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EFFECT OF SANITARY RISKS ON THE LEVEL OF PIG PRODUCTION IN NSUKKA LOCAL GOVERNMENT AREA OF ENUGU STATE, NIGERIA

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Abstract
The study examined the effect of sanitary risks on the level of pig production in Nsukka Local Government Area of Enugu State, Nigeria. The specific objectives of the study were to; describe the socio-economic characteristics of pig farmers; ascertain the perceived effect of sanitary risks on level of pig production, and; determine the relationship between socioeconomic characteristics and farmers' perception of the effect of sanitary risk on pig production. A multistage sampling procedure was used to randomly select 60 pig farmers were sampled for the study. Descriptive statistics such as frequency, percentage and mean scores, and inferential statistics such as multiple regression analyses were used for the study. Results revealed a mean age of 50. Additionally, 83.3% of the respondents are male while 16.7% of the respondents are female. Majority (76.7%) of respondents are married, with 65.0% having Secondary education, a mean household size of 6, and a mean stock size of 40. A mean year of experience of 7 was also recorded and majority (70.0%) said they have not had contact with extension agents. Results of pig farmers' perception of the effect of sanitary risks on pig production revealed that 'absence of functional foot dips on the pig farms ($\bar{x}$ =3.88), Keeping Quarantine section too close to the main property ($\bar{x}$ =3.8) were the major risk perception, the coefficients of sex (3.222), Age (-5.861), Household size (2.042), Years of Experience (-2.110), Level of Education (2.173), and stock size (2.432), were significant and related to effect of risks factors on pig production. The study concludes that there is a significant relationship between socio-economic characteristics and farmers' perception of risk effect on pig production. It is therefore recommended that adequate policies be formulated by Government to guide pig production in the study area, such as ensuring presence of functional dips and adequate distances for quarantine sections among others.

Keyword: Pigs, Farmers, Production, Sanitary Risk

Introduction

Pigs are one of the sources of animal protein in Nigeria; and they are monogastric animals with a high rate of productivity, and have the ability to utilize a host of agro industrial by products and crop residues, with little or no processing and at minimal cost (Igwe *et al.*, 2021). The pig industry in Nigeria is an important arm of the livestock sub sector in the overall agricultural sector (Ezeibe, 2020). This assertion derives from the fact that porcine production, among other species has a high potential to contribute to high economic gain in three ways. First, the pigs have high fecundity, high feed conversion ratio, early maturity, short generation interval and relatively small space requirement (Ezeibe, 2020). Secondly, they are multipurpose animals providing about 40% of meat in the world market, cooking fats and bristles. Pig is equally important for agro-based industries like feed mills for provision of bone and blood which are used for production of bone meal and blood meal respectively, which are good source of calcium in animal nutrition (Ogunniyi & Omoteso, 2019).

Pigs have shown great potentials because they have a short gestation period, high fecundity, and the meat to bone ratio of pork (pig meat) is favorable (Ekpo & Okon, 2023; Olomu & Oboh, 1995). The pig's many qualities enable Nigerians to consume more pig products, particularly in regions where religious prohibitions against pig breeding and eating do not exist.

However, given the outbreaks of African Swine Fever (ASF) and other diseases that impact pig productivity, pig farmers in Nigeria have been particularly concerned about healthcare as a variable when it comes to pig management; which is defined as providing pigs with feed, water, shelter, and medical attention (Ajala, 2007; Asambe, *et al.*, 2019). According to Maduka *et al*., (2020), the pig industry in Nigeria is expanding and farmers are generally aware of and use new technologies for increased productivity, but reports shows that there are various strategies used by livestock farmers in animal healthcare management (Asambe, *et al*, 2019; Kalu, *et al*, 2021). The continued report of disease outbreaks in domestic pig populations poses an enormous problem both on the income of the farmers and the general health of the consumer population, thus prompting a cause for greater understanding of the factors responsible. Hence, the need to assess the effect of Sanitary risks on the level of pig production in Nsukka Local Government Area of Enugu State, Nigeria. In order to address the broad objective of this study, the following research questions were raised and addressed: what are the socio-economic characteristics of pig farmers? how do pig farmers perceive the effect of sanitary risks on level of pig production? and; what is the relationship between pig farmers' socio-economic characteristics and their perception of the effect of sanitary risks in pig production.

Methodology

The study area

The study was carried out in Nsukka Local Government Area of Enugu Nsukka lies between the latitudes 6°51′N to 6°53′N and longitudes 7°23′E to 7°34′E (National Geospatial-Intelligence Agency -NGIA, 2008). It is the most populated Local Government Area of Enugu State among the seventeen Local Government Areas with a population of over 250,000 people and is bordered by seven other Local Governments all in Enugu State. The main language of the people is Igbo and the area is dominated by Christians with crop and livestock farming enterprises thriving (www.nsukkalga.en.gov.ng). The area has an average daily maximum and minimum temperature of 27 and 23.3ºC respectively. Rainfall in Nsukka is very high and intense with average monthly rainfall ranging from 250mm in April to 380 mm in October, with a mean annual total of 1500 mm (Yakubu, Onyeodi, Daniyan, Shuaibu & Abangwu, 2022). The population for the study consists of all the Pig farmers in Nsukka Local Government Area.

Sample and sampling procedure

The study employed a multi-stage random sampling procedure in selecting the sample size for the study. Nsukka, Local Government comprises eleven (11) communities. The first stage was a purposive selection of six (6) communities due to the predominance of pig farmers in the communities – Obimo, Opi, Ede-Oballa, Obukpa, Okpuje, and Eha-Alumona. The second stage was a selection of ten (10) pig farmers selected from the six communities to give a total of sixty (60) pig farmers for the study.

Analytical technique

The objective of assessing the sanitary risks perceptions among pig farmers in Nsukka Local Government Area of Enugu State was realized using mean scores. A rating scale was employed to assess farmers perception of sanitary risks on level of pig production in Nsukka Local Government Area of Enugu State was realized using the rating scale of; Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1. In using the rating scale, a mid-point was obtained by adding 4, 3, 2 and 1 which gives 10 when divided by 4 gives a mean score of 2.5. Any mean score below 2.5 was considered as disagreement to the perception statement while a mean score of 2.5 and above was considered as agreement to the perception statement.

The objective of determining the relationship between pig farmers' socio-economic characteristics and perceived sanitary risks in pig production was realized using multiple regression analysis.

The model is specified explicitly as follows:

1. **Linear function**

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + ei \ldots..eq\ 1$$

Where, Y = pig farmers' perceived sanitary risks (Mean Scores obtained per farmer)

X_1 = Sex (Male=1, Female=0)
X_2 = Age (Years)
X_3 = Marital status (married = 1, otherwise = 0)
X_4 = herd size (Number of pigs)
X_5 = Farming experience (years)
X_6 = Farm Income (naira)
X_7 = Education (years of schooling)
X_8 = Extension contact (Number of times or frequency of visits
X_9 = Cooperative membership (years)
β_0 = Intercept
ei = Error term

Results and discussion

Socioeconomic characteristics of Pig Farmers

The distribution of respondents by age indicate that less than half (35.0%) of the respondents are aged 51-60 years. A mean age of 50 was also recorded implying that most of the pig farmers are middle-aged. This finding is in tandem with that of Kalu, Odoemelam & Maduka (2021) and Asambe *et al.*, (2019), that most Livestock farmers are middle aged hence could be regarded as young. Their youth suggests that such farmers have the energy to provide the labour demand or managerial demands of pig production activities.

Table 1: Distribution of Pig farmers based on Socio-economic Characteristics

Age (in years)	Frequency (n = 60)	Percent	Mean
30 – 40	10	16.7	
41- 50	19	31.6	
51- 60	21	35.0	**50.3**
61 – 70	10	16.7	
Sex			
Female	10	16.7	
Male	50	83.3	
Educational qualification			
Primary education	2	3.3	
Secondary	39	65.0	
Tertiary education	19	31.7	
Household size			
1- 5	28	46.7	
6 – 10	30	50.0	
11 – 15	2	3.3	**6**
Stock Size (number of pigs)			
10 – 30	31	51.7	
31 – 60	18	30.0	
61 – 90	8	13.3	**40**
91 – 120	3	5.0	
Years of experience			
1 – 5	25	41.7	
6 – 10	23	38.3	**7.5**
11 – 15	10	17.5	
16 – 20	2	3.3	

Source: Field Survey, 2024

Result further showed that most (83.3%) of the respondents are male while 16.7% of the respondents are female. This implies that male farmers dominate the pig production enterprise, the study is also in consonance with Asambe *et al.*, (2019) who reported the dominance of male farmers in the pig production enterprise in Benue State. Kalu, Nwachukwu, Odoemelam, Maduka & Ukoha (2024), also reported that more male farmers are in involved in pig

farming in South East, Nigeria. Furthermore, the result indicates that majority (65.0%) of the respondents have Secondary education, followed by 31.7% who had Tertiary education. Education contributes immensely to the productivity and profitability of most businesses. A mean household size of 6 was also recorded. It is important to note that size of household serves as a source of labour in most agricultural productions. Pig production which requires a great deal of human effort will certainly benefit from higher household sizes.

Majority of the pig farmers (51.7%) kept 10 – 30 live pigs, a mix of weaners and table size, with a mean stock size of 40. The result suggests that most pig farmers in the study area are small holder farmers who are gradually expanding business. The result of the study is in tandem with Asambe *et al.,* (2019), who reported similar stock size average among farmers in Benue State, Nigeria. Kalu *et al.,* (2024), also highlighted that most farmers in South East, Nigeria keep between 10 – 50 live pigs and that the enterprise has a lot of opportunities yet untapped. It is pertinent to note that the pig enterprise is a lucrative one as opined by the farmers, due to high fecundity of the animals.

Effect of sanitary risks on the level of pig Production

Table 2 shows the result of pig farmers' perception of the effect of sanitary risks on pig production in Nsukka Local Government Area of Enugu State. A total of twenty-five (25) sanitary risk factors in pig production were presented to farmers to ascertain their perception of the variables. Result revealed that 'Slaughter slab within 1-km radius of the pig farm is harmful to my farm ($\bar{x}$ =3.55), Refuse dump sites within 1 km radius of the pig farm exposes my farm to risk ($\bar{x}$=3.78), Not sure of Source of replacement stock is a risk factor ($\bar{x}$ =3.37), Feeding of swill to pigs is dangerous ($\bar{x}$=3.63), Absence of functional foot dips on the pig farm is a risk ($\bar{x}$ =3.88), Keeping Quarantine section too close to the main property is a risk ($\bar{x}$=3.8), Workers don't bath in the piggery after work is harmful ($\bar{x}$ =3.58), Carcass burial within 1-km radius is harmful ($\bar{x}$=3.67), were agreed to by the pig farmers as being risk factors in pig production enterprise, and 'Pen not Disinfected daily is harmful ($\bar{x}$=2.6), Asambe *et al*., (2019) ascertained various risk factors in pig production in Benue State, and the result is in tandem with the findings of this study that there are certain risk factors which pig farmers do not pay attention to, although they pose serious risk to pig production. Such risk factors will require more awareness on them and appropriate Government policies to enforce them for the benefit of all.

Some of the risk factors which the pig farmers did not agree to include; Absence of Routine pests control is harmful ($\bar{x}$ =2.42), Presence of rodents on the piggery is harmful ($\bar{x}$=2.27), Not having Pig farm perimeter fencing is a risk ($\bar{x}$ =2.75), No designated work clothes for the piggery is harmful ($\bar{x}$ =2.32), and 'Lend out service boars/Boars swap is a risk ($\bar{x}$=2.33)

Table 2: Sanitary Risk Perceptions of Pig Farmers in the study area

S/N	Perceived risk factors	SA (4)	A (3)	D (2)	SD (1)	$\sum fx$	Mean $\sum fx/n$	Remark
1	Slaughter slab within 1-km radius of the pig farm is harmful to my farm	42(168)	9(27)	9(18)	0(0)	213	**3.55**	Agreed
2	Refuse dump sites within 1 km radius of the pig farm exposes my farm to risk	47(188)	13(39)	0(0)	0(0)	227	**3.78**	Agreed
3	Wearing of work clothes outside of the piggery premises is not healthy	6(24)	0(0)	4(8)	50(50)	82	**1.37**	Disagreed
4	Sharing of farm workers with other pig farms is not good	1(4)	3(9)	5(10)	51(51)	74	**1.23**	Disagreed
5	Sharing of working utensils with other pig farms is not good	0(0)	10(30)	12(24)	38(38)	92	**1.53**	Disagreed
6	Not sure of Source of replacement stock is a risk factor	29(116)	27(81)	1(2)	3(3)	202	**3.37**	Agreed
7	Feeding of swill to pigs is dangerous	40(160)	19(57)	1(1)	0(0)	218	**3.63**	Agreed
8	Nearby pig farm within 1 km radius of each other is harmful	9(36)	14(42)	13(26)	24(24)	128	**2.13**	Disagreed
9	Absence of functional foot dips on the pig farm is a risk	55(220)	4(12)	0(0)	1(1)	233	**3.88**	Agreed
10	Presence of ticks on pigs is harmful	0(0)	20(60)	7(14)	33(33)	107	**1.78**	Disagreed
11	Not having Pig farm perimeter fencing is a risk	22(88)	18(54)	3(6)	17(17)	165	**2.75**	Agreed
12	Keeping Quarantine section too close to the main property is a risk	54(216)	2(6)	2(4)	2(2)	228	**3.8**	Agreed
13	No designated work clothes for the piggery is harmful	19(76)	8(24)	6(12)	27(27)	139	**2.32**	Disagreed
14	Workers don't bath in the piggery after work is harmful	49(196)	4(12)	0(0)	7(7)	215	**3.58**	Agreed
15	Lend out service boars/Boars swap is a risk	19(67)	13(39)	6(12)	22(22)	140	**2.33**	Disagreed
16	No cleaning (wash/sweep) of pen floor daily is a risk	2(8)	26(78)	1(2)	31(31)	119	**1.98**	Disagreed
17	pen not Disinfected daily is harmful	4(16)	40(120)	4(8)	12(12)	156	**2.6**	Agreed
18	No Cleaning (wash) of work utensils daily is harmful	0(0)	22(66)	1(2)	37(37)	105	**1.75**	Disagreed
19	Carcass burial within 1-km radius is harmful	45(180)	10(30)	5(10)	0(0)	220	**3.67**	Agreed
20	No Piggery designated footwear is a risk factor	5(20)	12(36)	10(20)	33(33)	109	**1.82**	Disagreed
21	Absence of Routine pests control is harmful	4(16)	32(96)	9(18)	15(15)	145	**2.42**	Disagreed
22	Access by stray animals is dangerous	7(28)	3(9)	3(6)	47(47)	90	**1.5**	Disagreed
23	Presence of rodents on the piggery is harmful	5(20)	28(84)	5(10)	22(22)	136	**2.27**	Disagreed
24	Non consultation of veterinarians/trained animal health workers is not good	4(16)	4(12)	10(20)	42(42)	90	**1.5**	Disagreed
25	No inspection of life pigs before slaughtering is not good	10(40)	11(33)	4(8)	35(35)	116	**1.93**	Disagreed
	Grand Mean						**2.49**	

Source: Field Survey Data, 2024 **Strongly Agree = 4; Agree =3; Disagree = 2; Strongly Disagree = 1**

Relationship between pig farmers' socio-economic characteristics and perceived sanitary risks in pig production

The four functional forms of the multiple regression model were tried and the Linear model selected as the lead equation due to the highest number of significant variables and a significant F-value of 9.630 at P<0.05 which shows the overall significance of the regression line and a high R^2 value of 0.499 which implies that 49.9% of the total variation in the dependent variable was accounted for by the explanatory variables. The coefficient of sex (3.222) was significant and positively signed. This implies that being male or female contributes to the pig farmers' perception of risk factors in pig production.

Furthermore, at P<0.05, Age (-5.861) was significant and negatively related to farmers perception of risk factors in pig production. The implication of the result is that the more advanced the respondents are, the less they perceive the risk factors as being harmful to their enterprise. Maduka, Kalu and Odoemelam (2020) asserted that age affects the tendency to be very inquisitive and receptive to new ideas/innovations in other to meet personal and family needs.

The coefficient of Household size (2.042) was significant and positively related to farmers' perception of risk factors in pig production. This implies that the higher the household size the more likely; the farm family will be wary of information that constitutes risk in the enterprise, since individual family members can contribute to the information base of the family. The coefficient of Years of Experience (-2.110) was significant and negatively related to farmers perception of risk factors in pig production. This finding agrees with that of Asambe et al (2019), who reported the effect of level of experience of farmers in making good decision in the pig enterprise.

The coefficient of Level of Education (2.173) was significant and positively related to pig farmers perception of risk factors in pig production. The implication of the result is that the more advanced in learning an individual farmer is, the more likely he will be able to make sound judgment in any farming enterprise. Also, the coefficient of stocksize (2.432) was significant and positively related to pig farmers perception of risk factors in pig production. The implication of the result is that the larger the stocksize of the farmer, the more likely he will be able to make sound judgment in any farming enterprise as it relates

Table 3: Ordinary least square regression results of the relationship between pig farmers' socio-economic characteristics and perceived sanitary risks in pig production

Variable	Linear+	Exponential	Semi-log	Double-log
Constant	3.425	1.263	3.139	1.335
	(6.925)***	(9.492)***	(2.466)**	(9.908)***
Age	-0.200	0.044	-0.618	-0.201
	(-5.861)***	(-4.455)***	(4.852)***	(-4.456)***
Sex	0.425	0.103	0.436	0.133
	(3.222)***	(2.873)**	(2.554)**	(2.189)**
Marital Status	0.003	-0.001	-0.263	-0.133
	(-1.016)	(-1.408)	(-1.102)	(-1.164)
Years of Experience	0.029	0.004	0.018	0.004
	(2.110)**	(1.919)*	(1.159)	(1.031)
Stock Size	0.049	0.020	0.621	0.230
	(2.432)**	(2.740)**	(3.497)***	(3.757)***
Level of Education	-0.168	-0.006	0.025	0.057
	(2.173)**	(-1.399)	(2.196)**	(1.909)**
Household Size	0.172	0.043	-0.081	-0.094
	(2.042)**	(1.934)*	(-2.450)**	(-1.092)
R^2	**0.499**	**0.428**	**0.407**	**0.498**
Adj. R^2	**0.324**	**0.345**	**0.357**	**0.346**
F-statistic	**9.630*** **	**9.396*** **	**9.960****	**9.577*** **

Source: Computed from field survey data, 2024

**** = significant at 5% and ***** = significant at 1%** $H0_1$ rejected at 5% level

Conclusion and Recommendations

The study assessed the effect of sanitary risks on the level of pig production in Nsukka Local Government Area of Enugu State, Nigeria. It is therefore concluded that; the most pig farmers in the study area small-holder farmers, 'Having designated work clothes for the piggery, 'Refuse dumps kept away from the pig farm, and 'Careful to lend out service boars/Boars swap are major risk measures used by pig farmers. There is a significant relationship between socio-economic characteristics with farmers' perception of risk effect on pig production. There is need for Government to come up with policies that will guide pig production activities. There is need for all players in extending advisory services to pig farmers to step up services and formation of cooperatives could be useful in closing gaps between pig farmers and innovations generated from research organizations.

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