

**Pre-weaning mortality of piglets in Abia Central, Abia State, Nigeria:
Causes, risk factors, economic impacts and determinants**

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Abstract

Pig production is one of the major livestock businesses in Abia State, Nigeria, and pre-weaning mortality (PWM) is a constraint to profitable pig production. The present study evaluated the occurrence, causes, risk factors, determinants and economic impacts of pre-weaning mortality among pig farms in Abia Central, Abia State, Nigeria. Data were collected from 56 purposively selected pig farms in the surveyed area, through farm visits, record reviews, interviews and structured questionnaires designed to capture information on mortality patterns and management practices. A total of 144 sows and 792 piglets were evaluated during the 20 week study period. Feed samples were analyzed for proximate composition, and both sows and piglets were weighed at set intervals. Bacteriological evaluations were done on dead piglets. Results showed that the mean litter size, piglet birth weight and daily weight gain were 6.46 ± 0.49 , 1.09 ± 0.17 kg, and 0.96 ± 0.21 kg, respectively. A total of 181 piglets died within their first week of life, with 64.2% of deaths occurring within the first five days. The overall percentage neonatal mortality in the farms surveyed was 47.2%. Higher PWM was recorded during the rainy season (96.4%), when compared to the dry season (3.6%). The leading causes of mortality were diarrhoea/scouring (26.7%), crushing (23.2%) and hypoglycemia (12.5%). Other causes included cannibalism (10.7%), failure to suck (8.9%), congenital abnormalities (8.9%) and other factors (8.9%). The predominant bacterial organisms associated with PWM in the study area were *Salmonella* spp (37.5%), *Eschericia coli* (29.2%) and *Klebsiella* spp (12.5%). The average economic loss per farm attributable to PWM was ₦96,964.29 (64.64 USD). The contributing factors to PWN in the study area included failure to consult veterinarians during ill health of pigs, lack of regular cleaning and disinfection of farrowing pens, nutritional deficiencies, poor knowledge of herd health and limited farming experience. Strengthening of veterinary extension services and herd health interventions, and improvements of feed quality and management of the piggeries in the area surveyed was recommended to reduce neonatal mortality, enhance productivity and increase profitability of pig farming in the area.

Keywords: Pig production; Pre-weaning mortality; Occurrence; Causes; Determinants; Abia Central Area; Abia State Nigeria.

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Introduction

Pig production plays a crucial role in national development by providing animal protein and generating income for farmers. Raising pigs have advantages over other livestock in terms of their rapid growth rate, short reproductive cycle, high reproductive performance and their ability to convert a wide range of feed materials into valuable products including pork, skin, hair and manure, which makes it more economically viable than many other livestock enterprises (Alionye *et al.*, 2020). Furthermore, pigs contribute substantially to global production of meat and agro-industrial by-products, while their high-quality meat and manure play important roles in addressing protein deficiency and promoting sustainable agricultural systems (Ogunniyi and Omoteso, 2011). Despite its potential capacity to reduce the animal protein deficit in developing countries, pig production in sub-Saharan Africa faces major constraints such as inadequate management practices, limited feed resources and disease outbreaks (Boluwaji *et al.*, 2024).

Pre-weaning mortality (PWM) in piglets, defined as deaths between birth and weaning, remains a significant constraint to global swine production. Reported rates of PWM range from 10 – 20% in commercial piggeries, but may exceed 30% in smallholder farms, accounting for substantial economic losses, reduced productivity and welfare concerns (Baxter *et al.*, 2009; Muns *et al.*, 2016). The main reported causes of PWM include low birth weight, hypothermia, starvation, crushing by the sow, poor colostrum intake and infectious diseases, all of which are influenced by sow parity, litter size and management practices (Quesnel *et al.*, 2008).

Information on the causes of pre-weaning mortality in pigs is scarce in the Abia Central Area, Abia State Nigeria and across the sub-Saharan tropics, a gap that has negatively impacted on pig production in the region. Understanding the factors associated with

PWM is crucial for improving piglet survival and pig farm profitability. This study investigated the occurrence of and risk factors associated with pre-weaning mortality in piglets in Abia Central Area, Abia State Nigeria.

Materials and Methods

Study Location: The study was done in Abia Central Area of Abia State, Nigeria. Abia State is located in the South-Eastern region of Nigeria. Abia Central belongs to Umuahia Agricultural zone of Abia State, Nigeria (Figure 1). It lies between latitudes of 4^o40' and 6^o14' North of the Equator and longitudes 7^o10' and 8^o 10' East of the Greenwich Meridian. It had a population density of 655.6 persons per square kilometre and a population of 4,143,100 persons in year in 2022 (National Population Commission, 2022) and occupies an area of about 6,329 km² with about 1.9 percent of the country's population. It has an average population density of 364 persons per square kilometre with 63% of the people involved in agricultural production.

Sampling Technique: A multi-stage and purposive sampling procedure was used in this study. The first stage involved the purposive selection of Umuahia Agricultural Zone out of the three Agricultural zones in Abia State, based on population of pig farms in the zone. In the second stage, three Local Government Areas (LGAs) were purposively selected from Umuahia Agricultural Zones namely, Umuahia South, Umuahia North and Ikwuano LGAs. In the third stage, two communities was randomly selected from the three LGAs, making it a total of six communities while in the fourth stage, ten pig farms that were willing to participate in the study were randomly selected from each of the selected community, making a total of 60 pig farms for the study.

Study Duration and Animal Population: The study was conducted over a period of four

months and involved a total of 144 farrowing sows and 792 piglets from 56 of the selected pig farms.

Data Collection: Structured questionnaires, available farm records and oral interviews were used to obtain data covering farms' socio-economic characteristics, reproductive performance of sows, piglet mortality details, and herd health management techniques, diseases and biosecurity management. During each farm visit, information regarding the date of mating and expected farrowing date was recorded. Physical assessments were carried out to evaluate farm structures, availability of basic facilities, herd composition, and the types of feed used to feed the pigs. Data on performance parameters such as live weight of gestating and lactating sows, piglet birth weight and litter size were obtained from the selected pig farms via weekly or biweekly farm visits conducted by trained technicians.

Measurement of Sow and Piglet Weights: Live weights of pregnant sows were measured

using a weigh band (Farmer's Boy®; Dalton Supplies Limited, Oxon, England) on day 90 of gestation, at farrowing, and on days three and seven post-partum. Piglets were individually weighed using a weighing balance (Avery, England) on days one, three, and seven after birth to monitor early growth and survival performance.

Determination of Composition of Feed Samples: Feed samples were randomly collected from 15 out of the 56 farms and analyzed for their proximate contents at the Laboratory of the Department of Veterinary Biochemistry and Animal Production, College of Veterinary Medicine Michael Okpara University of Agriculture, Umudike. The analysis was carried out according to the methods of Association of Analytical Chemists (AOAC, 1990). Their carbohydrate, crude protein, ash, ether extract, crude fibre, nitrogen, moisture and dry matter contents and metabolizable energy were determined following standard procedures.

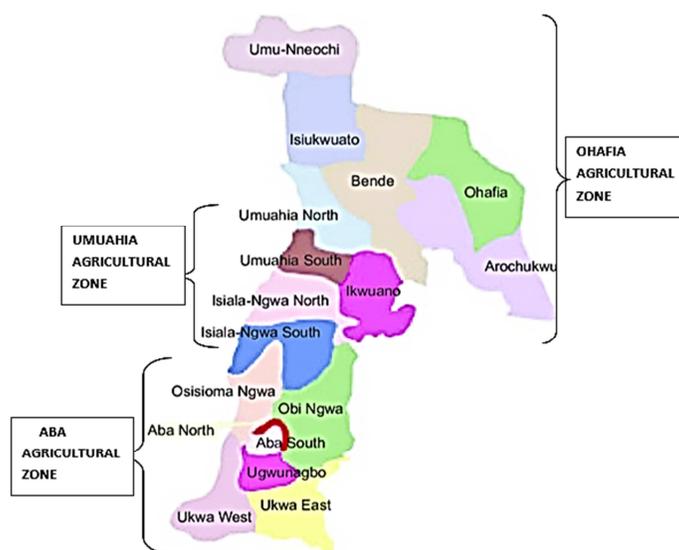


Figure 1: Map of Abia State, Nigeria showing the various Agricultural Zones: the study was done in Umuahia Agricultural zones composed of Umuahia South, Umuahia North, Ikwuano, Isiala Ngwa North and Isiala Ngwa South Local Government Areas in Abia Central. Source: National Population Commission (2010).

Bacteriological Examination: Rectal swab samples were collected from the piglets that died within seven days of birth across the farms. Each sample was properly labeled and recorded. The possible microbial causes of death were determined by bacteriological culture and identification, using standard methods.

Data Analysis: Data obtained in the study were subjected to descriptive statistics. Statistical Package for Social Sciences (SPSS) version 22 was the software package used for the data analysis. Percentage pre-weaning mortality was calculated, by dividing the average number of neonatal piglets that died with the average number of live born piglets, multiplied by 100. Multiple regression analysis was used to determine the variables significantly affecting pre-weaning mortality rates, using the stepwise method.

Results

Farm and socioeconomic characteristics of the respondents: The socioeconomic characteristics of pig farmers in the study area are presented in Table 1. The majority of respondents were males (83.9%) with a mean age of 44 ± 1.02 years. With regards to their educational qualifications, 46.4% of the respondents had secondary school education, 37.5% had tertiary education, and 16.1% had only primary education. Most respondents (66.1%) were married, with an average farming experience of eight years. In terms of occupation, 57.1% combined pig farming with other income-generating activities, while 30.4% practiced it as their primary occupation. Labour utilization varied, as 51.8% employed hired labour (73.3% male), whereas 48.2% relied on family labour (Table 1).

The distribution of pig farms by herd size is presented in Table 2. Most of the farms surveyed (51.8%) kept between 1 and 50 pigs; these were categorized as small-scale enterprises. Medium-scale enterprise farms

constituted 26.8% (51–100 pigs) and 10.7% (101–150 pigs), while another 10.7% of farms with more than 150 pigs were categorized as large-scale enterprise farms (Table 2).

With respect to breed composition, most farms (82.1%) reared crossbred pigs, while farms keeping local and exotic breeds exclusively accounted for 12.5% and 5.4%, respectively (Table 2).

Reproductive performance of herd: The reproductive performance parameters of sows in the study area are summarized in Table 3. The mean number of farrowing per sow per year was 2.00 ± 0.49 , with an average litter size of 6.46 ± 0.57 and mean live-born piglets per litter of 6.84 ± 0.44 . The mean number of neonatal deaths per litter was 3.23 ± 1.17 , while the average number of piglets surviving the neonatal period was 6.14 ± 1.35 . The overall neonatal piglet mortality rate in the study area was 47.22%. Mean litter weight at birth and mean daily litter weight gain were 1.08 ± 0.17 kg and 0.96 ± 0.21 kg, respectively. The average dam weight at term was 141.00 ± 39.63 kg (Table 3).

Causes, age, period and season of neonatal piglet mortality: The major causes of neonatal piglet deaths as identified by the pig farmers surveyed were diarrhoea and scouring (26.7%), followed by crushing by the dam (23.2%) and hypoglycaemia (12.5%) [Table 4]. Other recorded causes included cannibalism (10.7%), failure to suckle (8.9%), congenital abnormalities (8.9%), and unknown factors (8.9%) [Table 4].

Most neonatal deaths (57.1%) occurred between 1 and 3 days after birth, while 32.1% occurred within the first 24 hours (Table 4). Overall, 92.9% of neonatal deaths occurred post-farrowing (Table 4). Seasonal distribution indicated that 96.4% of the deaths were recorded during the rainy season, compared to only 3.6% during the dry season (Table 4).

Table 1. Demographic and socioeconomic characteristics of respondents in the questionnaire used to collect information on pre-weaning mortality of piglets in Abia Central Abia State, Nigeria.

Variables	Categories	Frequency (n = 56)	Percentages (%)	Mean (where applicable)
Gender of pig farm owner	Male	47	83.9%	
	Female	9	16.1%	
Age of respondents (years)	16 – 25	0	0.0%	44.43 ± 1.02
	26 – 35	10	17.9%	
	36 – 45	26	46.4%	
	46 – 55	8	14.3%	
	> 55	12	21.4%	
Level of Education of pig farm owner	No formal education	0	0%	
	Primary education	9	16.1%	
	Secondary education	26	46.4%	
	Tertiary education	21	37.5%	
Marital status of pig farm owner	Single	11	19.6%	
	Married	37	66.1%	
	Widower	8	14.3%	
Years of experience of pig farm owners	1-5 years	20	35.7%	8.27±0.99
	6-10 years	19	33.9%	
	11-15 years	11	19.6%	
	> 15 years	6	10.7%	
Occupation of pig farm owners	Pig farming only	17	30.4%	
	Pig farming & business	32	57.1%	
	Pig farming & public service	7	12.5%	
Source of labour	Family labour	27	48.2%	
	Hired labour	29	51.8%	
Sex of hired labourer	Male	22	73.3%	
	Both sexes	8	26.7%	

Table 2. Farm characteristics of piggeries surveyed on pre-weaning mortality of piglets in Abia Central Abia State, Nigeria.

Variables	Categories	Frequency	Percentages
Herd size	1 – 50 pigs	29	51.8%
	51 – 100 pigs	15	26.8%
	101 – 150 pigs	6	10.7%
	> 150 pigs	6	10.7%
Pig breeds by number of farms	Exotic breeds	3	5.4%
	Local breeds	7	12.5%
	Crosses	46	82.1%

Table 3. Reproductive performance of pig herds surveyed for pre-weaning mortality of piglets in Abia Central Abia State, Nigeria.

Parameters	Mean ± SD (where applicable)
Average number of farrowing/sow/year.	2.00 ± 0.49
Average litter size.	6.46 ± 0.57
Average number of live-born piglets/litter.	6.84 ± 0.44
Average number of neonatal piglets dead/litter	3.23 ± 1.17
Average number of piglets surviving neonatal period/litter.	6.14 ± 1.35
Average piglet weight at birth (kg)	1.09 ± 0.17
Average piglet weight gain at day 7 (kg)	0.96 ± 0.21
Average sow weight at term (kg)	141.00 ± 39.63
Total number of deaths	181

Assessment of Herd Health Management Management/Biosecurity Practice: Results of the survey of herd health management and biosecurity practices in the pig farms are presented in Table 5. Only a very small percentage (1.8%) of the farms involved in the study conducted post-mortem examinations on dead piglets, while the majority (98.2%) did not. Approximately about half of the farms (48.2%) consulted a veterinary officer when animals were sick. Most farms (60.7%)

maintained farm records, and 85.7% of respondents demonstrated some knowledge of herd health. Additionally, 53.6% of farmers were aware of fattening and farrowing pen management, while 71.4% and 80.4% practiced creep feeding and administered iron dextran to piglets, respectively.

Only a small proportion of farms (14.3%) had isolation pens, and none provided supplemental heat sources for piglets after

birth. With regard to quarantine measures, 42.9% of farms practiced strict quarantine when introducing new stock, whereas 64.3% carried out regular cleaning and disinfection of farrowing pens. Furthermore, 85.7% of respondents reported the occurrence of common diseases affecting neonatal piglets on their farms.

Occurrence of bacterial diseases in the pig farms: The following bacterial organisms were recorded to be associated with diseases in the pig farms surveyed: *Salmonella* spp was the most common disease causing bacteria (37.5%), followed by *Escherichia coli* (29.2%) and *Klebsiella* spp (12.5%), *Shigella* spp and *Streptococcus* spp were (8.3%), while *Staphylococcus aureus* (4.2%) was found to be the least prevalent (Figure 2).

Table 4. Causes, age, period and season of pre-weaning mortality of piglets in Abia Central Abia State, Nigeria.

Variables	Categories	Frequency	Percentages
Causes of death of neonatal piglets.	Crushing	13	23.2%
	Hypoglycemia	7	12.5%
	Failure to suck	5	8.9%
	Congenital abnormalities	5	8.9%
	Cannibalism	6	10.7%
	Diarrhoea/scouring	15	26.7%
	Others	5	8.9%
Age at death of live-born piglets.	Within 24 hours	18	32.1%
	1-3 days	32	57.1%
	4-7 days	4	7.1%
	After one week	2	3.6%
Period of occurrence of perinatal mortality.	Death before farrowing	2	3.6%
	Death during farrowing	2	3.6%
	Death after farrowing	52	92.9%
Season of piglets' mortality.	Rainy season	54	96.4%
	Dry season	2	3.6%

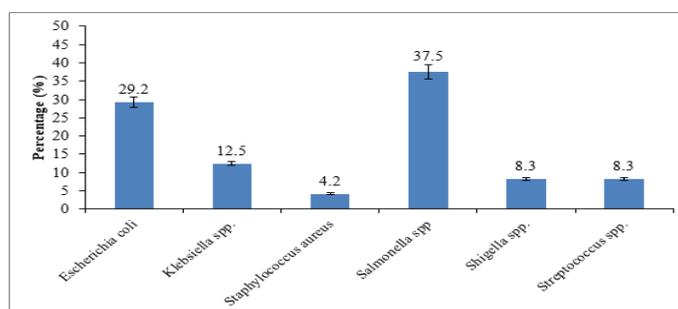


Figure 2. Bacterial organisms associated with diseases in the pig farms surveyed for pre-weaning mortality of piglets in Abia Central Abia State, Nigeria.

Table 5. Herd health, management and biosecurity practices in pig farms surveyed for pre-weaning mortality of piglets in Abia Central Abia State, Nigeria.

Variables	Categories	Frequency	Percentages
Post mortem examination conducted for dead piglets.	Yes	1	1.8%
	No	55	98.2%
Consult a veterinarian when animals are sick.	Yes	27	48.2%
	No	29	51.8%
Keep farm records.	Yes	34	60.7%
	No	22	39.3%
Have knowledge of herd health.	Yes	48	85.7%
	No	8	14.3%
Fattening /farrowing pen available.	Yes	30	53.6%
	No	26	46.4%
Practice creep feeding.	Yes	40	71.4%
	No	16	28.6%
Administer iron dextran to live-born piglets.	Yes	45	80.4%
	No	11	19.6%
Presence of isolation pen in the farm.	Yes	8	14.3%
	No	48	85.7%
Provision of heat sources for piglets after birth.	Yes	0	0%
	No	56	100%
Strict adherence to quarantine practice while introducing to the farm.	Yes	24	42.9%
	No	32	57.1%
Regular cleaning and disinfection routine for farrowing pen.	Yes	20	64.3%
	No	36	35.7%
Presence of common diseases affecting neonatal piglets on the farm.	Yes	48	85.7%
	No	8	14.3%

Economic losses due to neonatal pig mortality: A total of 181 piglets died across the surveyed farms. The average market price of a weaned piglet was ₦30,000 (20 USD). Consequently, the total economic loss due to piglet mortality was estimated at ₦5,430,000 (3,620 USD) with an average loss per farm of ₦96,964.29 (64.64 USD).

Composition of samples of pig feed surveyed: The proximate composition of pig feed samples collected from farms surveyed are presented in Table 6. The results revealed that the rations fed to the pigs were markedly deficient in energy, protein and other essential nutrients, but contained excessively high fibre levels. The high fibre content was likely due to

the large proportion of palm kernel cake (PKC) used in feed formulation. Observations further indicated that most farmers relied on self-compounded rations prepared from locally available ingredients such as PKC, brewer's spent grain, cassava peels and chips, bambara waste, kitchen waste, rice husk, and common salt.

Multiple regression analysis of variables affecting pre-weaning mortality rate in pig farms: Table 7 presents the results of the multiple regression analysis. The overall regression model was statistically significant ($F = 7.768$; $p < 0.001$). The coefficient of multiple determination (R^2) was 0.603, indicating that approximately 60.3% of the variation in neonatal piglet mortality rate in the study area

was explained by the independent variables, while the remaining 39.7% was attributable to random error or other factors not included in the model.

The findings further revealed that variables such as consulting a veterinarian when animals are sick, the farm owner's or attendant's knowledge of herd health, the presence of a farrowing pen, regular cleaning and disinfection of the farrowing pen, and the farmer's level of experience had significant effects in reducing neonatal piglet mortality. Conversely, factors such as the presence of an isolation pen and keeping farm records did not have significant effects on neonatal piglet mortality rates.

Table 6. Composition of pig feed samples in pig farms surveyed for pre-weaning mortality of piglets in Abia Central Abia State, Nigeria.

Nutrients, with units in brackets.	Composition
Crude protein (%)	4.27 ± 0.12
Metabolizable energy (kcal/kg)	1260.00 ± 38.00
Crude fibre (%)	43.62 ± 3.60
Ether extracts (%)	1.40 ± 0.90
Ash (%)	5.26 ± 1.30
Nitrogen (%)	35.63 ± 4.15
Moisture (%)	9.53 ± 0.98
Dry Matter (%)	90.42± 0.98

Table 7. Multiple regression analysis of variables affecting pre-weaning mortality of piglets in pig farms Abia Central Abia State, Nigeria.

Variables	Coefficient	Standard error	t value	P value
Constant	73.171	10.863	6.736	0.000*
Consult a Veterinarian	-8.473	3.673	-2.307	0.026*
Keeping farm records	-3.043	3.507	-0.868	0.390
Knowledge of herd health	-11.892	4.444	-2.676	0.010*
Presence of isolation pen	6.965	6.249	1.115	0.271
Presence of farrowing pen	-11.325	4.182	-2.708	0.009*
Regular cleaning and disinfection routine	-12.216	4.385	-2.786	0.008*
Farmer's experience	-12.901	4.676	-2.759	0.008*

Note: Dependent Variable: Neonatal Piglet Mortality; R Square = 0.603; Adjusted R Square = 0.526; F-value = 7.768; $p \leq 0.05$. *Significant

Discussion

The demographic indices recorded in the present study showed that pig farming in the study area is predominantly carried out by men (83.9%). This gender imbalance may be linked to the masculine labour needs and strenuous physically demanding nature of pig husbandry/farming and the higher economic returns associated with pig production compared to smallholder poultry system activities in which women and children commonly participate (Aleme *et al.*, 2018).

A large proportion of the respondents were married (66.1%). This may indicate that farmers rely on larger household sizes to support routine farm operations and other farm-related tasks. This observation aligns with reports of Jibowo (2012), who noted that most individuals engaged in pig production are mainly married adults. Ani (2015) further explains that marriage often correlates with household stability, suggesting that the high percentage of married respondents may contribute to better decision-making and management in pig enterprises.

The majority of pig farmers in this study were males in their mid-forties, with a mean age of 44.43 ± 1.02 years. This age group falls within the economically active population, implying that the farmers possess the physical capacity and mental alertness necessary for the intensive management practices required in pig production. This trend is consistent with reports by Uneze and Onugu (2012), who observed that males constituted 55.0% and 63.3% of pig producers in Abia and Anambra States, respectively. The relatively low participation of women may be due to the strenuous nature and high labour demands of commercial pig production.

The finding in the present study that all the respondents had some form of formal education agrees with earlier reports by Oluyole (2005), who emphasized that literacy enhances farmers' ability to adopt improved

technologies and management practices. While higher educational levels can positively influence farm productivity, there is still a need to integrate information on animal health into both formal and informal education systems, particularly at the primary level. This approach would support better dissemination of animal health knowledge nationwide.

This study recorded an average litter size of 6.46 ± 0.57 piglets in the study area. This figure is lower than the 8.1 reported in Northern Nigeria (Rekwot *et al.*, 2001), 9.8 documented in South-West Nigeria (Uko *et al.*, 1994), and 7.45 in Nsukka Nigeria (Abonyi *et al.*, 2012), and 8.72 in Lagos Nigeria (Eleazar *et al.*, 2021). When compared with values reported in developed countries, however, the average litter size observed in this study is considerably lower than the 15.8 in the Netherlands (Soede and Kamp, 2019), 14.8 in Denmark, and 11.5 in the United Kingdom (Rutherford *et al.*, 2013). The relatively smaller litter size in this study area may be attributed to both genetic and management-related factors. Notably, a large proportion of farmers (82.1%) relied on various crossbreeds for pig production. Such uncontrolled crossbreeding practices may, over time, result in the erosion of desirable traits, including litter size. The most critical management factor influencing litter size is reported to be nutrition (Dejan Škorjanc, 2025). Inadequate nutrition may reduce ovulation rates in sows and gilts and limit the survival of foetuses up to farrowing.

In contrast to the relatively higher productivity earlier reported, the smaller litter size and low birth weight observed in this study may be attributed to suboptimal management practices, poor feeding regimes and low genetic potential of the breeding stock. Moreover, the proximate composition of feed available to pigs in the study area was below the nutrient requirements recommended by

the National Research Council (1998), further supporting the possibility that nutritional inadequacy may have played a major role in the observed poor reproductive performance. Collectively, these comparisons underscore the urgent need for improved management practices, better nutrition, and selective breeding programs to enhance pig productivity in the region.

The predominance of *Salmonella* spp. and *Escherichia coli* as bacterial organisms responsible for diseases in the farms surveyed is of considerable concern, as these organisms have been widely implicated in neonatal and pre-weaning piglet mortality. *E. coli*, particularly enterotoxigenic strains, has been reported to cause neonatal diarrhea, dehydration and high mortality in piglets (Adeolu *et al.*, 2020). Similarly, *Salmonella* infections are associated with enteritis, septicemia, and growth retardation, all of which contribute significantly to pre-weaning losses (Bernad-Roche *et al.*, 2021).

The detection of *Klebsiella*, *Shigella*, and *Streptococcus* spp. further suggests the presence of opportunistic enteric pathogens that may exacerbate morbidity in piglets under unhygienic or stressful management conditions (Oluwayelu *et al.*, 2015). The low occurrence of *Staphylococcus aureus* observed in this study agrees with previous findings that, although *S. aureus* can cause localized infections and septicemia, it is less frequently associated with primary enteric disease in piglets (Oyekunle *et al.*, 2019).

Overall, the profile of bacterial organisms associated with diseases in the pig farms surveyed in this study underscores the multi-factorial nature of bacterial diseases causing agents associated with pre-weaning mortality in pigs, which is often driven by poor hygiene, inadequate colostrum intake, and reduced immunity (Nathues *et al.*, 2014). The high prevalence of *Salmonella* and *E. coli* therefore highlights the need for improved biosecurity,

sanitation, and preventive herd-health programmes to reduce neonatal losses in pig farms within Abia State, Nigeria.

The present study recorded a very high pre-weaning mortality rate of 47.2%, which is far above the levels commonly reported in other pig production systems. Previous studies have documented lower mortality rates, such as 17.75% in south-eastern Nigeria (Abonyi *et al.*, 2012), 40.2% in commercial pig farms in Lagos Nigeria (Eleazar *et al.*, 2021), and generally 10 – 25% under improved management conditions (Baxter *et al.*, 2009). The markedly higher mortality observed in the present study may be attributed to poor farrowing management, inadequate housing, insufficient colostrum intake, sow crushing, infectious diseases and limited veterinary intervention, which are common challenges in smallholder pig production systems in Nigeria. This finding highlights the need for improved sow nutrition, better piglet care practices, enhanced biosecurity, and routine veterinary support to reduce piglet losses and improve productivity in the study area.

The high piglet mortality rate recorded within the first two days after birth in this study (57.1%) agrees with previous reports across Nigeria. Pathiraja *et al.* (1987) observed a similar 50% mortality rate among smallholder pig farms in Zaria, while Ajala *et al.* (2007) and Adeola and Olorunlambe (2012) reported mortality levels ranging from 35% to 60% in Kaduna and Southwest Nigeria, respectively. These studies attributed high losses to poor farrowing management, inadequate veterinary care and unhygienic conditions. Comparable findings by Ogunleke *et al.* (2019) also showed a 52.3% pre-weaning mortality rate in Oyo State linked to poor herd health practices.

The economic loss estimated in this study (₦5,430,000 or \$3,620) is in line with earlier reports of Chima *et al.* (2020), who noted that piglet mortality caused significant financial

setbacks for smallholder farmers in South-Eastern Nigeria. Chiduwa *et al.* (2008) in Zimbabwe observed that pre-weaning mortality resulted in considerable income loss for pig producers, reducing overall farm profitability. Likewise, Adewole *et al.* (2019) reported that piglet pre-weaning mortality in Nigeria severely affects farmers' livelihoods due to the high replacement costs and reduced herd productivity. Similar economic constraints have been reported in Southeast Asia, where pre-weaning mortality was linked to inadequate management practices, poor housing, and limited veterinary access (Muns *et al.*, 2016). Chiduwa *et al.* (2008) in Zimbabwe observed that pre-weaning mortality resulted in considerable income loss for pig producers, reducing overall farm profitability. Likewise, Adewole *et al.* (2019) reported that piglet pre-weaning mortality in Nigeria severely affects farmers' livelihoods due to the high replacement costs and reduced herd productivity. Collectively, these findings confirm that neonatal piglet mortality remains a major constraint to profitable pig production, emphasizing the need for improved farrowing management, veterinary services, and farmer education.

The pig farmers' years of experience had a positive correlation with neonatal piglet mortality, meaning that an increase in the number of years of farmer's experience was associated with increase in the mean mortality of the pre-weaning piglets. This was not expected, because naturally, the more experienced a farmer is, the better he is able to reduce pre-weaning mortality in his farm.

Pig farming in Abia central is dominated by middle-aged, married men, reflecting a workforce capable of managing intensive pig production. High local demand for pork, with no cultural or religious barriers, supports regular livestock replacement and strong economic potential.

Strengthening of extension services and herd health interventions and improvement of feeding and management in the piggeries in the area surveyed is recommended, to reduce neonatal mortality, enhance productivity, and increase profitability for pig farmers in the area.

Conflict of interest

We declare no conflict of interest.

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