

Assessment of utilisation of biosecurity measures among pig farmers in Oyo state

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Target Audience: *Pig farmers, Animal scientists, Extension agents, Agribusiness experts*

Abstract

Spread and establishment of infectious diseases is a major challenge to livestock farming including pig production, as it significantly affects public health and farm output. Multi stage sampling techniques were adopted for this study. One hundred and twenty (120) respondents were selected for the study. Data were collected using well structured questionnaire and interview guide. The study described the socioeconomic and production characteristics of the respondents. The study also identified the biosecurity measures adopted and the factors that determined these by pig farmers in the study area. The result showed that 54% of the respondents were male, with a mean age and household size of 38 years and 7 members respectively. Most (55%) of the pig farmers had secondary school education. The most frequently used biosecurity measures were wearing footwears designated for farm work, use specific clothes for farm work and disinfection of the pen floor. The regression result showed that the R^2 was 0.52 indicating that about 52% of the variation in the factors affecting the use of biosecurity measure was explained by the model. From the study, it is recommended that extensive biosecurity measures should be enforced e.g discouragement of sharing farm tools.

Keywords: *Agriculture; Pig farmers; Bio-security; Measures; Regression model.*

Description of Problem

Pigs are highly social and intelligent animals (1). The domestic pig is among the most populous large mammals in the world. Small and medium sized livestock like poultry, sheep, goats, and in particular pigs are a viable and profitable enterprise that can be easily adopted and adapted by small-scale farmers. Pigs are prolific and are good feed to meat converters compared to other livestock such as cattle, sheep and goat (2). Increase in population growth directly affects rising and growing demand for animal products in order to ensure measure of adequate diet and food security. Shortage of animal protein is a major problem in Africa. Consequently, there has been a rise

in the production of animal products, particularly from poultry and pigs in the world. With the increase in worldwide demand for meat, fast-growing species with efficient feed conversion rates such as pigs are likely to account for a major share in the growth in the livestock subsector (3). Apart from the challenges of relative high cost of feed (4), the industry also battles with infectious diseases such as neonatal mortality, salmonellosis (5) and African swine fever (6) among others. The occurrence of infectious disease reduces the production efficiency which may further affect product quality leading to unsafe animal products hence, the farm economics will not be optimal. Biosecurity serves as a management

strategy that helps to safeguard the animals from infectious diseases that hampers livestock production efficiency that is capable of causing economic losses. Biosecurity is all encompassing as it involves the prevention of pathogens entering and spreading within a group of animals. The need to explore awareness of various biosecurity measures, their level of compliance on pig farms inspite of the reported gains of biosecurity is of great consequence, as well as identify the factors affecting biosecurity utilization among pig farms in Oyo State.

Materials and Methods

Description of study area and data collection

Ibadan, the capital of Oyo state is the third largest city in Nigeria by population (after Lagos and Kano). The city of Ibadan is located approximately on longitude 3°55'00" East of the Greenwich Meridian and latitude 7°23'47"North of the Equator at a distance some 145 kilometers Northeast of Lagos. Ibadan is located in southwestern Nigeria. A well-structured questionnaire was used to collect information from pig farmers in Ibadan and multi stage sampling techniques was used for the study.

Stage 1: purposive selection of Lagelu local government area due to the predominance of pig farmers.

Stage 2: using snow balling, a list of pig farmers was generated.

Stage 3: a random selection of one hundred and twenty pig farmers was done and they were interviewed.

Farmers and farms' characteristics were elicited which include the following;

Sex: Respondent sex was stated as either Male or Female

Age: This was measured in years as indicated by the respondents

Highest Educational level: Years spent in school was asked from the respondents

Household size: Respondent was asked to state the number of his/ her household members

Primary occupation: This was indicated by a response from listed choice as: pig farming, civil service, artisan, trading

Years of practicing pig farming: This was measured by indicating the number of years the respondent has been farming

Religion: This was measured by indicating a response from listed choice as Christianity, Islam, traditional worshipper

Farm size: This was measured by indicating a response from listed choice as hectare, acre, and plot

Breeds of pigs raised: This was measured by indicating a response from the listed choice as Exotic breeds, local breeds, cross breeds

Farming system: This was asked by indicating a response from listed choice as: Intensive system, Extensive system and Semi-intensive

Total number of pigs on farm: Respondent was requested to state the total number of pigs or herd size

Number of dead pigs in a year: Respondent was asked to state the number of dead pigs in a year etc.

Dependent variable

Dependent variable of this study is the Biosecurity practices index which was measured by using 3 point likert scale as never, occasionally or regularly and was scored as 1, 2 and 3 respectively to calculate the weighted mean. Furthermore, the value of the weighted mean was ranked based on the highest mean value as first, second, etc in descending order.

Data analysis

Data were subjected to both descriptive statistics such as (mean, frequency and

percentage) and inferential statistics. A multiple regression analysis was used to identify the determinants of Biosecurity index. The linear form of the regression model was expressed in the implicit form as follows; model specification

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, U)$$

where $Y = \text{Bio} - \text{security index}$ and

$f = \text{function of Bio} - \text{security index}$

Explicit form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + U$$

where $Y =$ Dependent variable, $\beta =$ Coefficient of the independent variables X and $U =$ Error term.

The choice of variables in the model was based on intuition and literature (4). The variables and its description are displayed in Table 1.

Table 1: Description of variables used in the model

Variable	Description
X_1	Farmer's age
X_2	Sex
X_3	Level of education
X_4	Householdsize
X_5	Years of experience
X_6	Management
X_7	Source of water
X_8	Type of feed
X_9	Disinfection of the pen floor
X_{10}	Use of footwear
X_{11}	Use of farm cloth
X_{12}	Use the burying site
X_{13}	Marital status

Results and Discussion

Personal Characteristics of the respondents

Sex of respondents

The brief description of the characteristics of the respondents is presented in Table 2. About 54.7% of the respondents were male while 45.3% of the respondents were female. The gender difference is minimal due to increase interest rate among the female gender. Traditionally women are not allowed to own cattle, but they are allowed to own pigs (8).

Age

The result shows that the mean age is (38%). Most (52%) of the respondents were between 31-43years, respondents between

18-30years were 24%, while respondents between 44-56 were 21% and respondents above 57 were 3%. This implies that majority of the respondent were still in their economically productive and active age.

Marital Status

The result shows that (14.2%) of the respondents were single while majority of the respondents were married (85.8%).

Educational Level

The result shows that more than half (55%) of the respondents had secondary school education as their highest educational attainment, followed by those with tertiary

education (36.7%), primary school education (6.6%) and respondents with no formal education were very few (1.7%). This support the findings of (7) that majority of pig farmers had secondary school education.

Household Size

The result shows that the mean household size is 7 persons, whereby 56.7% of the respondents had between 6-10 members in the family, 33.3% of the pig farmers had 1-5 members and 10% of the respondents had greater than 10 members.

Occupation

The result shows that majority of the respondents were farmers (57.9%), while

23.1% of the respondents were in civil service followed by artisan which was 10% and the least was trading (9%). This indicate that most of the respondents in the study area are practical pig farmers however, they are diversified into other livelihood activities.

Religion

The result shows that the majority of the respondents were Christians (63.8%) while Muslims were 35.5% and 1.7% of the respondents were traditional worshippers. This support the findings of (9) who stated that pig farming seems to be offensive and not acceptable to some extent thus pig farmers experience a level of stigmatization, discrimination and social rejection.

Table 2: Distribution according to the pig farmers characteristics

Variables	Frequency	Percentage n = 120
Mean Age	38	
Marital Status		
Single	17	14.2
Married	103	85.8
Educational Level		
Primary education	8	6.6
Secondary education	66	55
Tertiary education	44	36.7
No formal education	2	1.7
Household size (people)		
1-5	40	33.3
6-10	68	56.7
greater 10	12	10.0
Mean	7.0	

Source: Field survey, 2019

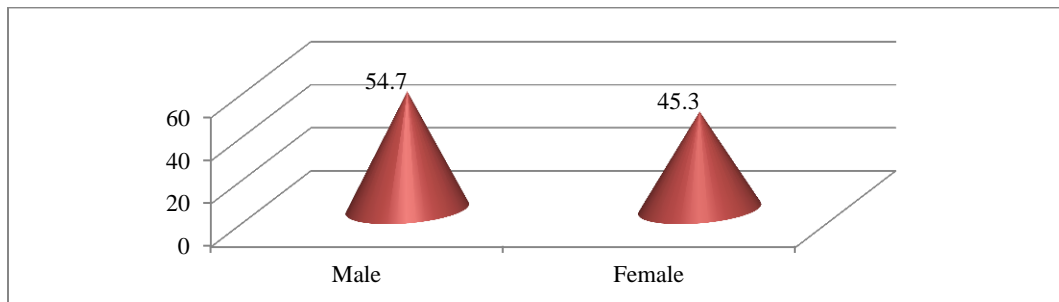


Figure 1: Sex distribution of the respondents

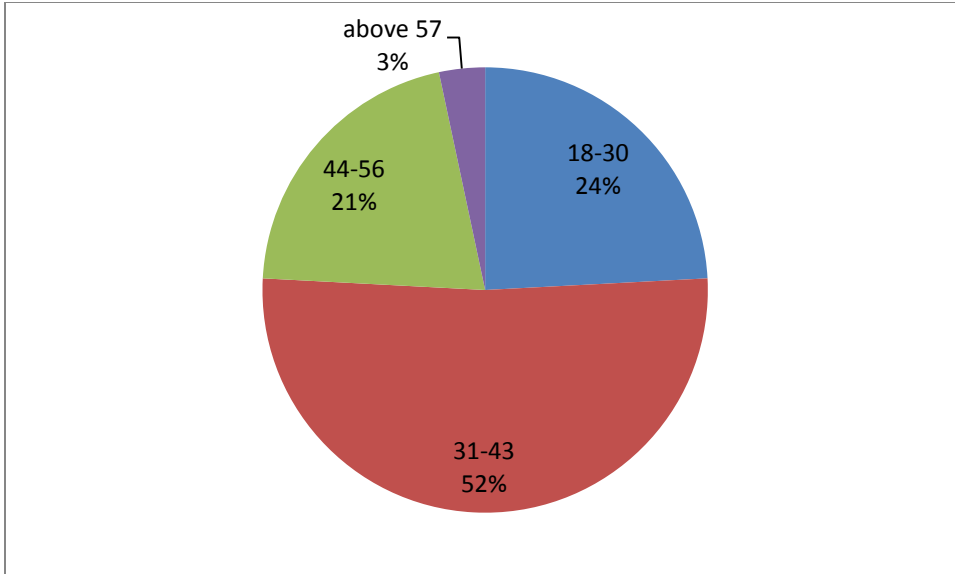


Figure 2: Age distribution in years of the respondents

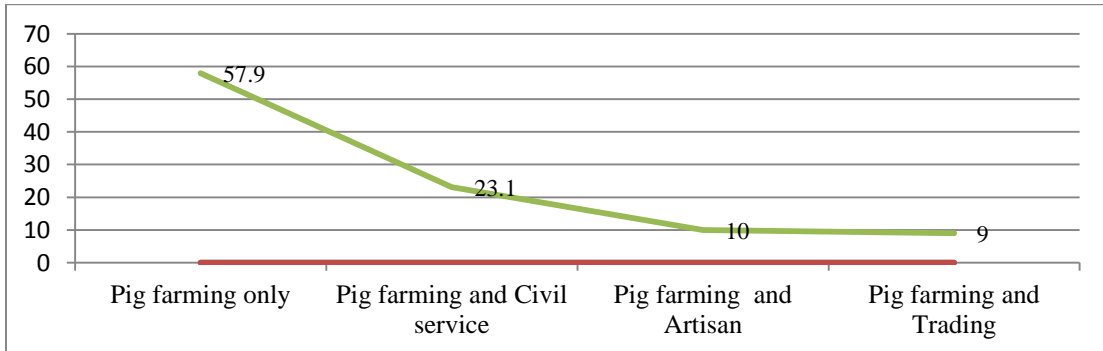


Figure 3: Distribution of the respondents based on occupation

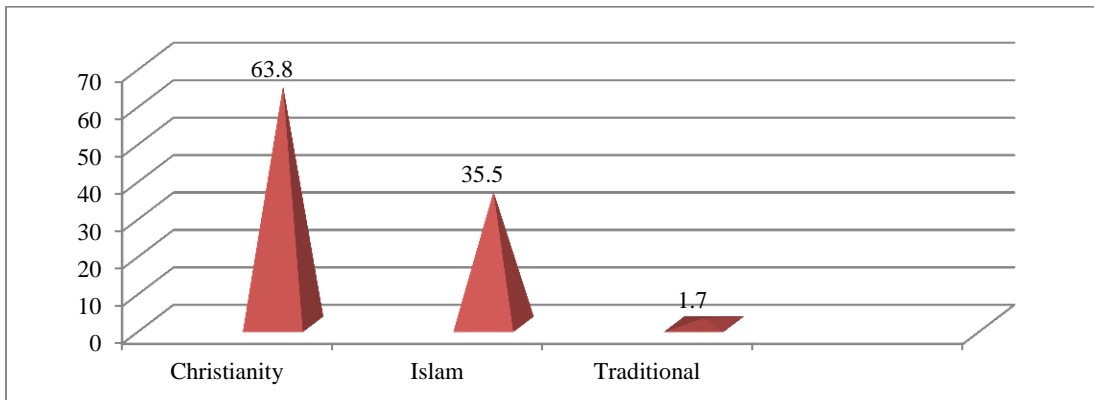


Figure 4: Distribution of the respondents based on religion

Pig production characteristics

Table 3 shows the production characteristics of the pig farmers in the study area. Majority (80.2%) of the respondents reported that the farmland type used was plot for their pig farming. This supports the findings of (10) who reported positive significant association between land area of the farm or farm size and adoption of

biosecurity measures in poultry keeping and dairy farming. Most (90.9%) of the respondents practice intensive system with most (74.4%) of the respondents reported to feed their animals with both local and concentrate feed. In addition, 76.9% of the pigs raised were cross bred and well water (52.9%) as the major source of water on the respondents' farms.

Table 3: Distribution according to pig farm's production characteristics

Variables	Frequency	Percentage
Farmland type		
Plot	97	80.2
Acre	20	16.5
Hectare	3	3.3
Management system		
Intensive system	110	90.9
Extensive system	9	7.4
Semi intensive	1	1.7
Feed type		
Locally formulated feed	30	25.6
Both locally formulated Feed and concentrate	90	74.4
Source of water		
Well water	64	52.9
Bore hole	20	17.3
River water	36	29.8
Breeds of pigs		
Exotic breed	25	20.7
Local breed	2	2.4
Cross breed	93	76.9

Source: field survey, 2019

Awareness level of respondents based on biosecurity measures

Table 4 shows the pig farmers awareness about the following biosecurity measures. Most of the farmers are aware of wearing designated cloth for farm work (95.8%), using specific footwear designated for farm work (97.5%), use of loading bay (86.7%), use of functional foot dip (70%), disinfection of pen floor (94.2%), quarantine or isolate sick animals on farm (95%), cleaning of working utensils (90.8%), use of burying site (96.7%), restricting visitors from farm (95%). However, some

respondents were unaware that wearing of farm cloth outside the farm (77.5%) and sharing farm equipment among fellow farmers (65%) were forms of anti biosecurity measures in pig production. This implies that the farmers are aware of the usage of biosecurity measure to prevent diseases. An earlier study conducted by (11) in Nigeria shows that, keeping flocks indoors without knowing the basic principles of biosecurity could actually expose humans to flocks, resulting in a higher risk of infection to the flock and humans (zoonosis).

Table 4: Distribution of farmers' awareness on Biosecurity measures

Biosecurity measures	Yes Frequency(%)	No Frequency(%)
Wearing of designated cloth for farm work	115(95.8)	5(4.2)
The use of specific foot wear designated for farm work	117(97.5)	3(2.5)
The use of the loading bay	104(86.7)	16(13.3)
The use of functional foot dip at the entrance of the farm	84(70)	36(30)
Disinfection of pen floor	113(94.2)	7(5.8)
Quarantine or isolate pig on farms	114(95)	6(5)
Clean the farm tools	109(90.8)	11(9.2)
The use of the burying site	116(96.7)	4(3.3)
Restrict visitors from the farm	114(95)	6(5)
Your farm workers wear farm cloth outside the farm	27(22.5)	93(77.5)
Share farming equipment among fellow farmers	42(35)	78(65)

Source:Field Survey, 2019

Biosecurity measures employed among pig farmers

The result in the Table 5 shows that, the use of specific foot wear designated for farm work was ranked 1st while wearing of designated cloth for farm work, disinfection of the pen floor, use of the burying site and restriction of visitors from the farm were ranked 2nd, 3rd, 4th and 5th respectively while the use of functional foot dip at the

entrance of the farm, cleaning of farm tools, the use of the loading bay, quarantine or isolate the pen floor were ranked 6th, 7th, 8th and 9th respectively and sharing of farming equipment among fellow farmers and farm workers wear farm cloth out side the farm were ranked 10th and 11th. These indicates that most of the biosecurity measures are frequently used.

Table 5 : Frequency of Biosecurity practises used by pig farmers

Biosecurity Measures	Regularly	Occassionally	Never	Weighted Mean	R
Wearing of designated cloth	107(88.4)	10(8.3)	3(3.3)	2.86	2 nd
Foot wear designated for farm work	111(91.7)	9(8.3)	0(0)	2.95	1 st
The use of the loading bay	80(66.1)	37(30.6)	3(3.3)	2.64	8 th
Use of functional foot dip	93(76.9)	15(12.4)	12(10)	2.68	6 th
Disinfection of the pen floor	103(85.1)	15(12.4)	2(1.7)	2.84	3 rd
Quarantine or isolate the pen floor	86(71.1)	31(25.6)	3(2.5)	2.43	9 th
Clean the farm tools	82(67.8)	37(32.2)	0(0)	2.68	7 th
The use of the burying site	101(83.5)	16(13.2)	3(2.5)	2.81	4 th
Restrict visitors from the farm	88(72.7)	27(22.4)	5(4.2)	2.69	5 th
Wearing farm cloth outside the farm	11(9.1)	45(37.2)	64(52.9)	1.56	11 th
No sharing of farming equipments	9(8.3)	60(49.6)	51(42.1)	1.65	10 th

Source: Field survey, 2019

Deteminants of Biosecurity measures

The result in Table 6 shows the significant factors that influences the use of biosecurity measures among pig farmers, they are type of feed, year of experience, source of water, disinfection of the pen floor, marital status, household size, use of footwears and burying sites. Farmer’s age, sex, level of education, management system and use of farm cloth were however insignificant in explaining use of biosecurity by pig farmers. The R² of 0.5551 indicate that about 56% of the variation in the factors affecting the use of biosecurity measure was explained by the influence of the factors. Household size and years of experience had negative relationship with biosecurity measures. This is not in line with a priori expectation and the work of (12) on pig

production in Ogun state. The household size and marital status negative relationship with biosecurity index could be because most of the respondents were married and marriage is often saddled with responsibilities of catering for more people in the household than those that are single, thereby making pig farmers have less time to ensure numerous biosecurity measures on their farms. Years of experience also showed a negative relationship with biosecurity index. This could imply that the more the years of experience farmers attain, the lesser the energy needed to execute more biosecurity measures. Source of water, type of feed, disinfection of pen floor, use of footwear, use of burying site were consistent with a priori expectation.

Table 6: Factors affecting the use of Biosecurity measures among pig farmers

Biosecurity index	Coefficient	Std. Error	t-value	p>t
Constant	-0.943	0.203	-4.65	0.00
Sex	0.024	0.029	0.81	0.42
Age	0.002	0.003	0.64	0.53
Level of education	0.023	0.022	1.03	0.31
Householdsize	-0.020*	0.006	-3.16	0.00
Years of experience	- 0.006***	0.003	-1.91	0.06
Management	0.053	0.051	1.05	0.30
Source of water	0.067*	0.027	2.43	0.02
Type of feed	0.079**	0.028	2.81	0.01
Disinfection of penfloor	0.103**	0.044	2.35	0.02
Use of footwear	0.242*	0.077	3.14	0.00
Wearing of farm cloth	0.070	0.048	1.46	0.15
Use of burying site	0.332*	0.085	3.90	0.00
Marital status	0.122**	0.059	2.06	0.04
R-squared =0.555				
Adj R-squared =0.500				
Prob>F =0.0000				

Field survey, 2019

*,** and *** are level of significance at 1%, 5% and 10% respectively.

Conclusions and Applications

The findings of the study shows;

1. Majority of the respondents were aware of the selected biosecurity practices in the study area except very few ones like

farm workers wearing farm cloth outside the farm and sharing farm equipment outside their farm among other farmers, these acts do not promote

adequate biosecurity generally in livestock production.

2. Household size and years of experience though had negative effects on biosecurity in pig farms, however, marital status, type of feed given to the animals, source of water, disinfection of the pen floor, use of foot wears and use of burying sites positively influence biosecurity in the pig farms.
3. Strict imposition of designated foot wears and absolute discouragement of indiscriminate disposal of farm wastes and mortalities within and outside pig farms can curb disease spread, improve the farmers standard of living and increase economic gain.

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