abattoirs in Anambra state**.** Among the two abattoirs; Kwata abattoir has highest and a better facility index score of 0.60 indicated 60% compared to that of Awka-etiti abattoir which had a facility index score of 0.40 indicated 40%.

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Table 3 The Availability of Sanitary Infrastructure within the Selected Abattoirs in Anambra State.

Sanitary infrastructure	Kwata abattoir	Awka-etiti abattoir	Total (N)%
Lairage	1	1	2(13.3%)
Segregation ward for sick animals	0	0	0
Office accommodation	1	0	1(6.7%)
Slaughter hall	1	1	2(13.3%)
Water facilities	1	1	2(13.3%)
Evisceration section	0	0	0
Flaying/dehairing section	1	1	2(13.3%)
Bleeding section	0	0	0
Toilet facilities	1	1	2(13.3%)
Hoist	0	0	0
Veterinary Laboratory	0	0	0
Cold room	0	0	0
Electricity supply	1	1	2(13.3%)
Cloak/changing room	1	0	1(6.7%)
First Aid box	1	0	1(6.7%)
Hand washing facilities	0	0	0
Catchment pit	0	0	0
Frequency (%)	**9(60%)**	**6 (40%)**	**15(100%)**
Facility index score	**0.60**	**0.40**	

N.B: 1-avalable, 0-not available
Source: Researcher's Fieldwork (2024).

Table 4 depicts the hygiene practices among abattoir workers in the selected abattoirs; 121(86.4%) of the respondents reported that abattoir workers were required to wear personal protective equipment (PPE) while 19(13.6) objected. Type of used PPEs; 53(37.9%) wear protective overall, 27(19.3%) use safety boots, 20(14.3%) use hand gloves while 6(4.3%). Hand washing station; 100(71.4%) responded that there was no hand washing station with soap and water available for workers while 40(28.6%) objected. Rate of washing hands; 56(40.0%) seldomly washed their hands, 43(30.7%) often washed their hands, 34(24.3%) washed their hands very often while 7(5.0%) said that they never wash their hands.

95(67.9%) responded that they wash their hands after visiting the toilet, 44(31.4%) responded that they wash their hand after touching dirty surfaces, 31(22.1%) responded that they wash their hands at the close of work while 15(10.7%) responded to washing their hands after each operation. According to the respondents, 42(30.0%) changed their clothing thrice weekly, 40(28.6%) did twice weekly, 33(23.6%) did daily while 25(17.9%) did once weekly. Frequency of cleaning work surfaces; 87(62.14%) cleaned their work surface daily, 11(7.9%) after every sale, 29(20.7%) weekly, 3(2.14%) monthly, while 10(7.14%) cleaned occasionally.

Table 4 The Hygiene Practices among Abattoir Workers in the Selected Abattoirs

Items	Response	Frequency	Percentage
Are Abattoir workers required to wear PPEs?	No	19	13.6
	Yes	121	86.4
Which of these PPEs do you wear?	Hand gloves	20	14.3
	Nose mask	6	4.3
	Safety boots	27	19.3
	Protective overall	53	37.9
Is there hand washing station with soap and water available for workers?	No	100	71.4
	Yes	40	28.6
How often do you wash your hands?	Never	7	5.0
	Seldom	56	40.0
	Often	43	30.7
	Very often	34	24.3
When do you wash hands?	after using the toilet	96	67.9
	after touching dirty surfaces	44	31.4
	at the close of work	31	22.1
	after each operation	15	10.7
How often do you change your clothing?	Daily	33	23.6
	Once weekly	25	17.9

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	Twice weekly	40	28.6
	Thrice weekly	42	30.0
Frequency of cleaning work surface	Daily	87	62.14
	After every sale	11	7.9
	Weekly	29	20.7
	Monthly	3	2.14
	Occasionally	10	7.14

Source: Researcher's Fieldwork (2024)

The table 5 shows the waste management techniques in selected abattoirs; 61(43.6%) of the respondents reported that solid wastes in the abattoir were managed by dumping on land, 28(27.1%) by packing away from the abattoir, 14(10.0%) by dumping along drainages, 13(9.3%) by burial method while 11(8.8%) responded that solid waste were managed by incineration or open burning while the least 3(2.1%) reported reprocessing. The type waste most generated; 50(35.7%) for horns and bones, 41(29.3%) for blood and offal and intestinal wastes and 8(5.7%) feces then were for hairs as the solid waste mostly generated. From the response on frequency of waste disposal, solid wastes were disposed 64(45.7%) for monthly, 58(41.4%) for weekly, and 18(12.9%) for daily. Management of liquid wastes were done as thus; 58(41.4%) said channeled to nearby water bodies, 54(38.6%) said channeled to nearby drainage system, 18(12.9%) channeled to catchment pits while 10(7.1%) responded that they were channeled to nearby bush. Rate of cleaning the water channels; 82(58.6%) responded to water channels being cleaned bi-weekly, 45(32.1%) responded daily, 9(6.4%) responded to weekly while 4(2.9%) responded to monthly.

Table 5 Waste Management Techniques in Selected Abattoirs

Items	Response	Frequency	Percentage
How are solid wastes managed in the abattoir?	Burial	13	9.3
	Dumping along drainage	14	10.0
	Dumping on land	61	43.6
	Incineration/open burning	11	8.8
	Packing away from the abattoir	28	27.1
	Reprocessing	3	2.1
What type of waste is mostly generated within your abattoir?	Blood an offal	41	29.3
	Hairs	8	5.7
	Horns and bones	50	35.7
	Intestinal wastes and faeces	41	29.3
Frequency of disposable/ removal of solid waste	Daily	18	12.9
	Weekly	58	41.4
	Monthly	64	45.7
How are liquid effluents managed?	Channel to catchment pit	18	12.9
	Channel to nearby bush	10	7.1
	Channel to nearby drainage system	54	38.6
	Channel to nearby water bodies	58	41.4
Frequency of cleaning water channels	Daily	45	32.1
	Bi-weekly	82	58.6
	Weekly	9	6.4
	Monthly	4	2.9

Source: Researcher's Fieldwork (2024)

IV. DISCUSSION

This study focused on the assessment of sanitary status and practices in the selected abattoirs and slaughter houses in Anambra State, Nigeria. The findings therefore shows that jobs related to abattoir operations were dominated by men in the study area. Among the workers, majority of them were married. It was found that less of elderly people aged 40 years and above were involved in abattoir operations. In a study carried out by Adeolu *et al.* [1] and Obidiegwu *et al.* [15] recorded similar findings with low in elderly workers in abattoirs' operations. Also, greater percentage (90%) of the respondents were Christians. This was not surprising because the study was done in southeast Nigeria that are dominated by Christians.

The majority (80%) of the respondents had formal education which was in line with a study conducted by Oruonye [16] where the majority of the abattoir workers at Ijebu Igbo were found to be formally educated. Unfortunately, 87.1% out of the total population did not have medical certificate of fitness, violating the Federal Republic of Nigeria Official Gazette (chapter 6-abattoir sanitation) sub-section III, which states that "all workers in the abattoir shall be medically examined and issued with Medical Certificate of fitness signed by a qualified medical practitioner, this shall be renewable every six months. From the results, majority of

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the respondents were employed cleaner and they do make use of disinfectants in daily cleaning of abattoir.

In a research conducted by Sirma et al [17] suggested that the reduction of microbial contamination depends on the enforcement of hygienic practice such as regular disinfection of working tools in reducing the microbiological contamination of carcasses. The used routine disinfection in the slaughterhouse depends on the usage of disinfectants that are effective and efficient against variety of microorganisms and does not tent the meat and its marketability. It was observed that greater percentage (66.4%) used only water for cleaning, which is inadequate and does not support effective cleaning of abattoir.

The observational study revealed that some certain facilities were not operational, they were rated inadequate. Then, the majority of the facilities seen in this study were not in a condition to support standard operating procedures and acceptable hygienic standards in the abattoirs, and this could be detrimental to public health as opined by a study [18]. Given the significance of Lairage in the abattoir, where animals are allowed to rest and where ante- mortem examinations are conducted before slaughter, the findings demonstrated that although Lairage was present, it was either not operational or flooded due to absence of roof. According to Fearon [19], slaughterhouses should be situated away from residential areas, public buildings, and places of worship, but they should nevertheless have access to a permanent road, a ready supply of water, a system for disposing of waste that is beneficial to the environment, and electricity. Based on those parameters, it was discovered that 1 of the 2 slaughterhouses in this study was good but situated in an improper location which could expose residents to various bacteria that cause food poisoning, diarrhea, zoonotic diseases, and other health consequences [20].

In the current investigation, it was discovered that 1 out of 2 slaughterhouses had an extremely unclean and unhygienic surrounding, and none had a hand washing station, moreover, liquid effluents were either channeled to a water body or a drainage system in both abattoirs. The slaughtering process was done on a bare floor which according to respondents was seldomly disinfected. This supports a study by Birhanu et al [21], on abattoir management; a case study of Malumfashi LGA, Katsina state in Nigeria, were he observed that the slaughtering process was done on a bare floor.

Moreover, the study area, none of the slaughterhouses had a compartmentalized facility, and it was a common practice to execute all the operations such as slaughtering, bleeding, skinning, evisceration, carcass splitting, and processing on the same spot. This type of operation and practice, for sure, could lead to contamination of carcasses and raw meat according to Spickler [22].

The findings reported that ante-mortem and post-mortem inspections were practiced in both abattoirs (100%), however due to absence of veterinary office, veterinarian visits seldomly which implies that the inspections were insufficient compared to public health standards and the health status of the uninspected animals remains questionable. The result agreed with Cook et al. [23] who reported that antemortem inspection was practiced at a very low level. Disinfection of premises was not practiced at any of the slaughterhouses, which could attribute increased load of microorganisms there and subsequently could contaminate raw meat through air or cross contact through foot wares of workers moreover, and no facilities or practice of hygiene and sanitation for the visitors during entry or exit into slaughterhouses (0%).

The use of PPEs was majorly observed among the management while other workers were exposed (no PPEs). Workers attested to changing their clothing mostly three times in a week and washing their hands mostly after visiting the toilet. The findings were supported with a study by Abiayi et al. [24] who observed that animals are being slaughtered on unclean open slabs, and this is usually carried out by butchers who use little or no protective wears in abattoirs with poor drainage systems, water supply and waste disposal system.

The findings showed that cleaning was done daily basis majorly with water as the cleaning agent. The water only was not encouraging despite the frequency of cleaning and at the same time, there was no employed cleaner in one abattoir.

It was also noticed that few of the workers make use of protective overall, safety boots, hand gloves and nose mask as personal protective equipment. The idea was correspond to research finding by Agu et al. [2], hygiene practices in abattoir and slaughter slab; determinants and assessment of abattoir and slaughter slab facilities in Abakaliki, Ebonyi state where majority of the abattoir workers were found to be on apron (protective overall). However, observation by the researcher contradicted the rate of use of PPEs as was claimed by the respondents; only 5% of the workers were seen on PPEs.

The lack of hand washing station with soap and water contributes to public health challenge as most of the workers were seen eating and smoking with dirty hands, and this can lead to oral transmission of zoonotic diseases and Cook et al. [23] made similar finding in Western Kenya.

From the result, it was observed that majority were ignorant of the fact that their cloths can serve as a breeding ground for microorganisms if infrequently washed, this indicates the need for more education of abattoir worker to prevent disease outbreak associated with this poor hygiene.

Major wastes generated were horns and bones, blood and offal, and intestinal contents and faeces. It was reported that frequency of waste disposal was monthly. While liquid effluents were mostly channeled to water bodies and to nearby drainage systems, solid wastes were usually dumped on the land (43.6%). This further strengthens the finding by Agu et al. [2] that showed that open dumping was the commonest waste disposal method employed by the abattoir in Ebonyi state, south-eastern Nigeria. A similar problem was reported in Saudi Arabia [25] and in Ghana [26], where the abattoir waste is usually disposed of in the waste yards

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without any pretreatment as well as recovery of energy. Some of the areas pointed out by the workers that requires improvement were cold room, toilet facilities, sanitation and taxations (100%). According to Akporhuarho et al. [27], who reported that abattoir workers are faced with numerous challenges, ranging from inadequate finance, poor infrastructure and basic amenities, poor sanitation, inadequate number of abattoirs, and lack of government support etc.

V. CONCLUSION

The findings of this study on abattoirs and slaughterhouses in Anambra State reveals significant deficiencies in both facilities and hygiene practices. This is evident in the low index rate for sanitary practices and facilitates availability, making it a public health issue requiring urgent attention to prevent potential outbreak of food-borne diseases as the focus of public health is prevention.

RECOMMENDATIONS

➢ *Based on the Findings of the Study, it is Important to make the Following Recommendations;*

- All the abattoir workers should be given health education on abattoir and slaughter house sanitation.
- There is need to organize workshops and seminars periodically for all the categories of abattoir workers by health educators to enlighten them on hazards associated with their workplace.
- Environmental health officers should show strong commitment inspecting abattoir and slaughter premises.
- Efforts should be made by management to provide adequate protective devices and training needed for the safety of abattoir workers so that optimum performance will be ensured.

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➢ *Conflict of Interest*

All authors of this article report no conflicts of interest throughout the work.

➢ *Data Availability*

The datasets used and /or analysed during the current study are available from the corresponding author on reasonable request.

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Every author contributed in different form such as collection of data, analysis of data, type setting and reviewing the manuscript while the lead author organized for the conduct of the study.

REFERENCES

[1]. Adeolu A.T., Opasola A.O., Salami O.O., Iyanda A.Y., Omenta R.C. Sanitary status and compliance with the standard slaughter practices in Karu abattoir Abuja municipal area council of the FCT, Nigeria. *International Journal of Current Innovations in Advanced Research,* 2019; *2*(2):1-14.

[2]. Agu AP, Onah CK, Umeokonkwo CD, Nnabu RC, Una AFI. Hygiene practices in abattoir and slaughter slab, determinants and assessment of abattoir and slaughter slab facilities in Abakaliki, Ebonyi State South- East Nigeria. *Afr Health Sci*. 2021; 21(4):1914-1923.

[3]. Olawuyi KA, Enitan SS, Akele RY, Junaid SA, Abdullahi IN, Avwioro GO, Itodo GE, *et al.*. A review on the state of abattoirs in Nigeria during COVID-19 pandemic era: Potential threats and public health interventions. *Journal of Public Health and Diseases 2020; 3*(6): 105-118.

[4]. Ikpe, R. T., Agbendeh, N. L., & Akinsuyi, O. S. Prevalence study of zoonotic gastrointestinal parasitic infections in goats in Makurdi Metropolis, Nigeria. *Journal of Zoonotic Diseases*, 2022*; 6*(1), 11-16.

[5]. EHCON. Environmental hazard and health risks associated with slaughterhouses in Ibadan, Nigeria. Environmental Hazards. 2020. https://doi.org/10.1080/17477891.

[6]. Nandita D, Badaru O. Ayobami and Adekeye B. T., Microbiological Assessment of Agege Abattoir Situated in Lagos State, Nigeria. J*ournal of Environmental Science, Toxicology and Food Technology*. 2015; 9: 86-93.

[7]. Kalio, G. and Ali-Uchechukwu, A. Assessment of abattoirs operations and hygiene practices in obio-akpor local government area, rivers state, Nigeria. *Nigerian Journal of Animal Production*, 2020; 46(3), 73-81. https://doi.org/10.51791/njap.v46i3.858

[8]. Daily Trust (2019)."The sorry state of Anambra abattoirs". Available at: *https://dailytrust.com/the-sorry-state- of-anambra-abattoirs.*

[9]. Kaltungo BY. Sero-prevalence and risk factors for Brucella melitensis in camels in two Local Government Areas of Katsina State, Nigeria'. Project submitted to College of Veterinary Surgeons Nigeria for the award of Fellow, College of Veterinary surgeons Nigeria, 2018; pp 1–56.

[10]. Isiaka H.A., Campbell C., Ademola T.G. Effect of Abattoir Effluent on surrounding underground water quality: A Case Study of governor road abattoir at Ikotun, Lagos state. *International Journal Of Advances In Pharmacy, Biology And Chemistry; Ijapbc,* 2014; *3*(4), 2277 – 4688

[11]. Barter, H. C. Slaughterhouse Rules: Declining Abattoirs and the Politics of Food Safety Regulation in Ontario. University of Toronto. 2014.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25mar201

[12]. Richard OG, Okolocha EC, Odinya AV, Paul MP, Audu DF, Dzikwi AA. Public health risk of abattoir operation in Zango Abattoir Zaria, Kaduna State Nigeria. *Annual Research and Review in Biology.* 2015; *5*(2):139-146.

[13]. Alhaji NB, Baiwa M. Factors affecting workers' delivery of good hygienic and sanitary operations in slaughterhouses in north-central Nigeria. *Sokoto Journal of Veterinary Sciences* 2015; *13*(1):29-37.

[14]. Obidiegwu C. S, Chineke H. N, Ubajaka C. N, Adogu P.O.U. Public Health Challenges in Somachi Main Abattoir Owerri, Nigeria: A Review and Field Activity Report". *EJMED, European Journal of Medical and Health Sciences;* 2019. DOI: http://dx.doi.org/10.24018/ejmed.2019.1.2.34

[15]. Oruonye E.D. Challenges of abattoir waste management in Jalingo metropolis, Nigeria. *International Journal of Research in Geography*, 2015; 1(2):22-31. ISSN 2454-8685

[16]. Sirma, A., Muthuma, E., Kariuki, J., Maina, A., Thaiya, J., & Njagi, O. Using a value chain framework for food safety assessment of edible offals in nairobi, kenya. Frontiers in Sustainable Food Systems, 2023. https://doi.org/10.3389/fsufs.2023.1059058

[17]. Lawrence O.M., Solomon A.O., Kayode A.O., Opeolu O.S., Christiana K.S., & Oseremi A.F. Abattoirs: The Hidden Sources of Plants' Heavy Metals and Other Pollutants in Lagos, Nigeria. Intech Open. 2023. doi: 10.5772/intechopen.110339

[18]. Fearon J., Mensah S.B., Boateng V. Abattoir operations, waste generation and management in the Tamale metropolis: Case study of the Tamale slaughterhouse. *Journal of Public Health and Epidemiology,* 2014; 6(1): 14-19. https://doi.org/10.5897/JPHE2013.0574

[19]. Hassan I, Campbell C, Ademola T.G. Effect of Abattoir Effluent on surrounding underground water quality: A Case Study of governor road abattoir at Ikotun, Lagos state. *International Journal of Advances In Pharmacy, Biology And Chemistry; Ijapbc* – 2014, *3*(4), ISSN: 2277 – 4688.

[20]. Birhanu, A. Meat, E. (2020). Pre-slaughter stress, management of stress and its effect on meat and carcass quality. International Journal of Food Science and Agriculture, 2020; 4(1),30-37. https://doi.org/10.26855/ijfsa.2020.03.006 britannica.com.

[21]. Spickler, A. R. Transmission of Zoonoses between Animals and People. Merck and the Merck Veterinary Manual. Merck and Co. NJ, USA. 2019. (https://www.merckvetmanual.com/publichealth.

[22]. Cook, EAJ., De Glanville, W. A., Thomas, L. F., Kariuki, S., De Clare Bronsvoort, B. M., & Fèvre, E. M. Working conditions and public health risks in slaughterhouses in western Kenya. BMC Public Health, 2017; 17(1). https://doi.org/10.1186/s12889-016-3923-y

[23]. Alhaji NB, Baiwa M. Factors affecting workers' delivery of good hygienic and sanitary operations in slaughterhouses in north-central Nigeria. *Sokoto Journal of Veterinary Sciences* 2015; *13*(1):29-37

[24]. Alkoaik, F. N. Integrating aeration and rotation processes to accelerate composting of agricultural residues. *PloS One*, 2019; 14(7), e0220343. https://doi.org/10.1371/journal.pone.

[25]. Fearon J., Mensah S.B., Boateng V. (2014) Abattoir operations, waste generation and management in the Tamale metropolis: Case study of the Tamale slaughterhouse. *Journal of Public Health and Epidemiology, 2014;* 6(1): 14-19. https://doi.org/10.5897/JPHE2013.0574

[26]. Akporhuarho, P. O., & Achoja, F. O. (2014). Abattoir agribusiness: the case of beef processing and marketing for rural development in Delta State, Nigeria. *Spanish Journal of Rural Development*, 5(2), 93