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WASTE, ENVIRONMENTAL AND DISEASE MANAGEMENT CHALLENGES IN SMALL-SCALE PIG FARMS IN EASTERN ZONE OF IMO STATE, SOUTHEASTERN NIGERIA

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ABSTRACT
This study evaluated waste, environmental, and disease management challenges in small-scale pig farms in eastern zone of Imo State, Southeastern Nigeria. Primary data generated through structured questionnaires from 32 farmers, made up of 17 from Owerri West Local Government Area (OWL), and 15 from Aboh-Mbaise LGA (AML) were used for the study. Most of the farmers (46.88%) practiced open burning of the pig wastes, while other disposed of them at dump sites (37.50%), or farm lands and sales as fertilizer (21.88% each), and other uses (28.13%). The major environmental challenges were air pollution (43.75%), land degradation (12.50%), and conflict with neighbors (6.25%). The major diseases, and clinical signs encountered were diarrhea, worm infestation, and foot rot (78.13 – 96.88%), trypanosomosis (50.00%), mange and mites (46.88%), swine fever (40.63%), bacterial and respiratory infections (34.38% each). The common drugs used in managing disease conditions included ivermectin (96.88%), iron dextran (96.88%), vitamin, and antibiotics injections (87.50% each), and trypanosides among others. There is the need to train the farmers on simple waste management approaches that will help to mitigate the environmental and health problems encountered in the farms
Keywords: Pig farming, waste management, diseases, drugs

INTRODUCTION
Commercial intensive pig production in the hot humid tropical rainforest zone of southeastern Nigeria is constrained by recurrent feed deficits, environmental management challenges arising from poor handling of wastes, and high incidence of endemic diseases (Ohanaka *et al.,* 2017; Moses *et al.,* 2020). The waste management challenges have been linked to the feeding of cheap and highly fibrous materials to the animals in order to reduce the feeding costs (Ohanaka *et al.,* 2017), resulting in the generation of large quantities of dung (Edo *et al.,* 2021a), which are poorly managed because the farmers lack the appropriate technologies and expertise on waste management (Ume *et al.,* 2018; Edo *et al.,* 2021a).
Such a production environment has elicited several pollutions, and public health concerns from the general public, especially from people residing close to these farms, leading to several cases of protests, litigations, and shutdown of farms (Kadurumba *et al.,* 2019; Edo *et al.,* 2021b). Disease incidences among the pig populations in southeastern Nigeria, especially piglet diarrhea, helminthiasis and ectoparasitism have also been reported to be high, and may be linked to the poor farming environment (Nwanta *et al.,* 2011). There is therefore the need for continual evaluation of these production constraints in order to understand the farmer's predicaments, and the initiation of policies that will mitigate these challenges. This study evaluated waste, environmental, and disease management challenges in small-scale pig farms in Eastern Zone of Imo State, Southeastern Nigeria.

MATERIALS AND METHOD
The study was carried out in pig farms at Owerri West Local Government Area (OWL), a peri-urban environment, and Aboh-Mbaise Local Government Area (AML), a rural environment in Imo State. The state is situated in the southeast agro-ecological zone of Nigeria, within latitude 5^0 and 6^0 3' N, and longitude 6^0 15' and 7^0 35' E, and dominated by plains 200 meters above sea level (Ofomata, 1975). The climate is tropical rainforest, and has been described severally. Pigs are reared mostly in small-scale intensive farms, and has gained popularity in recent years due to the availability of relatively cheap palm kernel cake from palm oil processing factories in the zone (Ume *et al.,* 2018; Edo *et al.,* 2021a). The study locations were selected purposively based on the intensity of pig production in the LGAs. At these locations, 25 pig farms each were purposively selected based on the willingness of their owners to participate in the study, and having at least 10 pigs in the farm as at the

time of the study. Primary data were collected on the waste, and disease management activities in the farms using structured questionnaires. On the whole, only 32 of the 50 questionnaires were retrieved (17 at OWL, and 15 at AML). Data generated were subjected to descriptive statistics such as frequency counts, means and percentages.

RESULTS AND DISCUSSION

Table 1 highlighted the waste management practices, and environmental challenges encountered in the pig farms. Most of the farmers utilized several options in managing the wastes generated in their farms. For example, 46.88% of the farmers practiced open burning of the pig wastes indicating that they could not be sold or absorbed as fertilizer by crop farmers. Other options available to the farmers included disposal at dump sites (37.50%), disposal on farm lands, and sales as fertilizer (21.88% each), and other uses (28.13%). Edo *et al.* (2021a), and Ewuziem (2021) in their recent studies of pig farms in Imo State also reported that most farmers practices open dumping of pig wastes. The major environmental challenges encountered included air pollution (43.75%), land degradation (12.50%), and conflict with neighbors (6.25%). Interestingly, 53.81% of the farmers claimed that they have no environmental challenges, possibly because of the location of their farms away from residential areas. Edo *et al.* (2021b), and Kadurumba *et al.* (2019) reported similar in Imo and Rivers states respectively, indicating that the major environmental challenge to pig farming in southern Nigeria is air pollution that usually elicits complaints from neighbors.

Table 1: Waste management practices and environmental challenges in the pig farms

Parameters	Owerri West (n=17) Frequency (%)	Aboh-Mbaise (n=15) Frequency (%)	Overall mean (n=32) Frequency (%)
Waste disposal methods			
Disposed at dump sites	5 (29.41)	7 (46.67)	12 (37.50)
Disposed in farmlands	5 (29.41)	2 (13.33)	7 (21.88)
Disposed in streams	—	—	—
Sold as fertilizer	3 (17.65)	4 (26.67)	7 (21.88)
Gathered and burnt	7 (41.18)	8 (53.33)	15 (46.88)
Others	3 (17.65)	6 (40.00)	9 (28.13)
Environmental challenges			
Air pollution	12 (70.59)	2 (13.33)	14 (43.75)
Conflict with neighbors	2 (11.77)	—	2 (6.25)
Litigation by neighbors	1 (5.88)	—	1 (3.13)
Pollution of water bodies	—	—	—
Degradation of land	4 (23.53)	—	4 (12.50)
Extremes of temperature	1 (5.88)	—	1 (3.13)
Others	2 (11.77)	—	2 (6.25)
None	4 (23.53)	13 (86.67)	17 (53.13)

Table 2 showed disease conditions, and clinical signs associated with pig production in Imo state. The results showed 75.00% of the farmers affirmed that diseases are major constraints to pig production in the study area. It is however strange that 81.25% of these farmers did not consult Veterinary service providers for the disease problems. This could be attributed to the low income level of pig farmers, which has been shown to influence the demand for such services by farmers (Bassey *et al.,* 2018). The major disease, and clinical signs encountered by the farmers included diarrhea, worm infestation, and foot rot (78.13 – 96.88%), which are conditions predisposed by unhygienic farming environment. Other conditions such as trypanosomosis (50.00%), mange and

mite infestation (46.88%), and swine fever (40.63%) also recorded moderate incidence rates, while bacterial, and respiratory infections recorded similar 34.38% each. It is of interest that while all the farms at the rural location (Abo-Mbaise LGA) reported cases of trypanosomosis, only one farm recorded such at the peri-urban center (Owerri West LGA). This results collaborates the earlier report by Okoli (2003) of trypanosomosis recording high prevalence among livestock populations presented for treatment at the Imo state veterinary clinics. The overall disease picture for the state agrees with the reports of Nwanta *et al.* (2011), and Edo *et al.* (2021a) that disease burden is a major constraint to profitable pig production in the state and Nigeria.

Table 2: Incidence of pig diseases in the farm and drug use habits of farmers

Parameters	Owerri West (n=17) Frequency (%)	Aboh-Mbaise (n=15) Frequency (%)	Overall mean (n=32) Frequency (%)
Disease problems			
Yes	13 (76.47)	11 (73.33)	24 (75.00)
No	—	—	—
Maybe	4 (23.53)	4 (26.67)	8 (25.00)
Vet. consultation			
Yes	6 (35.29)	—	6 (18.75)
No	11 (64.71)	15 (100.00)	26 (81.25)
Pig diseases/symptoms			
Diarrhea	15 (88.24)	15 (100.00)	30 (93.75)
Foot rot	13 (76.47)	12 (80.00)	25 (78.13)
Mange	9 (52.94)	6 (40.00)	15 (46.88)
Trypanosomiasis	1 (5.88)	15 (100.00)	16 (50.00)
Worms	16 (94.12)	15 (100.00)	31 (96.88)
Respiratory infections	8 (47.06)	3 (20.00)	11 (34.38)
Bacterial infections	9 (52.94)	2 (13.33)	11 (34.38)
Swine fever	10 (58.82)	3 (20.00)	13 (40.63)
Others	1 (5.88)	—	1 (3.13)
Commonly used drugs			
Ivermectin	17 (100.00)	14 (93.33)	31 (96.88)
Iron dextran	16 (94.12)	15 (100.00)	31 (96.88)
Vitamin	13 (76.47)	15 (100.00)	28 (87.50)
Long acting antibiotics	15 (88.24)	13 (86.67)	28 (87.50)
Tylosin	10 (58.82)	2 (13.33)	12 (37.50)
Trypanocides	—	9 (60.00)	9 (28.13)
Ethno-vet. practices			
Yes	5 (29.41)	5 (33.33)	10 (31.25)
No	12 (70.59)	10 (66.67)	22 (68.75)

The common drugs used by the pig farmers to manage the disease conditions included ivermectin (96.88%) used probably to manage the worm, and mange infestations, iron dextran (96.88%), and vitamin injections (87.50% each), used as preventive, and anti-stress medications, and the long acting antibiotic injections for the treatment of the bacterial, and respiratory infections. It is expected that the trypanocides were used solely at Aboh-Mbaise LGA since the incidence of trypanosomosis was restricted to that location. Only 31.25% of the farmers use ethno-veterinary preparations in disease treatment, indicating a dependence on modern veterinary drug by the

farmers. This may be linked to the educational qualifications of the farmers, which was reported earlier by Moses *et al.* (2020) to be high.

CONCLUSION AND RECOMMENDATIONS

The results of this study shows that pig farmers in Imo state are challenged by poor production environment, which may be responsible for the high incidence of worm infestation, diarrhea, foot rot, bacterial and respiratory diseases in the farms. There is therefore, the need for the training of the farmers on simple waste management approaches that will help to mitigate these challenges.

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