Double Hurdle Analyses of Factors Influencing the Participation of Poultry Farmers in Insurance in Afijio Local Government, Oyo State

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Abstract
The poultry industry in Nigeria is a high-risk enterprise that is particularly subject to the vagaries of nature and hence the need for farmers to hedge their business. Therefore, this study investigated insurance coverage among poultry farmers as a risk mitigation tool. The study was conducted in Afijio Local Government Area of Oyo State, Nigeria. A multistage sampling technique was employed to select representative farmers for the study. One hundred and twenty (120) farmers were randomly selected from all sampled communities. The data were analyzed using descriptive statistics and a double hurdle regression model. The results show that 25.42% of the poultry farmers had insurance, while 74.58% had no insurance policy. The double hurdle regression model showed a good fit of a chi-square value of 27.58, which was significant at 1%. The result showed that members of cooperatives, the number of birds, access to extension agents, and farming experience were important factors influencing the decision to take insurance. The analysis of the constraints faced by poultry farmers in the uptake of insurance showed that high premium rate fears that claims might not be paid, and insufficient compensation in the event of loss were the significant challenges experienced by poultry farmers in their use of insurance. Therefore, the study recommends effectively targeting farmers for sensitization on the benefits of joining cooperatives and other social groups and, most importantly, better accessibility of poultry farmers to extension services to improve their insurance uptake.

Keywords: Insurance cover, risk management, agriculture, double hurdle, poultry

Introduction

Agricultural production is considered necessary in developed and developing countries for its role in food provision and rural employment. It is a source of livelihood for over 2.5 billion people and is particularly vulnerable to risk (FAO, 2016). Nigeria is among the African countries where agriculture plays a vital role in the economy. It has been established that about 34.66% of the entire population is employed in agriculture in Nigeria (World Bank, 2020). About 90% of Nigeria's food production comes from small farms (Oluwatayo et al., 2008). Poultry farming is one of the leading enterprises in Nigeria's Agricultural sector. It has gained acceptance among the citizens of almost all the regions in Nigeria due to its prolific instincts and short-term rate of returns in cash and kind benefits (Igene, 1997). Nigeria's livestock population consists of 20.7 million cattle; 80.8 million goats; 42.5 million sheep; 6.5 million pigs, and 207.8 million poultry (Simona, 2012). This shows that poultry alone constitutes more than 60% of the total livestock population, indicating the dominance of the poultry sub-sector in the livestock industry. Other poultry-related birds are domestic fowl, turkey, duck, guinea fowl, goose, and pigeon. The poultry industry in Nigeria has suffered a lot of losses, which has affected both farmers and consumers. Birds, in general, are prone to disease attacks. An attack can wipe out thousands of birds or even the entire farm.

An attack on the poultry industry in 2006 by avian influenza forced many small and medium-scale poultry farms to close. In such scenarios, insurance remains the only option to assist farmers in continuing business (Adeyonu et al., 2016). Despite the importance of insurance in sustainable development, insurance has not been fully accepted by poultry farmers and other farmers. Insurance has been described as an effective agricultural risk management strategy. It is a contract signed between two parties in which one party, called an insurer, undertakes an exchange called a premium to pay the other party a fixed amount of money on the occurrence of an unforeseen event (risk) (Adams, 1995).

It has also been identified as an essential tool for promoting and ensuring the sustainability of Agriculture due to its inherent nature of risk. Livestock accounted for 6.48% of the agricultural sectors' contribution to GDP while crop production represented 91.6% of the sectors' economic activities (NBS, 2019). These figures portray how marginalized the livestock sector is compared to the crop sector. Inefficient risk management in agriculture has remained a severe challenge to all stakeholders involved in agriculture. Despite the importance of insurance in helping the farmer maintain a given level of return, a large number of poultry farmers are not participating in insurance schemes; majority of those that purchase insurance premiums do so because they are mandated to obtain insurance as a requirement for obtaining loans or agricultural credit (Eleri et al., 2012).

It is often argued that the formal private insurance sector in developing countries has failed to serve the poorer section of the economy. Obtaining insurance cover from the private sector has its difficulties. The farmers are generally reluctant to patronize the insurance market by willingly forgoing a small payment in the form of premiums in exchange for their farm risks (Olubiyo et al., 2009). They also need to learn about the fundamentals of livestock insurance. While on the part of the insurance companies, Nigeria is known to be vulnerable to changes in global agro-commodity prices, with a significant impact on inflation and foreign reserves. This makes it difficult for insurers to maintain a fixed premium charge (Ehiogu, et al., 2019). Insurance providers require up-to-date information on farm operations, particularly crop yields and losses from natural disasters to compute premiums and pay indemnities. Most farmers do not keep accurate farm records, and consequently, they do not have this information, making it difficult for insurance providers to assess claims adequately. (SAHEL, 2014). Only one percent of Nigeria's 200 million population have one form of insurance or the other, and agriculture insurance has a current coverage of 25% of the total population of Nigerians who have Insurance (Nigeria Incentive-Based Risk Sharing System for Agricultural Lending, NIRSAL, 2019). This penetration rate shows the institution is faced with many challenges that have hindered its penetration and growth in the agricultural sector. Thus, it can be inferred that in spite of the roles and policies of Government and private sector aimed at increasing effective risk management, more ground needs to be covered as the ratio of insured poultry farmers to non-insured poultry farmers remains exceptionally high.

Previous studies have revealed that the farmers had an unfavourable perception of agricultural insurance as a result of the obstacles arising from their low level of education, lack of awareness, and also communication gaps that existed between these farmers and appropriate stakeholders (Nwani, 2019; Akinola; 2014; Chikaire et al., 2015). Also, in an attempt to determine the factors influencing farmers' crop insurance participation over

time in China, Wang et al. (2016) reported that crop insurance uptake was influenced by yield volatility, education, engagement experience, and farm size. Okoffo et al. (2016) investigated the factors affecting willingness to pay for crop insurance and insurance firms' readiness to provide crop insurance to cocoa producers in Ghana. Age, marital status, and education positively impacted cocoa farmers' desire to insure their farms. In contrast, family size and cultivated area were found to influence farmers' willingness to insure their farms adversely. Furthermore, age, family size, and developed area were reported to impact the premium cocoa farmers willing to pay positively. In contrast, marital status and cocoa income positively influenced those ready to pay.

According to Omodele and Okere (2014), Oyo State is one of the States with a high concentration of commercial poultry production, hence, the reason for choosing the State. Some empirical studies, such as Okunmadewa et al. (2002), show that insurance services positively affect the welfare of rural farming households. However, there are also cases where the farmers' attitude to insurance services was not favorable, leading to no significant influence on farmers' welfare (Adah et al., 2016; Ajiboye et al., 2018). This study investigates the factors influencing poultry farmers' participation and the extent of their participation in insurance schemes. It seeks to achieve the following objectives: describe the socio-economic characteristics of the poultry farmers and examine the constraints faced by poultry farmers in the uptake of insurance. The study furnishes policymakers with the necessary information on factors that impede or enhance insurance uptake among poultry farmers. It thus assists policymakers in considering more prudent and efficient insurance schemes to improve agricultural productivity.

Materials and Methods
Study Area
This study was carried out in Afijio Local Government Area (L.G.A), Oyo state, Nigeria. The L.G.A is one of the thirty-three (33) Local Government Areas in the State and has its administrative headquarters in the town of Jobele. It has an area of 722 km2 and a population of 134,173 at the 2006 census (National population Census, 2006). Afijio Local Government is located at Latitude 7° 44' N and Longitude 3° 51'E. Afijio local government area is subdivided into ten (10) wards: Ilora I, Ilora II, Ilora III, Fiditi I, Fiditi II, Aawe I, Aawe II, Akinmorin/Jobele, Iware, and Imini. It is bounded in the North by Oyo East Local Government Area, Akinyele L.G.A in the South, and Iseyin L.G.A in the West. It also shares a common boundary with Ejigbo and Iwo L.G.A in the East. The Yoruba tribe mainly dominates the area. The L.G.A falls within the country's tropical rainforest and derived Savannah zones, with wet and dry seasons and relatively high humidity. Its daily average temperature ranges between 25 (77.0°F) and 35 (95.0°F). These climatic conditions make it suitable for cultivating various crops (OYSG, 2020). The choice of this area is premised on the fact that Poultry farmers are

prevalent in this area. The inhabitants of this L.G.A are predominantly farmers who have taken advantage of vast agricultural land that favours the cultivation of food crops such as cassava, maize, yam, and soya beans as well as cash crops, including oil palm, cocoa, timber, etc. coupled with a few numbers of artisans (Oyo state Government, 2017). Economically, the L.G.A is considered as viable as people from different works of life trade at the Local government famous markets such as the farmers market at Eleekara market, Iware, Oparinde market, Oja Oke, and Fiditi market, etc. The Local Government Area is home to one of the State's farm settlements – Ilora farm settlement.

Type and Source of Data
The study utilized both primary and secondary data. However, it used more primary data than secondary data. The secondary data were obtained from bulletins and journals and provided reports and findings from other researchers working on similar studies. The primary data were obtained from poultry farmers using a structured questionnaire to capture their socio-economic characteristics, level of awareness of poultry insurance, and the types of insurance covers purchased, among others.

Data Collection and Sampling Techniques
A multistage sampling technique was used to obtain a representative sample. The multistage sampling consist of four stages. In the first stage, Afijio Local Government Area was purposively selected based on its reputation as an egg-producing area in Oyo State (Adeyonu et al., 2016) and Akintunde (2015). The second stage involved using a simple random sampling technique to select four out of ten wards within the LGA. In the third stage, two farming communities were randomly selected from each of the sampled wards to give a total of eight farming communities for this study. The fourth stage involved randomly testing 15 poultry farmers, each from each community selected, giving a total of 120 poultry farmers. The neighborhoods selected were Eleekara, Ilora, Akinmorin, Jobele, Fiditi, Ijaiye-Ojutaye, Idi-gbon, and Ajegunle. However, 118 respondents provided complete information that was used for data analysis. Table 1 presents the distribution of poultry farmers across the study area.

Analytical Techniques
The study used descriptive statistics tools such as mean, standard deviation, and frequency to describe the socio-economic characteristics of farmers in the study area, various types of insurance covers obtained by poultry farmers, and constraints faced by poultry farmers in their insurance uptake.

Double Hurdle Model
The double Hurdle (DH) model was used to analyze the factors influencing poultry farmers' decision to participate in insurance and the extent of insurance taken up by the poultry farmers. Farmers are assumed first to decide whether to take up insurance. Secondly, they would have to determine what insurance plans to purchase. These decisions were jointly estimated using the DH model. The DH model assumes that individuals pass through two hurdles (Cragg, 1971). For this study, the first hurdle is taking up insurance as a risk mitigation strategy. In contrast, the second hurdle examines the extent of the insurance plan purchased.

First hurdle
In the first hurdle, a probit model was used to predict the probability of whether a farmer took up insurance or not. The probability of using an insurance cover is depicted as one and zero otherwise, regardless of the extent or intensity of insurance coverage. The general probit model can be expressed as follows:

Hurdle 1:

$$Y_i^* = \alpha + \sum_{i=1}^{N} \beta_i X_i + e_i \quad \ldots \ldots (1)$$

Where Y can be defined as a latent variable not observed, a dummy variable defined by Yi is what is observed.

Y_i = is the dichotomous dependent variable expressed as follows:

Y_i = 1, when a farmer is interested in adopting and purchasing insurance

Y_i = 0, when a farmer is not interested in adopting and purchasing insurance

α = is the intercept

β_i = the regression coefficients that explains the probability to farmers' interest to adopting and purchasing insurance Bxi is a normally distributed random variable

X_i = independent variables with an assumption that

e_i = the stochastic error terms

The dependent variable, the interest to purchase insurance, is a dummy, binary outcome/dichotomous variable. The independent variables representing factors affecting the participation of poultry farmers in agricultural insurance, as shown in the literature, are defined in equation (2)

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots + b_{13} X_{13} + e \ldots \ldots (2)$$

α = Intercept or constant term

β_i = the regression coefficients

Socio-economic variables
x_1 = Tertiary education (Yes = 1, No = 0)

x_2 = Farming experience (years)

x_3 = Household size in numbers

x_4 = Sex of the farmer (female= 0, male =1)

x_5 = Age of Farmer square (years)

x_6 = Age of Farmer (years)

x_7 = Number of birds

Institutional Characteristics
x_8 = Membership of Cooperatives (Yes = 1, No = 0)

x_9 = Access to extension agents (Yes =1, No = 0)

ei = error term.

Biological factors
x_{10} = Experience of Previous high mortality in the past 5 years (Yes =1, No = 0)

$x_{11=}$ Experience of Frequent outbreak of disease in the past 5 years (Yes =1, No = 0)

Second hurdle

The dependent variable is a counting variable in the second hurdle. The Poisson model was employed to estimate the extent of participation in insurance by poultry farmers. Empirically, the second hurdle is the generalized Poisson regression model is represented by the following equation:

$$Y_i = \gamma_0 + \sum_{r=1}^{p} \gamma_r x_{ri} + v_i \quad \ldots \ldots (3)$$

Where x_{ir} = are independent variables

γ_r = the regression coefficients

γ_0 = the intercept

Socio-economic variables

X_1 = Farming experience (years)
X_2 = Household size (number)
X_3 = Sex of the farmer (0 = Female, 1 = Male)
X_4 = Age of Farmer (years)
X_5 = Age of Farmer squared (years)
X_7 = Number of stocks (birds)

Institutional Characteristics

X_8= Access to extension agents (Yes =1, No = 0)
X_9 = Government subsidization on premium (Yes =1, No = 0)
X_{10} = High cost of investments (Yes =1, No = 0)
X_{11} = Price of premium (N)

Biological factors

X_{12} = Previous experience with risk in the past five years (Yes =1, No = 0)
X_{13} = High mortality (Yes =1, No = 0)
X_{14} Weather conditions (Yes =1, No = 0)
v_i= error term.

Results and Discussion

Socio-Economic Characteristics of Farmers

Table 1 result showed that about 76.27% of the respondents were between the age ranges of 30 – 50 years. The average age of the respondents was about 38 years, suggesting that the majority of the respondents were within the economically active age group. This is because farming is still labour-intensive in Nigeria (Ajibefun, 2003). Education was a priority in the study area as the majority (84.8%) of the farmers had primary to tertiary education. The mean years of farming experience were six years. Farmers who had access to credit facilities were 79.6%, while 29.6% had access to extension agents. The study also revealed that 55.1% of the respondents have less than five (5) people in the household, 44.9% had between 5-10 people as their household size, and the average household size was four persons per household. This is consistent with the results of Akintunde (2016) and Adeyonu et al. (2016). Only about 11.80% of the respondents have over 1,000 birds, suggesting that they were predominantly small-scale farmers, with a more significant proportion (49.2%) of them concentrating on egg production and also about 32.2% of them rearing both layers and broilers. As shown in table 1, Female involvement in poultry production in the study area accounted for only 17.8%, while the males accounted for the remaining 82.8%. Most (78%) of the respondents were married, implying that poultry farming activities in the study area shouldered many family responsibilities. This finding agrees with Okoffo et al. (2016) and Akintunde (2015). Almost all the respondents had formal education. Less than 15% had no formal education. High literacy is assumed to be a critical factor in decision-making among farming households. Over 70% of the respondents had access to extension services. This may be responsible for the poultry farmers' low uptake of insurance coverage. Akintunde (2015) and Babalola (2014) also reported low participation of poultry farmers in extension education. The central preoccupation of the extension worker is the education of farmers about government policies and their effects on their farming business. The results showed that 44.9% of the respondents have less than five (5) years of farming experience, and 44.1% are between 5 - 10 years. The mean years of farming experience were 6.1.

Determinants of poultry farmer's participation in insurance scheme

This section presents the results of the Double Hurdle model. The diagnostic statistics from the model indicate that the estimated model has a good fit as shown by the significant value of the chi-square statistic of 33.66 which was significant at (p<0.01). Also, the Log-likelihood statistic ratio (LR) of 65.96 was significant, meaning that the independent variables included in the model jointly explained the probability of the poultry farmers' decision to take up insurance and also the extent of insurance uptake. Virtually all the included variables satisfied the a priori expectation. The variables used in the model were broadly categorized into socio-economic, institutional and biological factors. The results of the probit regression model (hurdle 1) in table 2 showed that the significant variables in the model are access to extension agents (p <0.05), number of birds at (p <0.05), membership of cooperative was (p <0.05), while farmers who had experienced high mortality in the previous years was significant at (p <0.1) and experience in poultry enterprise (p <0.1).From Table 2 the number of stock (birds) was significant at (p >0.05) and positively influenced the farmers decision to participate in insurance, implying that large-scale poultry farmers are more likely to insure their farms than small-scale poultry farmers. This study's result on stock size is comparable to that of Oyinbo et al. (2012), Adeyonu et al., (2016) and Akintunde (2015) who found that farm size was a major variable that influenced farmers' likelihood of participating in an agricultural insurance scheme. In addition, most large-scale poultry producers have access to financing, and one of the terms of the loans is that they must insure their farms. Access to Extension agents was significant at (p >0.05) and positively influenced the decision to participate in livestock insurance by poultry farmers this variable follows a priori expectation. This indicates that all things being equal, access to extension agents affords farmers access to information on making the right

decisions in their farming practice. This result is consistent with findings of Babalola (2014); Mohammed and Ortmann (2005) and Akintunde (2015) who confirmed contacts with extension agents to be significant in influencing the farmers' participation in agricultural insurance scheme. From the institutional characteristics used in the model, membership in cooperatives was positive and significant at 5%. This shows that belonging to a Cooperative society positively affects their decision to participate in insurance because the cooperative associations and other associations are proper channels of informing and educating their members about the best agricultural practices and government policies like NAIS. This finding is consistent with Adeyonu et al. (2016). Experience in poultry enterprise was significant at (p >0.1) and negatively related to the probability of farmers being interested in livestock Insurance. This may be because farmers with more years in the poultry business might understand the effect of disasters on their companies and have more excellent proficiency in utilizing technologies and taking other alternative risk management approaches through time to deal with various risks without insurance. This finding is in consonant with Danso-Abbeam et al. (2014) and Kouame and Koumenan (2012). However, this contrasts with that of Babalola (2014), who reported an indirect correlation between experience and probability of adoption of the insurance scheme. Lastly, the high mortality of poultry stock in previous years was positive and significant at 10%, with a marginal effect of 0.69. Hence, if a farmer experiences high mortality at an earlier year, it increases the probability of him taking up insurance. Depending on the severity of the risk, poultry farmers who hitherto had an experience with risk will have higher reasons for seeking insurance coverage. This agrees with Ajiboye et al. (2018) and Babalola (2014), who confirmed that exposure to previous risks or losses increased the likelihood of farmers taking insurance.

Extent of use of insurance by poultry farmers
The results of the Poisson regression model (hurdle 2) in Table 3 showed that from the socio-economic characteristics, the number of the birds kept (0.0003) was significant at 1%; this shows the importance of this factor in poultry farmers' extent of participation in insurance. This variable was also shown to be positively connected with farmers' involvement in insurance, meaning that farmers who invest more in their businesses have an increased likelihood of insuring their farms than those who support less in their enterprises. The frequent outbreak of diseases was significant at (p >0.05) and optimistic, with a coefficient of 0.58. This means that an increase in the frequency of outbreaks of diseases experienced by farmers leads to an increase in the extent of participation of farmers in insurance. This can be interpreted as the more the farmers experience frequent outbreaks of diseases amongst their birds in previous years, the greater their extent of participation in insurance. This makes logical sense as farmers would love to take more insurance policies to prevent their total loss to the various diseases plaguing the poultry sector. Membership of cooperatives was positive and significant at 5% with a coefficient of 0.97. Poultry farmers who are members of one association or the other are more likely to purchase more insurance coverage than their counterparts who do not belong to any association. From the biological factors included in the model, the high mortality of poultry stock in previous years was positive and significant at (p >0.1) with a coefficient of 0.12. This implies that earlier experiences of high mortality and fire outbreaks in previous years increase the extent of insurance taken by poultry farmers. The first hurdle Probit regression analysis has therefore shown that Access to extension agents, membership of cooperatives, number of stock (birds), high mortality of poultry stock in previous years and farming experience are the significant factors influencing the participation of poultry farmers in the study area. Also, the second hurdle Poisson regression model analysis revealed that the significant factors influencing the extent of participation in insurance among the poultry farmers in the study area include the farmers' number of poultry stock, membership of cooperatives, and finally, the frequent outbreak of disease and high mortality experienced in previous years. In conclusion, membership in Cooperatives and number of birds owned, and the high mortality experienced in the last years were significant in both hurdles; these variables were positive in the two hurdles.

Constraints Militating against Poultry Farmers in Insurance Uptake
This objective was separated into two parts, the first was for farmers who took up insurance, and the other was for farmers that did not take up insurance. The farmers who did not take up insurance were asked the reasons for not taking it, while the farmers who took insurance were asked about the challenges they encountered in the uptake of insurance. The analysis of the field data revealed that 74.6% of the respondents are farmers without insurance plans, while the reminder 25.4% took up insurance as a measure of risk mitigation. This shows that most poultry farmers in the study area do not have insurance; they do not consider insurance a good risk mitigation strategy for one reason or the other. Table 4 shows that weather conditions were the most critical factor poultry farmers considered when deciding to get their farms insured. This result is consistent with Ajiboye (2018). The Assurance of receiving a claim/indemnity in the event of disaster came second. High cost of investment ranked third; some farmers considered it necessary to take up insurance to protect their investment. Government subsidization on the cost of insurance premiums in NIAC ranked fourth. The fifth was due to the outbreak of diseases amongst the stock of birds owned by the farmers in past years. While both output and revenue in the previous year, as well as compulsion by banks to take insurance before getting funds, tied for 6th place, and finally, the Price of the premium paid came last in the ranking. The frequency of the constraints faced by farmers who have not taken up insurance was calculated and then ranked according

to the magnitude, as shown in Table 5. The analysis showed that high premium rate, fears that claims might not be paid, and compensation paid not to cover the losses experienced, were the significant challenges experienced by poultry farmers in their decision to take up insurance.

Conclusion
Poultry farmers usually have to deal with severe risk at some points in the management of the enterprise. The main objective of this study was to determine the factors that influence the uptake and extent of insurance uptake by poultry farmers in Afijio local government area of Oyo State in Southwestern Nigeria. The study revealed that most of the poultry farmers in the study area did not adopt or see insurance as a valuable tool in preventing a total loss of value in the event of a disaster. Factors that significantly influenced poultry farmers' participation in insurance were access to Extension agents, cooperative membership, number of stock (birds), high bird mortality in previous years, and farming experience. However, factors influencing the extent of insurance by poultry farmers in the study area were number of birds owned by the farmer, membership of a cooperative society, high mortality, and frequent outbreak of disease experienced by the farmer in previous years. Based on the findings of the study, it is recommended that the Government and other stakeholders ensure proper knowledge of the benefits of livestock insurance should be disseminated by extension agents to enhance the degree of participation of poultry farmers in the uptake of livestock insurance policies to manage risk in the poultry industry and that the poultry farmers should be adequately educated on the benefits of belonging to a cooperative society. Since result has shown that membership in a Cooperative society influences the uptake and extent of insurance among poultry farmers.

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Table 1: Socio-economic Characteristics of Farmers (Quantitative)

Variables (N=118)	Frequency	Percentage	Mean	Standard deviation
Age			38.26	7.63
<30	19	16.10		
31-40	63	53.39		
41-50	27	22.88		
>50	9	7.63		
Household size			3.97	1.85
<5	65	55.08		
5-10	53	44.92		
Farming Experience (years)			6.09	4.62
<5	53	44.92		
5-10	52	44.07		
11-15	8	6.78		
>15	5	4.24		
No of Birds owned			1205.55	1120.7
<200	7	5.93		
200-500	30	25.42		
501-1000	37	31.36		
1001-2000	30	25.42		
>2000	14	11.86		
Sex				
Female	21	17.80		
Male	97	82.20		
Marital Status				
Single	26	22.03		
Married	92	77.97		
Access to Credit				
NO	24	20.34		
YES	94	79.66		
Access to Extension Agents				
NO	83	70.34		
YES	35	29.66		

Source: field survey data, 2021; Note: Figures in parenthesis are standard deviation

Table 2: Parameter Estimates of the Factors that Influence Poultry Farmers participation in Insurance Scheme

Hurdle 1 (Probit regression)	Coefficients	Std. Err.	Z	P > Z	Marginal Effects
Socio-economic characteristics					
Tertiary education	0.718	0.518	1.39	0.166	0.718
Farming experience	0.093*	0.049	1.90	0.058	0.093
Household size	-0.048	0.093	-0.52	0.605	-0.048
Sex	0.431	0.544	0.79	0.429	0.431
Age	-0.028	0.164	-0.17	0.866	-0.028
Age square	0.0001	0.002	0.08	0.936	0.0001
Number of stock (birds)	0.0004**	0.0002	2.12	0.034	0.0004
Institutional characteristics					
Membership of Cooperatives	0.526**	0.357	2.17	0.041	0.526
Access to extension agents	0.869**	0.378	2.30	0.021	0.869
Biological factors					
Previous high mortality	0.697*	0.402	1.73	0.083	0.697
Frequent outbreak of disease	0.127	0.389	0.33	0.745	0.127
Constant	-1.115	3.427	-0.33	0.745	

*Note: *, **, *** - Variable is significant at 10%, 5%, 1% respectively*

Table 3: Parameter Estimates of the Factors that Influence the Extent of Participation of Poultry Farmers in Insurance

Hurdle 2 (Poisson regression)	Coefficients	Std. Err.	z	P>z
Socio-economic characteristics				
Farming experience	0.542	0.520	1.04	0.297
Household size	-0.137	0.092	-1.49	0.137
Sex	0.525	0.514	1.02	0.307
Age	0.019	0.154	0.12	0.901
Age square	-0.001	0.002	-0.61	0.540
Cooperative	0.967**	0.392	2.47	0.014
Number of Birds	0.0003***	0.0001	2.65	0.010
Institutional characteristics				
Access to Extension Agents	-0.544	0.356	-1.53	0.126
Government subsidization on premium	0.299	0.384	0.78	0.436
High cost of investments	0.121	0.335	0.38	0.718
Price of premium	0.387	0.588	0.66	0.510
Biological factors				
Frequent outbreak of disease	0.583**	0.372	2.57	0.017
High mortality	0.121*	0.064	1.87	0.061
Weather conditions	0.249	0.481	0.52	0.604
Constant	0.692	0.093	7.40	0.000

Number of obs = 118
Wald chi2(11) = 33.66
Log likelihood = -65.956293
Prob > chi2   =   0.0008

*Note: *, **, *** - Variable is significant at 10%, 5%, 1% respectively*

Table 4. Distribution of Poultry Farmers According to their Reasons for Participating in Agricultural Insurance

Reasons for insurance uptake	Frequency	Rank
Weather conditions	22.4	1st
Assurance of receiving a claim/indemnity in the event of disaster	16.8	2nd
High cost of investment	15	3rd
Government subsidization on premium	13.1	4th
Outbreak of diseases	12.1	5th
Output/revenue in previous year	8.4	6th
Compulsion by banks to take insurance before getting funds	8.4	6th
Price of premium	3.7	8th

Source: Field survey, 2021
Insurance Scheme (Multiple Responses n = 30); n= number of respondents that had insurance

Table 5. Distribution of Poultry Farmers According to their Challenges in Participating in Agricultural Insurance

Constraints	Frequency	Rank
High premium rate	30.3	1st
Fears that claims might not be paid	22.6	2nd
Compensation paid doesn't cover the losses	19.7	3rd
Inadequate information about insurance cover	17.8.	4th
Perceived Incompetence of insurance company issuing the policy	9.6	5th

Source: Field survey, 2021
Insurance Scheme (Multiple Responses n = 88); n= number of respondents with no insurance