PRINT ISSN 1119-8362
Electronic ISSN 2659-1499
Full-text Available Online at
https://www.ajol.info/index.php/jasem
https://www.bioline.org.br/ja
J. Appl. Sci. Environ. Manage.
Vol. 28 (10) 3245-3252 October, 2024

Knowledge and Economic Loss of Pig Farmers to African Swine-Fever in Lagos State, Nigeria

OYEGBAMI, A; *IDOWU, AB; OLUWOLE, OO; OMODEWU, IA

Institute of Agricultural Research and Training, Obafemi Awolowo University, Ile-Ife, Nigeria.

**Corresponding Author Email: idowuayodeji30@gmail.com*
**ORCID: https://orcid.org/0009-0007-7653-8228*
Tel: +234 803 466 3661

Co-Author Email: titi_oyegbami@yahoo.com; oluwoleolufunke@gmail.com; ifeayo24@yahoo.com

ABSTRACT: The objective of this paper is to evaluate the knowledge and economic loss of pig farmers to African Swine-Fever (ASF) in Lagos state, Nigeria using appropriate standard methods with Questionnaires administered to120 respondents. Results revealed that the mean age of pig farmers was 47.5 years while 94% and 65% were married and male respectively. The result further showed that 51% were engaged fully in livestock production as their primary occupation while 47.9% have between 5-10 years of pig farming experience with 58.1% having tertiary education and over 60% sourced credit for their business externally. The results also revealed that farmers got information more from fellow farmers weekly (μ=29.25) and extension agents monthly (μ=28). With an average knowledge of ASF score of μ=1.61, farmers had high knowledge in "it is good to consult veterinary service on their farms" (μ=1.71) and low knowledge in "there is no need to disinfect the farms regularly" (μ=0.41). Furthermore, the results showed that farmers who raised large white breeds with 51–100 pigs suffered more (35.6%) losses than farmers with cross breed with cost of feeding accounting for 48.4% of the total cost of production The study also revealed that farmers' age, number of extension contacts ($p<0.05$) and number of ASF trainings attended ($p<0.01$) were positive drivers that influenced the level of knowledge of ASF. Farmers also cited the cost of feed (u=0.71) and disease outbreak (u=0.69) as the two biggest obstacles to pig production in the study area.

DOI: https://dx.doi.org/10.4314/jasem.v28i10.35

Cite this Article as: OYEGBAMI, A; IDOWU, A. B; OLUWOLE, O. O; OMODEWU, I. A. (2024). Knowledge and Economic Loss of Pig Farmers to African Swine-Fever in Lagos State, Nigeria. *J. Appl. Sci. Environ. Manage.* 28 (10) 3245-3252

Dates: Received: Received: 07 July 2024; Revised: 15 August 2024; Accepted: 19 August 2024 Published: 05 September 2024

Keywords: Knowledge; Economic loss; Pig; Farmers; and African swine-fever

In Nigeria, pigs (*Sus scrofa*) are the most significant domestic animals and they belong to the family Suidae and order Artiodactayla. (Ugbomoiko *et al*., 2008). A subset of animal husbandry called "pig farming" is the management, breeding, and raising of pigs as livestock, mostly for human consumption. According to Hirst, (2019), the commercial history of this industry spans over 9,000 years, making it one of the oldest in the world. In Nigeria's livestock industry, pigs are unquestionably important. Their remarkable capacity to adjust and flourish in diverse habitats distinguishes them from other livestock species, even though they make up only four percent of all domestic animals in the nation (Ajala *et al*, 2007). Nigeria's pig industry contributes significantly to the country's economy in addition to ensuring local and national food security. It provides a way of subsistence for a large number of small-scale farmers. In 2020, Nigeria's pig meat production was estimated to be around 350,000 metric tons, making it the largest producer of pig meat in Africa. According to the FAO, pork consumption in Africa will increase by 3.3 percent up to the year 2050 and the piggery industry is currently worth over $771 million in Nigeria,

projected to increase by 22% by the year 2050 (Adeniji, 2023). Pigs have the potential to be incredibly prolific animals because of their capacity to produce large litters after a comparatively short gestation period. When it comes to meat yield per ton of live weight of breeding females annually, they are about six times more productive than cattle (Adeniji, *et al.,* 2015). However, pig farming creates jobs across the value chain and provides a source of protein for human consumption, which could aid in the reduction of poverty and achievement of food security in Nigeria and Africa. For the majority of sub-Saharan Africans, it is a vital source of food and a means of subsistence (Ajieh and Okwolu, 2015). Nigeria is not among the top three producers of pork and pork-related products in Sub-Saharan Africa, despite being one of the region's biggest consumers of the meat and home to the largest pig farm. According to Saka *et al*. (2010), the Oke Aro Pig Farm Estate, which is home to over 3000 pig farmers, is facing challenges meeting the demands of 50 million customers due to the fact that the majority of pig farmers in Nigeria own fewer than 100 pig herds. These challenges can be linked to recent outbreaks of diseases that have resulted in significant losses and have put the entire pig populations under threat.

There are now more pig farms in Nigeria than ever before, demonstrating the industry's growing potential. Nonetheless, the African Swine-Fever (ASF) outbreak that decimated numerous pig farms in Nigeria's Southwest Agro-ecological zone and caused enormous losses for farmers put a stop to this growth. (Majiyagbe *et al*., 2004; Otesile *et al*., 2005; Olugasa and Ijagbone 2007). There were 124 ASF outbreaks documented in Nigeria between July 2016 and December 2022, according to data from the Federal Ministry of Agriculture and Rural Development. There were reports of ASF cases (outbreaks) from every geopolitical zone in the nation, with the North Central geopolitical zone having the highest number of cases (WAHIS, 2023). Yet, Nigeria is severely impacted economically by ASF outbreaks, which also result in a significant loss of livelihoods. The African Swine-Fever virus (ASFV) is the cause of ASF, a highly fatal viral hemorrhagic disease that affects pigs. ASF is a serious porcine disease that poses a serious risk to the world's pig production industry and affects both domestic and wild Suidae Family species. Cases of fatalities in impacted domestic pigs can reach 100% (Ebwanga *et al*., 2021). Since there are currently no available vaccines, biosecurity measures represent the only reliable means of containing ASF outbreaks. It is therefore crucial to assess the extent of economic losses farmers in pig enterprise suffer at any instance of ASF outbreak and the factors that determines the knowledge level of farmers on ASF. Therefore, the objective of this paper is to evaluate the knowledge and economic Loss of Pig Farmers to African Swine-Fever (ASF) in Lagos State, Nigeria.

MATERIALS AND METHODS

The Study Area: The study was conducted in Lagos State which is located in Southwest Nigeria on the coast of the Bight of Benin, it is bounded by Ogun state to the North and East by the Bight of Benin to the South, and by the West by the Republic of Benin. Lagos State have three agricultural zones namely; the Eastern, far Eastern and Western zones. Lagos is the most populous city in Nigeria as well as Africa with an estimated population of 15.9 million.

*Study Design***:** The purpose of this descriptive cross-sectional study was to ascertain the degree of farmers' financial losses to ASF in Lagos State as well as their level of knowledge.

Sampling Procedure and Sample size: Based on the three agricultural zones in Lagos State, samples were taken. The population for the study was chosen through a multistage sampling procedure, with the Eastern, Far Eastern, and Western zones being the agricultural zones involved. Pig farmers were purposively selected from each of the three zones based on the design of the study in stage one, 5 blocks were randomly selected from each of the zones to give a total of fifteen (15) blocks in stage two and eight (8) farmers per block were also randomly selected from each block to give a total of one hundred and twenty (120) pig farmers in all, however, only 117 questionnaires was used for analysis.

Data Collection and Analysis: Data was collected in collaboration with staff of Lagos state Agricultural Development Authority (LASADA) of Lagos State to identify pig farmers. A structured questionnaire was used to elicit information from farmers and the data obtained was analyzed using percentages, mean and charts. Other tools deployed are Relative Importance Index RII to rank the constraints identified by farmers and Tobit Regression model to determine the relationship between the knowledge of ASF by farmers and their socio-economic attributes. Data collected includes the following:

Personal Characteristics: This include age, sex, marital Status, major occupation, years spent in pig production, educational status and source of income.

Source of Information on ASF: The information source and frequency of information received from a list of potential sources were asked to be ticked by the

respondents. This was measured as none (0), weekly (1), Monthly (2), quarterly (3). The mean value was used to rank the result and used for discussion

Constraints in Pig Production: Respondents were asked to check the options that applied to them from a list of potential constraints. To calculate the mean score, a yes/no option was used. The constraints were ranked from greatest to least using a relative importance index (RII).

Knowledge of ASF: Respondents' knowledge of ASF was assessed using a series of yes/no/undecided questions, which were assigned with the values 2, 1, and 0 with the average scores determined by computing the responses. A statement is considered to have high knowledge if the mean score is higher than the average mean, and low knowledge if it is below the average mean.

*Statistical Analyses***:** SPSS version 20, a statistical package for social sciences, was used to analyze data that were collected. To analyze the objectives, descriptive statistics such as frequency counts (percentages and mean), RII, and Tobit Regression model were used.

*Model Specification***:**
$y^* = x'\beta + \varepsilon$ (Wooldridge, 2002).. (1)
With ε j X N (0, σ2)

$y = y^*\ y^* > 0$

where y= knowledge of ASF (mean score > 1.6 =1, otherwise =0)

$X'\varepsilon\ x = X_1 - X_7$

$X_1 - X_7$ = sex, age, marital status, educational level, years of pig farming, ASF training attended and number of Extension contact respectively.

RESULT AND DISCUSSION

Socio- Economic Characteristics: Age, sex, marital status, primary occupation, years spent in pig production, level of education, and income source were among the socioeconomic characteristics of farmers that were examined. Table 1 shows the results of the socioeconomic characteristics. The mean age of pig farmers, according to the results, was 47.5%, meaning that they were in their active years. However, closer examination reveals that 47.9% of the farmers were between the age range of 46 and 60 years, which may indicate that farmers in this group are transitioning out of the active age group. Furthermore, the study also revealed that 94% of farmers were married with 65% of farmers being men.

Table 1: Socio Economic Characteristics of Respondents

Variable	Frequency	Mean
Age (Yrs)		
0-30	5 (4.4)	
31-45	45 (38.5)	
46-60	56 (47.9)	47.5
>60 years	11 (9.4)	
Total	117 (100.0)	
Sex		
Male	76 (65.0)	
Female	41 (35.0)	
Total	117 (100.0)	
Marital status		
Single	7 (6.0)	
Married	110 (94.0)	
Total	117 (100.0)	
Major Occupation		
Farming	40 (34.2)	
Civil service	7 (6.0)	
Trading	2 (1.7)	
Livestock Farming	6 (5.1)	
Pig Farming	48 (41.0)	
Total	117 (100.0)	
Years in Pig Production		
<5years	25 (21.4)	
5-10years	56 (47.9)	
11-15years	25 (21.4)	
16-20years	8 (6.8)	
>20years	3 (2.6)	
Total	117 (100.0)	
Education Status		
No Formal	0 (0)	
Adult Education	2 (1.7)	
Primary School	3 (2.6)	
Secondary School	38 (32.5)	
Tertiary	68 (58.1)	
Adult Education	1 (1.3)	
Total	117 (100.0)	
Source of Income		
Previous Saving	10 (8.5)	
Loan from Bank	15 (12.8)	
Loan from Cooperative society	9 (7.7)	
Borrowing from Friends	6 (5.2)	
Previous savings and loans from bank	24 (20.5)	
Loans from bank and Cooperative society	29 (24.8)	

Source; Field survey 2022

This suggests that men dominated pig production activity in the study area. In addition, the results showed that 41% of the respondents were fully committed to pig farming, 34.2% had general farming as their primary occupation, 6% worked in the civil service, 5.1% were into livestock farming, and 1.7% were primarily involved in trading. However, this suggests that agriculture remains the respondents' primary occupation (80.3%) with a minute percentage (7.7%) engaged in other activities outside agriculture. Almost half (47.9%) of respondents had between 5 – 10 years of pig rearing experience with only about 2.6% having above 20 years of experience.

This suggests that while the respondents do not have a great deal of experience, they also do not qualify as having little pig production experience. The study further revealed that all the respondents have a good level of education, 58.1% have Tertiary education, 32.5% had Secondary education and 2.6% had Primary education. This indicating that they are all formally educated and can comprehend technicalities of technology especially with regard to pig management and good agricultural and biosecurity practices if brought to them. However, the study also revealed that more than 60% of the respondents sourced for credit externally; from banks only (12.8%), Cooperatives only (7.7%), both banks and cooperatives (24.8%) and borrowing from friends (5.2%) for the expansion of their enterprise/production. This however implies that the enterprise has a prospect for growth and might require better investment.

Source of agricultural information: Figure 1 shows the frequency of information viz a viz the source respondents get information about pig production in the study area. The study revealed that fellow farmers (μ=29.25) is the commonest source of information available to farmers, this was followed by information from extension agents (μ=28) and agricultural shows (μ=11) as the least source of information available to farmers. This result implies that pig farmers get information on pig production from different sources and access information more from fellow farmers having the highest mean and ranking signifies that the farmers are accessible to one another.

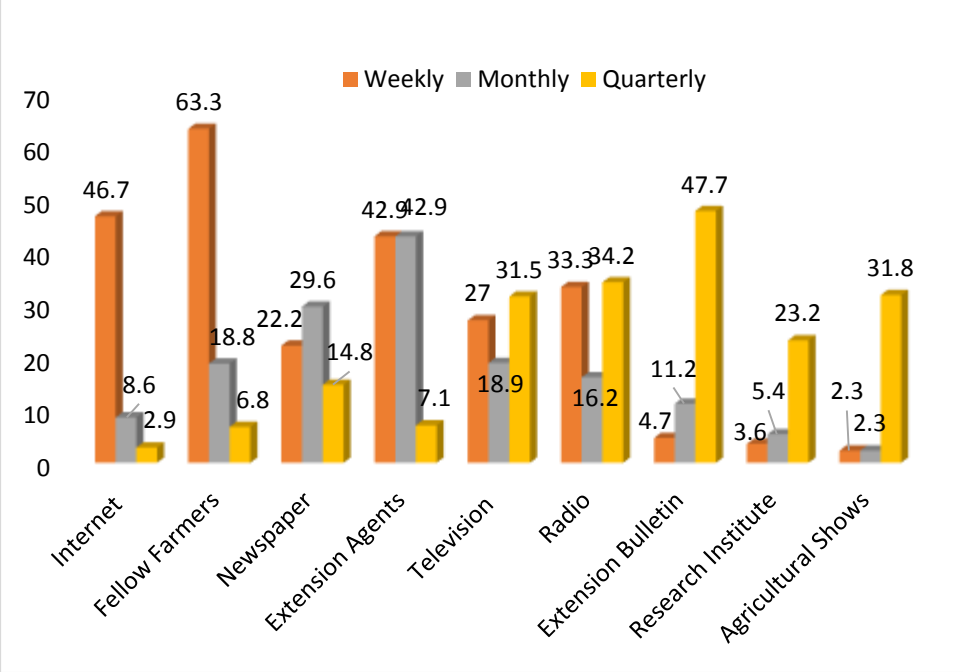

Fig 1: Source of information to pig farmers
Source: Field Survey, 2022

Farmers' knowledge of African Swine-Fever (ASF): Table 2 shows the result of farmers' knowledge of African Swine-Fever. Using the mean score of 1.61 as a bench mark, the table revealed that pig farmers were highly knowledgeable that; ASF affects pig alone ($\bar{x}$ =1.63), there are no curative measures for ASF ($\bar{x}$ =1.68), it is good to consult veterinary services on farms ($\bar{x}$ =1.71). Respondents have low knowledge that: biosecurity measures are necessary on the farm ($\bar{x}$ =0.48), pig that die of ASF are best disposed by burning ($\bar{x}$=1.60), that it is necessary to disinfect pens ($\bar{x}$ =0.41), that there are veterinary and administrative set up for animal diseases in Nigeria ($\bar{x}$=1.09), that there is need to take precautions against ASF and that ASF is a viral disease.

The result implies that pig farmers in the state still need education and training on precautionary, biosecurity and management measures against this will help increase their knowledge, reduce loss, boast production as well as increase income of farmers.

Economic Losses and Implications: Figure 2 shows the number of pigs lost in percentages to ASF. Farmers who suffered between 50-100 pigs recorded their highest losses in large white (35.6%) and

landrace (28.6%) while farmers who suffered the most losses i.e more than 100 pigs had the most of their breeds in Duroc and Crosses (28.6%) with their least lost in other breeds. The implication of these losses showed that Duroc and Cross breeds were the most affected (>100 pigs) breed followed by large white and landrace. This can however be attributed to the availability of the breeds in the study area and possibly the low immunity system of the breeds which is open for further investigation(s) to breeders.

.

Table 2: Knowledge Statement on African Swine-Fever (ASF)

Knowledge Statement	Yes	No	Undecided	Mean	Decision
ASF is a viral disease	66	40	11	1.47	High
It is not contagious and not deadly	11	2	74	0.45	Low
ASF affects pig alone	84	23	0	1.64	High
No need to take precautions against ASF	13	39	65	0.55	Low
There are veterinary and administrative set-up for animal disease in Nigeria.	29	0	18	1.09	Low
It is good to consult veterinary services on farms	91	18	8	1.71	High
There is no need to disinfect pen	10	28	79	0.41	Low
Pigs that die of ASF are best disposed by burning	84	19	14	1.60	Low
Bio security measures are not necessary on the farm	14	75	28	0.48	Low

Source: Field Survey, 2022 *Mean Score = 1.61*

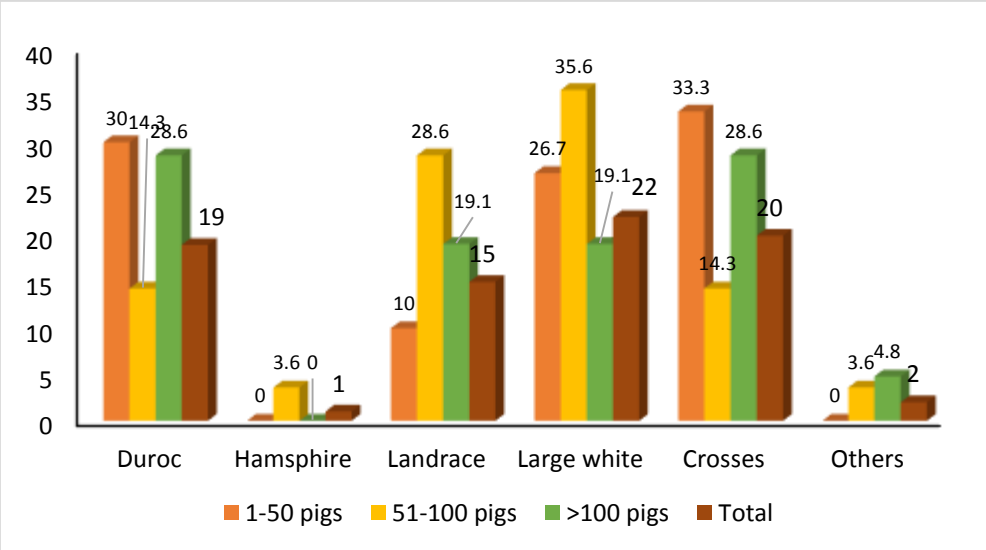

Fig 2: Percentage losses to ASF
Source; Field survey 2022

Production Expenses and Economic Implication of losses: Figure 3 revealed that 48.4% of cost of production was incurred on feeding with the least cost of production (8.6%) incurred on medication and veterinary services which was above the ethical practice of expected 5% of feed cost for medication. Table 3 showed that 9,267 pigs (94.6%) of the 9,826 pigs that were available prior to the ASF incidence were lost to the disease. Growers and gilt/in-sow suffered the greatest losses (98.39 percent), while piglets had the lowest mortality rate (79.29 percent). This however can be attributed to the perceived high immunity of piglets, however, the strike had a high damaging effect across the study area.

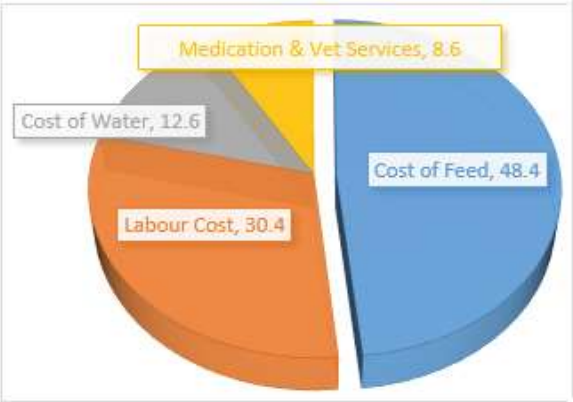

Fig 3: Production expenses
Source; Field survey 2022

The study further showed that the average loss incurred per farmer was N1,021,256.41 which translates to a great loss considering the effect of the ASF incidence. Farmers with growers and gilts incurred the most economic loss of N197,316,000 and N196,320,000 respectively. Table 4 revealed the percentage breakdown of the losses incurred by the breed(s) on the farmer's farm. Large white (35.6%) suffered the more losses at an average of 51-100 pigs lost by farmers which indicated that farmers had a substantial number of the breed before the ASF strike while Hamsphire had the least lost due to just one farmer having the breed on his farm. The implication of this is that pig farmers lost more large-white breed (35.6%), Crosses (33.3%) and Duroc (30.0%) to the ASF incidence.

Table 3: Economic losses incurred by pig farmers due to ASF Outbreak

	Average	Piglets	Weaners	Growers	Gilt/Insow
Total number of farms (n)	117				
Total number of pigs (animals) before ASF	9,826	1,748 (16.8)	2,108 (20.3)	3,476 (33.5)	2,494 (24.0)
Total number lost to ASF (animals)	9,267	1,386	2.025	3,402	2,454
Total number of pigs after ASF incidence	559	362	83	74	40
Percentage loss to ASF	94.31%	79.29%	96.06%	97.87%	98.39%
Average weight (kg) during ASF incidence.	47.5	15	27	65	83
Average price per kg (N) as at time of ASF Outbreak	740	550	680	780	950
Average cost per animal as at ASF incidence (N)	45,000	17,000	30,000	58,000	80,000
Total cost of Animal loss (Estimated)	477,948,000	23,562,000	60,750,000	197,316,000	196,320,000
Average loss incurred per farmer (N)	1,021,256.41	201,384.62	519,230.77	1,686,461.54	1,677,948.72

Source: Field Survey Estimation, 2022

Table 4: Number of losses by breeds of pig lost

Loss to ASF	Duroc	Hamsphire	Landrace	Large white	Crosses	Others	Total
1-50 pigs	9 (30.0)	0 (0)	3 (10.0)	8 (26.7)	10 (33.3)	0 (0)	30
51-100 pigs	4 (14.3)	1 (3.6)	8 (28.6)	10 (35.6)	4 (14.3)	1(3.6)	28
>100 pigs	6 (28.6)	0 (0)	4 (19.1)	4 (19.1)	6 (28.6)	1 (4.8)	21
Total	19	1	15	22	20	2	79

Source: Field survey 2022; *Figures in parenthesis are in percentages. n =117*

Constraints in Pig Production: High cost of feeds (μ=0.716) was ranked as the most significant constraint identified by farmers that can impede production, according to Relative Importance Index of constraints analysis as shown on Table 5. The study's focal point, African Swine-Fever (ASF) disease outbreak (μ=0.694), as the second most important constraint. However, this clarifies that the biggest issue that could restrict output was disease outbreak and not feed cost concerns, provided they could source ingredients at a cheaper cost. The least ranked item was waste disposal (μ=0.035), which the respondents believed did not present a threat as long as the pen house environment was properly maintained.

Table 5: Constraints in Pig production

Constraints	Mean	RII	Importance
High cost of feeds	23.8	0.716239	1
Disease Outbreak	23.4	0.694017	2
Lack of credit facility	16.8	0.466667	3
Lack of organized market for pig products	15.4	0.42906	4
Bad road network	20.6	0.413675	5
High cost of Transport	16	0.4	6
Environmental pollution	14	0.374359	7
High cost of building material	12	0.355556	8
High cost of drugs	12.2	0.352137	9
Lack of quality water	13.2	0.335043	10
Religion	13	0.263248	11
High cost of labour	8.4	0.198291	12
Bad waste disposal method	1.8	0.035897	13

Source; Field survey 2022

Relationship between socio-economic characteristics and respondent's knowledge of ASF: The result of the determinants of the knowledge on ASF in the study revealed that age of farmers ($p<0.05$), training on ASF

($p<0.01$) and number of extension contact ($p<0.05$) were significant drivers that influences the level of knowledge of ASF the farmers had. The implication of this is that, farmer's level of knowledge could be influenced by their age, i.e age of farmer's has a positive relationship with the level of knowledge on ASF. Also, the number of ASF trainings attended by farmers has been organized by LASADA office and number of extension contacts farmers have during field visit by staffs of LASADA has a positive relationship with the level of knowledge as shown on table 6.

Table 6: Relationship between socio-economic characteristics and respondent's knowledge of ASF

Variables	Coefficient	t-value
Constant	-.422439	
Age of farmers	.2080216**	2.59
Sex of farmers	-.004298	-0.93
Marital status of farmers	.3357628	2.01
Educational Level	-.036898	-0.99
Years of Pig Farming	-.004269	-0.10
Number of ASF Training(s) attended	-.231572***	-2.64
Number of Extension contacts monthly	.354335**	-0.74
R^2	0.675	
Adj R^2	0.622	
F	3.30	

Source; Stata 14 Result Output.
Note (**) and (***) denotes significant level at 5% and 1% respectively, n=117

Conclusion: The findings showed that, should African swine fever breakout, pigs would suffer significant financial losses. Therefore, before granting access to their pen houses and limiting movement within the area, farmers should adopt and implement preventive measures (biosecurity protocols). Farmers ought to be able to receive alerts from their various association groups about suspected disease outbreaks in the area. The government should also push extension agents to visit farms more regularly in order to raise farmers' awareness of the disease. Lastly, it should mandate that all ASF outbreak cases be thoroughly reported and buried.

Declaration of Conflict of Interest: The authors declare no conflict of interest.

Data Availability Statement: Data are available upon request from the first author or corresponding author.

REFERENCE

Adeniji, A; Osibanjo, A; Abiodun, J; Oni-Ojo, E (2015) Corporate Image: A Strategy for Enhancing Customer Loyalty and Profitability. *J. South Afri. Bus Res*, 2015, DOI: https://doi.org/10.5171/2015.259483

Adeniji, I (2023). Top pig producing State in Nigeria and opportunities. Available at https://www.linkedin.com/pulse/top pig producing state-Nigeria.

Ajieh, PC; Okwuolu, U (2015). Constraints and strategies for enhancing pig production in Delta State, Nigeria. *Glob. J. Sci Front Res*: *D Agric. Vet*. 15 (8): 46-52

Adetunji MO; Adeyemo K (2012): Economic efficiency of pig production in Oyo State, Nigeria: a stochastic production frontier approach. *Amer. J. Exp. Agric.* 2(3): 382–394.

Ajala MK; Adesehinwa AOK; Mohammed, AK (2007): Characteristics of smallholder pig production in Southern Kaduna area of Kaduna State, Nigeria. *Amer.-Eur. J. Agric. Env. Sci.* 2: 182–187

Ebwanga, EJ; Ghogomu, SM; Paeshuyse, J (2021). African Swine-Fever in Cameroon: A Review. Pathogens 2021, 10, 421. https://doi.org/10.3390/pathogens10040421

Hirst, KK (2019). "Pigs – The domestication history of Sus Scrofa." *ThoughtCo*

Majiyagbe, KA; Shamaki, D; Luther, NJ; Udeant, TKC (2004). African Swine-Fever epidemics: The Nigerian experience (1997-2004) *Vom J. Vet. Res.*, 1: 138-153.

Otesile, EB; Ajuwape, ATP; Odemuyiwa, SO; Akpavie, SO; Olaifa, AK; Odaibo, GN; Olaleye, OD; Adetoyese, AI (2005). Field and experimental investigations of an outbreak of African Swine-Fever in Nigeria. *Rev. d'Éle. et de Méd. Vét. es Pays Trop.*, 58 (1 and 2): 21-26.

Olugasa, A; Ijagbone, O (2007). Patterns of spread of African Swine-Fever in south-western Nigeria, (1997-2005). *Vet. Ital.*, 43 (3): 621-628.

Saka, JO; Adesehinwa, AOK; Ajala, MK (2010). Incidence of African Swine-Fever (ASF) disease and its associated implications on pig production in Lagos state, Nigeria. *Bul. J. Agric. Sci*, 16: 80-90

Ugbomoiko, US; Ariza, L; Heukelbach, J (2008): "Pigs are the most important animal reservoir of Tunga penetrans (jigger flea) in a rural Nigeria". *Trop. Doc.* 38(4): 226–227. DOI: http://doi.org/10.1258/td.2007.070352.

World Animal Health Information System (WAHIS) (2023). *Rev Sci Tech*, 4 (2): 1-22

Wooldridge, J (2002). Econometric Analysis of Cross Section and Panel Data. *Cambridge: MIT Press.*