Determinants of Poultry Farmers' Participation in Livestock Insurance in Southwest Nigeria

O.K. Akintunde
Department of Agricultural Economics, University of Ibadan, Ibadan

ABSTRACT

Poultry birds are primarily exposed to the risk of death caused by various types of diseases. In many cases, epidemic diseases can cause catastrophic losses from deaths of an entire stock of livestock. In the light of this, this study was designed to examine the determinants of poultry farmers' participation in livestock insurance in southwest Nigeria. Primary data were obtained with the aid of structured questionnaire from a cross section survey of 403 poultry farmers drawn through multi-stage sampling procedure. Descriptive statistics and logit model was used to analyze data obtained. Majority (81.4%) of the poultry egg farmers were males. Majority (85.6%) were married with an average household size of 5.4±1.7 members. The average age and mean years of experience were 45.5±9.1 and 10.0±5.05 years, respectively. More than half (59.6%) of the poultry farmers were aware of livestock insurance policy while only 11.9% of the poultry farmers insured their poultry farms. Stock size, rearing system, access to extension services and poultry rearing experience were significant variables that influenced the participation of the poultry farmers in livestock insurance policy. It is recommended that effective service delivery by insurance service providers will ensure continuity of farmers' participation in agricultural insurance. Also, the government should formulate a policy that will make livestock insurance more affordable to poultry farmers and adequate dissemination of knowledge on the benefits of livestock insurance by extension agents is crucial to increase the level of participation of poultry farmers in the use of livestock insurance policy.

Key words: Risk, mitigation, response, factors, egg, production, logit

INTRODUCTION

Poultry enterprises are usually faced with a lot of risks and uncertainties, some of which are natural hazard such as floods, drought, fire outbreak, diseases, pest attacks and theft. Since, the poultry farmer cannot predict the probability of occurrence of any of these and cannot bear these risks and uncertainties alone, he is faced with the option of transferring or sharing the risks involved in the production. Therefore, poultry farmers underwrite livestock insurance in order to mitigate the ill effects of risks. Agricultural insurance is an economic component of farm management designed to reduce the adverse effect of natural disaster on farmers' incomes through the payment of indemnity (Ajieh, 2010).

In Nigeria, the Government introduced agricultural insurance programme with the tripartite aim of broadening farmers' access to farm resources, positively changing farmers' attitude to risk in their choice of resource use and to achieve increased food supplies in the market (Olubiyo *et al.*, 2009). The previous studies have shown that agricultural insurance protects farmers against financial disaster after suffering any of the insured risks and the farmer is not only able to continue in business but also empowers the farmers to obtain farm credit (Hardaker *et al.*, 1997; Olubiyo and Hill, 2003; Epetimehin, 2010).

The National Agricultural Extension and Research Liaison Services identified the following as the benefits of agricultural insurance to farmers: (a) It protects farmers against financial disaster after suffering any of the insured risks for which indemnity (compensation) is paid. The farmer is not only able to continue in business but also the stability of his income is enhanced, (b) Agricultural insurance empowers the farmers to obtain farm credit. Since, insurance guarantees protection against crop and/or livestock failure, the insured farmer has greater confidence in obtaining loans, (c) It facilitates better planning and project implementation since there is a high level assurance for continuity in business, (d) It serves as an assurance to banks and other financial institutions who grant loan for agricultural purposes that loans given will be repaid and (e) It build farmers confidence in using new technologies and making greater investments in agriculture (NAERLS., 1991).

Nigerian farmers are not very excited about taking an insurance policy. This can be traced to the less than satisfactory image of the insurance industry regarding loss compensations and this problem has created mixed feelings towards Agricultural insurance by prospective farmers and hence, the farmers become reluctant in their willingness to take an insurance cover and also considering the very low incomes, the small sizes of holdings aimed at subsistence production, large scale ignorance and poverty and the adverse view of other people's experiences with activities of insurance companies in other sectors, peasant farmers are generally reluctant to patronize the insurance market, let alone willingly forgo a small payment in the form of premiums in exchange for their farm risks (Olubiyo *et al.*, 2009).

Despite the existence of insurance services rendered by Nigerian Agricultural Insurance Corporation and other private firms in Nigeria, there has been a low level of participation of farmers buying insurance premium. It is in the light of the above that this study was conceived to examine determinants of participation of poultry farmers in livestock insurance in southwest Nigeria. The specific objectives are to:

- Determine the level of awareness of poultry farmers livestock insurance
- Profile the level of participation in livestock insurance policy by poultry farmers
- Examine the factors influencing the poultry farmers inparticipation in livestock insurance policy

MATERIALS AND METHODS

Study area: The study was carried out in Osun and Oyo states, Southwest, Nigeria. Osun State has 30 local government areas with an estimated population of 3.4 million (NPC., 2006) and land area of 14,875 km^2 on latitude 5°N and 8°N, between longitude 4°E and 5°E. The climate is humid tropical type with a mean annual temperature of about 28°C and a mean annual rainfall of over 1600 mm. Oyo State has 33 Local Government Areas with an estimated population of 5.6 million (NPC., 2006). The land area is 35,743 km^2 located within latitude 3°N and 5°N, between longitude 7°E and 9.3°E. The average temperatures are between 24°C and 25°C. Rainfall figures over the state vary from an average of 1200 mm at the onset of heavy rains to 1800 mm at its peak in the southern part of the state to an average 800 and 1500 mm at the northern part of the state.

There are two distinct ecological zones in both states; the rainforest and derived savannah zones. Major crops found in these states are yam, cassava, maize, rice, vegetables and cash crops like cocoa, rubber, kolanut and citrus. Rural households in the states rear sheep, goats, local chickens and pigs. Also, intensive rearing of exotic breeds of cockerels, layers and broiler birds have become popular in the study areas.

Source and type of data: The primary data were obtained with the aid of well-structured questionnaire that captured socio-economic/demographic characteristics of poultry farmers and farm characteristics. These include age of the poultry egg farmer, gender, level of education, poultry farming experience, household size and sources of credit. It also includes information on awareness about the livestock insurance policy and participation in the policy by the poultry farmers.

Data collection and sampling technique: A multistage sampling technique was employed in selecting the poultry farmers in the study areas. The first stage was the purposive selection of Osun and Oyo States from the six states that made up the Southwest, Nigeria, based on the highest exotic-poultry population distribution in Southwest, Nigeria (FDLPCS., 2007). The second stage involved purposive selection of six (6) Local Government Areas (LGAs) from Osun State and eight (8) local governments from Oyo State. The size of the local governments chosen from each state was based on available records of number of registered members of the Poultry Association of Nigeria (PAN) in which Oyo State has the highest number of poultry farmers than Osun State. The purposive selection of the local governments in each state was based on those with the highest number of registered members of the Poultry Association of Nigeria (PAN). They are Iwo, Ejigbo, Irewole, Ayedire, Irepodun and Ilesa West in Osun State and Afijio, Egbeda, Lagelu, Akinyele, Atiba, Oyo East, OnaAra and Oyo West in Oyo State.

The third stage was the random selection of two hundred and forty (240) and one hundred and eighty (180) poultry farmers selected from Oyo and Osun States respectively proportionate to the size of registered members of the Poultry Association of Nigeria (PAN) in each state. Also, the number of poultry farmers selected in each selected Local Governments Area is proportionate to the size of registered members of the Poultry Association of Nigeria (PAN) in each LGAs. In all, total of four hundred and twenty (420) poultry farmers. However, due to incomplete responses, only four hundred and three (403) questionnaires were used for the analysis.

Analytical techniques: Data collected were analyzed with descriptive statistics and logit regression model. The descriptive statistics was used to examine the level of poultry farmers' awareness and participation in livestock insurance policy while the logit regression model to determine the factors influencing poultry farmers willingness to participate in livestock insurance livestock policy.

Logit regression model: The logit regression model is a unit or multivariate technique which allows for estimating the probability that an event occurs or not by predicting a binary dependent outcome from a set of independent variables. There are two reasons for choosing Logit model for this study instead of linear probability and probit models according to Rahman and Alamu, (2003). Logit model ensures production of probability of choice within (0, 1) range. This is an advantage over linear probability model and it is easier and more convenient to compute than probit model. The logit model is based on cumulative logistic probability function and it is computationally tractable. According to Gujarati and Porter (2009), it is expressed as:

$$P_i = E\left(Y = \frac{1}{X_1}\right) = \beta_1 + \beta_2 X_2 + \beta_3 X_i \tag{1}$$

For ease of estimation, Eq. 1 is further expressed as:

$$P_i = \frac{1}{1 + e^{-Z_i}} = \frac{e^z}{1 + e^z} \tag{2}$$

Where:

P_i = Probability of an event occurring

$$Z_i = \beta_1 + \beta_2 X_i \tag{3}$$

The empirical model of the logistic regression for this study assumed that the probability of the poultry farmers' participation in livestock insurance policy is expressed as:

$$P_i = \frac{e^{(b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_7 X_7 + \ldots + b_{10} X_{10})}}{1 + e^{(b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + \ldots b_{10} X_{10})}} \tag{4}$$

Pi range between zero and one and it is non-linearly related to Z_i. Z_i is the stimulus index which range from minus infinity to plus infinity and it is expressed as:

$$Z_i = \ln\left(\frac{P_i}{1 - P_i}\right) = b_{0 + b_1 X_1 + b_2 X_2 + \ldots + b_7 X_7 + u} \tag{5}$$

To obtain the value of Z_i, the likelihood of observing the sample was formed by introducing a dichotomous response variable. The explicit logit model is expressed as:

$$Y_i = b_{0 + b_1 X_1 + b_2 X_2 + \ldots + b_{10} X_{10} + u} \tag{6}$$

Where:

Y = Dichotomous response variable (1 for poultry farmers who participated in livestock insurance policy, 0 otherwise)

X_1 = Age of farmers (years)

X_2 = Years of formal education (years)

X_3 = Gender (dummy = 1 if female, 0 otherwise)

X_4 = Household size (number of persons)

X_5 = Hired labour (man-days)

X_6 = Poultry rearing experience (years)

X_7 = Access to Extension services (dummy = 1 if yes, 0 otherwise)

X_8 = Access to Credit (dummy = 1 if yes, 0 otherwise)

Poultry farms' characteristics:

X_9 = Rearing system (dummy = 1 if battery cage, 0 otherwise)

X_{10} = Stock size (number of layers stocked)

b_1-b_{10} = Coefficients of stimulus variables

b_0 = Constant term

u = Error term

RESULTS

Socio-economic characteristics of poultry egg farmers and farm characteristics:
Table 1 presents socio-economic characteristics of poultry egg farmers. Majority (70.5%) of the
poultry farmers were below 50 years of age with an average age of 45.5±9.1 years. Poultry farmers
were mostly male (81.4%). Most of the poultry farmers were married (85.6%) with average
household size of 5.4±1.68 persons. Majority had secondary education (45.2%) followed by those
with tertiary education (36.7%). More than half (56.3%) of the poultry farmers had between 5-
10 years of poultry farming experience with the mean years of experience being 10.0±5.1 years.
Majority (70.0%) of the poultry farmers had an access to credit while the remaining (30.0%) were
discovered not to have access to any source of credit. Also, majority (73.9%) of the poultry farmers
had access to livestock extension services.

Poultry farm characteristics: Table 2 shows that half (50.4%) of the poultry egg farmers
preferred to raise Harco breed of hen while a few (2%) raised Rhode Island Red. Majority (87.3%)
of the farmers stocked pullets. Farm size was classified following Adene and Oguntade (2006),
Obi *et al.* (2008) and Arowolo *et al.* (2012). Farms having between 500 and 2000 birds were

Table 1: Socio-economic characteristics of poultry farmers

Characteristics	Frequency	Percentage
Age (Years)		
<30	33	8.2
30-39	99	24.6
40-49	152	37.7
≥50	119	29.5
Mean = 45.5	S.D = 9.1	
Gender		
Male	328	81.4
Female	75	18.6
Marital status		
Married	343	85.1
Single	37	9.2
Divorced	7	1.7
Widowed	16	4.0
Household size		
1-3	44	10.9
4-6	290	72.0
>6	69	17.1
Mean = 5.4	S.D = 1.7	
Level of education (years)		
No formal education	7	1.7
Adult education	4	1.0
Primary education	62	15.4
Secondary education	182	45.2
Tertiary education	148	36.7
Poultry farming experience (years)		
<5	36	8.9
5-10	227	56.3
11-16	105	26.1
>16	35	8.7
Mean = 10.0	S.D = 5.1	
Access to credit		
No	121	30.0
Yes	282	70.0
Access to livestock extension		
No	105	26.1
Yes	298	73.9

Field survey data, 2013

Table 2: Poultry Farm's characteristics and system of management practice by the farmers

Parameters	Frequency	Percentage
Breeds of Hen		
Harco	203	50.4
Bovan nera	104	25.8
Dominant black	29	7.2
Rhode Island red	8	2.0
Isa brown	59	14.6
Stock type		
Day old chicks	51	12.7
Pullets	352	87.3
Stock size		
500-2000	129	32.0
2001-9999	235	58.3
≥10000	39	9.7
Mean = 4924.2	S.D = 3838.9	
Poultry system		
Deep litters	97	24.1
Battery cage	306	75.9
Mortality rate		
<5	110	27.3
5-10	216	53.6
11-20	70	17.4
>20	7	1.7
Mean = 7.7	S.D = 4.9	

Field survey data, 2013

considered as small scale commercial farms, those farms having more than 2000 birds and flock size which is less than 10000 birds were regarded as a medium commercial farm while those having 10000 birds and above is classified as large commercial poultry farms. The result shows that the medium scale poultry egg farmers constituted more than half (54.3%) of the farmers. Also, the least number (13.6%) of the farmers are large scale operators while the small scale constituted 32.0% of the poultry egg farmers. The average flock size was 4924.2±3838.9 layers. Majority (75.9%) of the poultry egg farmers operated battery cage system while lesser number (24.1%) of the farmers reared their birds on deep litter system. The average mortality was 7.7±4.9%; 27.3% of the farmers had less than 5% of mortality, 53.6% of the poultry egg farmers had 5-10% of mortality rate, 17.4% of the farmers had 11-20% of mortality rate while 1.7% of the farmers had more than 20% of mortality rate.

Awareness and participation of poultry farmers in livestock insurance policy: Table 3 shows that more than half (59.6%) of the poultry farmers were aware of livestock insurance policy. Table 4 reveals that only 11.9% of the poultry farmers insured their poultry farms.

Determinants of poultry farmers' participation in livestock insurance: The factors determining the poultry farmers' participation in livestock insurance are presented in Table 4. The diagnostics statistics revealed that the chi square distribution which was used to test the overall model adequacy was significant at 1% (χ^2 = 106.11, p<0.0000). The result of the logit regression in Table 5 shows that stock size, rearing system, access to extension services and poultry rearing experience were significant variables that influenced the participation of the poultry farmers in livestock insurance policy. Both access to extension services and poultry rearing experience were significant at 10% significance level while rearing system and stock size were significant at 5 and 1%, respectively. However, gender, age of the poultry farmers, household size, years of education, access to credit and labour were not significant.

Table 3: Distribution of poultry farmers by awareness of livestock insurance

Characteristics	Frequency	Percentage
No	163	40.4
Yes	240	59.6
Total	403	100.0

Source: Field Survey Data (2013)

Table 4: Distribution of poultry farmers by participation in livestock insurance

Characteristics	Frequency	Percentage
No	355	88.1
Yes	48	11.9
Total	403	100.0

Source: Field Survey Data (2013)

Table 5: Determinants of poultry farmers' participation in livestock insurance

Explanatory variables	Coefficients	Standard error	t-value
Age of poultry farmers	0.0200	0.03030	0.66
Gender (female = 1)	-0.6132	0.88360	-0.69
Years of formal education	0.1817	0.14250	1.28
Household size	0.1048	0.14230	0.74
Years of poultry rearing experience	0.0769*	0.04130	1.86
Access to credit	1.2189	1.77940	1.56
Access to livestock extension	1.9884*	1.05180	1.89
Hired labour	-0.0012	0.02450	-0.05
Rearing system(dummy = 1 if battery cage, 0 otherwise)	1.1821**	0.56640	2.09
Stock size	0.0003***	0.00005	5.05

Field Survey Data (2013), *Significant at 10% level, **Significant at 5% level, ***Significant at 1%

DISCUSSION

Most of the poultry farmers were in their active and productive years who can easily adopt new innovations that could enhance poultry production. The result implied that modern poultry farming is still predominantly a male occupation likely because of the high level of risk involved, labour intensive and other husbandry processes which are not attractive to most women. Consistent with this finding are the studies of Lawal *et al.* (2009), Adisa and Akinkunmi (2012) and Uzokwe and Bakare (2013). Most of the poultry farmers were married (85.6%) with average household size of 5.4±1.68 persons. More than half of the poultry farmers had between 5-10 years of poultry farming experience. This is expected to manifest in high level poultry management as the longer the years of poultry farming experience, the more exposed the farmer becomes and the more efficient the farmer is expected to be in poultry management.

Majority of the poultry farmers had access to livestock extension services. This implies, that majority of these poultry farmers had access to advisory services and adequate information on improved poultry management techniques. Medium scale poultry egg farmers constituted more than half of the farmers. Also, the least number (13.6%) of the farmers are large scale operators while the small scale constituted 32.0% of the poultry farmers.

More than half of the poultry farmers were aware of livestock insurance, however, few of the farmers insured their poultry farms. This indicates a preponderance of low participation in livestock insurance by the poultry farmers in the study area. This result confirms the findings of Ajieh (2010) who revealed the low participation of poultry farmers in agricultural insurance in Kwara state of Nigeria. This is probably due to constraints to farmers' participation in agricultural insurance which include fears that claims may not be paid; inadequate knowledge on the benefits of livestock insurance, delay in payment of compensation and high premium rate. However, the implication of the result is that the layers chicken farmers in the study area have to mitigate against production risks that might occur through other means.

The coefficient of years of poultry rearing experience of the farmers was found to be positive and significant at 10% implies that the longer the years of poultry rearing experience, the more exposed the farmer becomes and the higher their participation in livestock insurance policy. The coefficient of accessibility to extension services by the poultry farmers was found to be positive and significant at 10% implying that the higher the access to extension services by the poultry farmers, the higher their participation in livestock insurance. This result is inconsistent with findings of Farayola *et al.* (2013), who confirmed contacts with extension agents to be insignificant in influencing the farmers' participation in agricultural insurance scheme. The coefficient of poultry rearing system of the farmers which was found to be positive and significant at 5% implies that the poultry farmers that operate battery cage system tend to insure their poultry farms.

The coefficient of stock size of was found to be positive and significant at 1% implies that poultry farmers with larger stock tend to insure their poultry farms than small scale poultry farmers. This result on stock size obtained from this study is similar to the previous study of Oyinbo *et al.* (2012), who reported farm size as a significant variable that influenced the probability of participation of the farmers in agricultural insurance scheme. This result is expected as the risk is higher in the large scale farms than small farms. Also, most of the large scale poultry farmers have access to credit and they have to insure their farms as one of the conditions to obtain the loans.

This study concludes that stock size and rearing system in that order were the most important factors determining the poultry farmers' participation in livestock insurance policy. Also, gender, age of the poultry farmers, household size, years of education, access to credit and labour were found not to be the determinants of poultry farmers' participation in livestock insurance policy. The conclusion of this study disagrees with the similar studies conducted by Mishra and Godwin (2006), Oyinbo *et al.* (2012) and Farayola *et al.* (2013), who reported that the coefficient of age of the farmers which was found be negative and significant which implies that the older the farmers, the lower their participation in agricultural insurance scheme.

The study recommends that the government should formulate a policy that will make livestock insurance more affordable to poultry farmers by increasing the present level of subsidy granted for livestock insurance cover. Nigerian Agricultural Insurance Company (NAIC) should endeavour to keep to contractual arrangements of indemnifying the farmers in the advent of disease outbreak so as to allay the fears of other farmers that claims may not be paid. Also, adequate dissemination of knowledge on the benefits of livestock insurance by extension agents is crucial to increase the level of participation of poultry farmers in the use of livestock insurance policy to mitigate against risk in poultry enterprise.

REFERENCES

Adene, D.F. and A.E. Oguntade, 2006. The structure and importance of the commercial and village based poultry industry in Nigeria. FAO Poultry Production Systems, FAO, Rome, Italy, October 2006, pp: 1-102.

Adisa, B.O. and J.A. Akinkunmi, 2012. Assessing participation of women in poultry production as a sustainable livelihood Choice in Oyo State, Nigeria. Int. J. Plant Anim. Environ. Sci., 2: 73-82.

Ajieh, P.C., 2010. Poultry farmers' response to agricultural insurance in delta State, Nigeria. J. Agric. Sci., 1: 43-47.

Arowolo, R.O.A., K.O. Soetan, O.O. Arowolo and O.O. Sodimu, 2012. The level of awareness and use of anticoccidials in poultry farms in South Western Nigeria. Afr. J. Pharm. Pharmacol., 6: 3158-3164.

Epetimehin, F.M., 2010. Agricultural insurance in Nigeria and its economic impact. J. Bus. Manage., 2: 1117-3653.

FDLPCS., 2007. Current issues in the control of avian influenza in Nigeria. Proceedings of the Stakeholders Meeting with Poultry Association of Nigeria by Dr. Mohammed Dantani Saidu, October 30, 2007, Abuja, Nigeria.

Farayola, C.O., I.A. Adedeji, P.O. Popoola and S.A. Amao, 2013. Determinants of participation of small scale commercial poultry farmers in agricultural insurance scheme in Kwara State, Nigeria. World J. Agric. Res., 1: 96-100.

Gujarati, D.N. and D.C. Porter, 2009. Basic Econometrics. 5th Edn., McGraw-Hill Irwin, New York, ISBN: 9780071276252, Pages: 922.

Hardaker, J.B., R.M. Huime and J.R. Anderson, 1997. Coping with Risk in Agriculture. CAB International, Wallingford, Pages: 274.

Lawal, B.O., D.O. Torimiro and B.A. Makanjuola, 2009. Impact of agricultural extension practices on the Nigerian poultry farmers' standard of living: A perceptional analysis. Trop. Subtrop. Agroecosyst., 10: 465-473.

Mishra, A.K. and B.K. Goodwin, 2006. Revenue insurance purchase decisions of farmers. Applied Econ., 38: 149-159.

NAERLS., 1991. Practices of agricultural insurance in Nigeria. Extension Bulletin No. 10, National Agricultural Extension and Research Liaison Services (NAERLS), Abuja, Nigeria.

NPC., 2006. Analysis of Nigerian 2006 census results. National Population Commission (NPC), Abuja, Nigeria.

Obi, T.U., O.A. Olubukola and G.A. Maina, 2008. Pro-Poor HPAI risk reduction strategies in Nigeria: Background paper. DFID Pro-poor HPAI Risk Reduction Strategies Project, Africa/Indonesia Region Report No. 5, South Africa.

Olubiyo, S.O. and G.P. Hill, 2003. Beyond the risk factor: Bank lending to small-scale peasant farmers in Nigeria. Afr. Rev. Money Finance Bank., 2: 12-21.

Olubiyo, S.O., G.P. Hill and J.P.G. Webster, 2009. Econometric analysis of the impact of agricultural insurance of farming systems in the middle belt, Nigeria. Afr. J. Food Agric. Nutr. Dev., Vol. 9.

Oyinbo, O., R.O. Abdulmalik and R.A. Sami, 2012. Determinants of crop farmers participation in agricultural insurance in the federal capital territory, Abuja, Nigeria. Greener J. Agric. Sci., 2: 21-26.

Rahman, S.A. and J.F. Alamu, 2003. Estimating the level of women interest in agriculture the application of logit regression model. Nig. J. Sci. Res., 4: 45-49.

Uzokwe, U.N. and E.A. Bakare, 2013. The effects of climate variability on poultry production in Ose Local government area of Ondo State, Nigeria: Socio-economic characteristics and perceptions of farmers. Int. J. Agric. Biosci., 2: 39-44.