

DETERMINANTS OF POULTRY INSURANCE:

A Case Study of Poultry Farming in Rural Bengal

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[ABSTRACT]

Risk and uncertainties are connected with poultry farming. Insurance of poultry units transfer risk and uncertainties to the insurance provider. Insurance encourages poultry farmers to stay away from financial loss. To find out the determinants of livestock insurance among poultry farmers in rural areas of Birbhum, East Burdwan and Hooghly districts of West Bengal, we have collected data from 133 poultry farms. After analyzing the collected data through binary logit regression analysis, we conclude that outstanding loan, in addition to the age of poultry owners and children's education expenditure; mostly influence the poultry farmers' willingness to insure their poultry units.

Keywords: Poultry farming, Insurance, Binary logit Analysis.

I Introduction

Poultry farming belongs to the important appliances in agricultural sector in rural India. It has gained acceptance among the people of all regions in West Bengal. Unfortunately, many risk and uncertainties, including lack of biosecurity (Sims (2007)), are involved in agricultural manufacturing like poultry farming. Risk is generally considered as the potential deviation between expected and real revenue. Poultry farmers generally enjoy limited predictability of risks and uncertainties. Therefore they are expected to avert those risks and uncertainties to the insurance providers through payment of some pre-assigned premium (Akintunde (2015)).

The enhanced willingness to transfer risk and uncertainties to the insurance providers has the ability to encourage greater investment in poultry production (Mahul and Stutley (2010)). But realities do not always stand for favoring insurance as an option for risk sharing (Chand *et al.* (2016)). Enrolling into an insurance policy is a tedious task. It involves cost in terms of insurance premium while benefit is uncertain (or at least unobservable). Low or unsustainable income among poultry farmers has an adverse effect on choosing insurance as a risk sharing tool. The unsatisfactory claim settlement regarding loss compensations also plays a retarding role to motivate poultry farmers for choosing insurance as an avenue of risk sharing. There are diverse feelings towards agricultural insurance by poultry farmers.

Low level of participation of poultry farmers in buying insurance premium is very much common in developing nations (Mahul and Stutley (2010), Ajieh (2010)). This paper is entrusted to find out the determinants of livestock insurance among poultry farmers in the three districts of South Bengal.

Insurance is a complicated service which in some situation may act as necessary good while in other situations it may be looked as a luxury good (Rees and Wambach (2008)). Insurance companies generally guided by risk aversion and charge high premium from high risk poultry farms. High premium rate may result low demand for insurance. Therefore the 'risk' of the poultry farm to meet adversities plays the proximate role in shaping insurance decision of poultry owners.

Now the 'risk' of poultry farming has various dimensions. First of all, the unpredictability of demand for poultry products may potentially put a threat of low profit, even loss (Chatterjee and Rajkumar (2015)). The market of poultry products strongly faces substitutability from other livestock farming. Presence of low priced livestock products put a strong impediment to the profitability of poultry farming. Natural calamities, coupled with low profitability, may widen the 'risk' of poultry farming (FICCI (2018)).

Second, poultry owners' management power to combat adversities associated with economic social and cultural aspects may vary due to lack of proper training or education. Therefore another major source of 'risk' emerges from inadequate level of education of poultry owners (Adeyonu, Oyawoye, Otunaiya, and Akinlade, (2016)). Most of the poultry farms are managed by unprofessional business men who have alternative source of income. We consider level of education as one of the prime factor influencing insurance decision of poultry farmers in the districts of Birbhum, Bardhaman and Hooghly.

Third, poultry farming in rural west Bengal is not an industry, rather it's a type of agriculture (Sethi (2007) and Dana (1998)). Although poultry farming is not subsistence farming, it is not completely commercialized. Backyard poultry farming is considered as a practicable alternative for rural poor to overcome the problem of disguised unemployment (Sarap (2017)). This intended us to consider family size as a matter of 'inspiring' factor of insurance decision of the poultry framers. If poultry farms are running through modern entrepreneurial practice, family size would not have any effect on the risk and profitability of poultry farms. Therefore dependence of insurance decision on family size may be considered as an index of entrepreneurisation of poultry farming.

Fourth, poultry farmers like all productive and commercial activities, hunt for profit. High market share and a sizeable amount of revenue may induce the poultry farmers to expand current business. To protect high precariousness in profitability in poultry business, the poultry farmer may opt for insurance. But in other strand, high precariousness in profitability may discourage the insurers to supply insurance products among poultry farmers. Even, for high risk poultry farms, the insurers may charge prohibitive premiums. Therefore profitability bears a mixed responsibility in inducing purchase of insurance plans among poultry farmers. This justifies the inclusion of 'revenue' as a proximate determinant of insurance decision among poultry farmers.

Fifth, dearth of capital is a common phenomenon in almost all underdeveloped countries. Shortage of capital among poultry farmers in rural Bengal is an extreme reality (Mehta and Nambiar (2007)). Expansion of banking sector in rural areas is growing and supply of loanable funds is increasing in recent years. Commercial add-on of poultry farming influenced poultry farmers to opt for business loans from commercial banks. Repayment of such loan requires high profitability and longer survival of the poultry farming industry. Poultry farmers may opt for insurance for high profitability and longer survival of the poultry farming industry (Mehta and Nambiar (2007), NABARD (2018)). It is expected that high amount of loan as well as high value of fixed capital may compel the poultry farmer to be insured.

Sixth, age may be looked as a proxy of experience (Miller (2001), Jeong, Kim and Manovskii (2008)). The theory of learning by doing emphasizes 'experience' as a factor of production (Chang, Gomes and Schorfheide (2002)). Highly experienced labour is associated with a higher level of productivity. Productive units generally distinguish between 'novice' and 'experienced' workers in terms of pay packet (Kurugscu (2006)). But there is no ready reference to measure experience quantitatively. Age appears to be as a proxy measurement of experience. Age is expected to appear as a sound factor in determining insurance decision of poultry farmers (Oyinbo, Abdulmalik and Sami (2012)). Mishra and Godwin (2006), Oyinbo et al. (2012) and Farayola et al. (2013) found significant impact of age of the poultry farmers upon the insurance decision. Our study has included 'age' as an influencing factor of insurance decision of poultry farming.

Seventh, good health can serve better than challenging health in the labour market. Government healthcare facility is generally associated with low cost and therefore quality of healthcare is compromised (Lewis (2006)). Poultry farmers using government health facility is highly likely to suffer from ill health in comparison to the private healthcare users (Chakraborty, Gatti, Klugman and Gray-Molina (2002)). Therefore those poultry farmers are highly prone to purchase insurance plan for their poultry units.

Eighth, educating all children is an important precedence among modern families. Private schools are growing while public schools are suffering from declining enrolment (Kingdon (2017)). This is due to the fact that demand of 'quality' primary education is sharply increasing. Inability to respond with this enhanced demand by public education system paved the way of increasing private schools. Education expenditure in private school is much higher than the education expenditure in public schools. Therefore temptation of admitting children into private schools may put financial burden upon parents. High insecurity in terms of children's educational expenditure may induce poultry farmers to opt for insurance.

Lastly, employment in subsidiary (moonlighting) job lowers the income insecurity (Kisumano (2017), Adhikary and Pal (2012)). Therefore poultry farmers, who are engaged in other subsidiary activities, may not choose insurance for poultry farming. Therefore multiple employments in various economic activities may discourage poultry farmers to be insured.

Keeping in view all these ‘qualifications’, this paper aims to uncover factors affecting insurance decision of poultry framers. To complete the empirical flight, we have estimated a binary logit model where the dependent variable is whether the poultry farm is insured or not. The decision to insure the poultry unit is considered to depend upon a set of independent variables comprising family size, level of education, age of the poultry farmer, monthly average revenue from poultry farming, amount of outstanding loan, whether the poultry farmers are using the public healthcare system or not, and the market value of fixed capital engaged in poultry farming.

II

Model and Methodology

Let us consider a sample of n independently and identically distributed observations $i = 1, 2, \dots, n$ of the dependent dummy variable y_i and a k dimensional vector x_i so that the values y_i is determined by the elements of x_i . y_i is a binary (dichotomous) variable, equals with 1 if the i th poultry farmer is insured and 0 otherwise. To detect factors affecting the probability of being insured, we consider the following binary logit model,

$$y_i = \beta_0 + \beta_1 \text{FAMSIZE} + \beta_2 \text{LEVEDU} + \beta_3 \text{AVG_REV} + \beta_4 \text{SUBSIDIARY} + \beta_5 \text{LOAN} + \beta_6 \text{AGE} + \beta_7 \text{MED} + \beta_8 \text{EXPEDU} + \beta_9 \text{FIXED_CAP} + u_i \quad (1)$$

Where

$$y_i = \begin{cases} 1 & \text{if the poultry farmer is insured} \\ 0 & \text{otherwise} \end{cases}$$

FAMSIZE is the family size of the poultry farmer.

LEVEDU is the level of education measured in terms of years of schooling of the poultry owner.

AVG_REV stands for monthly revenue of the poultry farm measured in rupees. This variable plays a proxy of profitability.

SUBSIDIARY stands for secondary or moonlighting income measured in terms of rupees.

LOAN is outstanding debt of the poultry farm measured in rupees over years.

AGE stands for age of the poultry farmers measured in years.

$$\text{MED} = \begin{cases} 1 & \text{if the poultry owner generally uses government hospital or health centre} \\ 0 & \text{otherwise} \end{cases}$$

EXPEDU stands for monthly expenditure on children’s education measured in terms of rupees.

FIXED_CAP stands for money value of fixed capital in the day of survey.

u_i is the disturbance term associated with the i th observation.

We have investigated 133 poultry farms to uncover underlying factors behind insurance decision of poultry owners in South Bengal. We have randomly selected three districts from fifteen districts of South Bengal, the districts of Hooghly, Birbhum and East Burdwan. We have randomly selected three blocks in each district and then on the basis of SRSWOR, we have selected the representative poultry farms. We have surveyed 55 poultry farms from Burdwan, 40 from Birbhum and 45 from Hooghly district. Due to incomplete information provided by the respondents, we have excluded seven of them from our data set. Therefore our data set contains 133 observations. On the basis of 133

observations, we have estimated equation (1) in terms of a binary logit model in accordance with Farayola *et al.* (2013), Akintunde (2015) and others.

III RESULTS

Table -1 presents the summary statistics of the data collected in the districts of East Burdwan, Birbhum and Hooghly. The average family size of poultry farmers is nearly five. This is indicative to envisage that modern micro family system is not popular in the community of poultry farmers. Maximum family size of poultry farmers in our sample is seven and minimum is two. Most of the poultry farmers in our sample are educated; the lowest is fifth class passed while the highest is an undergraduate. Monthly average revenue ranges from a moderate level (Rs. 12000) to a very high level (Rs. 42000).

Table – 1: Summary Statistics of Quantitative Variables

Variable	Mean	Median	S.D.	Min	Max
FAMSIZE	4.68	5.00	1.29	2.00	7.00
LEVEDU	7.50	7.00	1.89	5.00	13.00
AVG_REV	21500.00	20400.00	4540.00	12000.00	42000.00
LOAN	21400.00	25000.00	17600.00	0.00	50000.00
AGE	41.80	41.00	7.76	21.00	57.00
EXPEDU	630.00	120.00	1640.00	0.00	14200.00
FIXED_CA P	69400.00	70000.00	7390.00	50000.00	85000.00

Source: Authors' own calculation based on survey data

Poultry business in modern Bengal is nowadays regarded as a capitalist venture by commercial banks and therefore there are huge supplies of loanable funds. Average indebtedness of the poultry farmers in our sample ranges up to Rs. 50000. Poultry farmers in our sample are not too young and too old. Average age in our sample ranges from 21 to 57 years. Most of the poultry farmers are matured with a mean age of 41.8 years and standard deviation 7.76 years. Monetary responsibility of poultry farmers upon children's education is not too high, ranging from without expenditure to Rs 14300 per month. Fixed capital associated with poultry farming ranges from Rs 50000 to Rs 85000 with an average of Rs 79400.

Table- 2 presents the Binary logit estimate of model (1). Our estimates confirm the fact that only age, outstanding loan and educational expenditure for children can affect the poultry owners' decision to purchase insurance for their poultry farms. Table -3 presents marginal probability of poultry insurance due to quantitative variables evaluated at mean.

Family size was expected to affect insurance decision of poultry farmers positively since larger family qualifies for larger dependence upon poultry farming. But our estimation put no notice of such dependence. Insurance decision of poultry farmers is independent to their family size.

Level of education have the influence to increase managerial power and is expected to affect the insurance taking decision of the poultry farmer. But our empirical result does not support this dependency. At 19% level of significance the co-efficient of LEVEDU - 0.191289 which indicates that the need for poultry insurance decreases as poultry farmers become more educated.

Revenue is expected to persuade positively on the insurance decision of poultry farms by poultry owners. But the result of the binary logit estimate of our model does not support such determination. Although the co-efficient is indicative in pinpointing the positive association between monthly average revenue and poultry insurance, the odds in favour of poultry insurance due to the unit increase in revenue is very low.

Moonlighting, or subsidiary employment in addition to poultry farming, is likely to affect poultry farm insurance at an optimistic way. The coefficient of SUBSIDIARY is significant only at 27% level. The positive sign of the coefficient indicates a loose association between moonlighting and poultry insurance.

The most important determinant of insurance of poultry farms is outstanding loan. Loan from commercial banks or otherwise raises the volume of working capital and thereby affect productivity positively. But future repayment of outstanding loans creates a burden to the poultry farmer. Therefore if probability of loss increases, the volume of burden due to external debt increases. As a result, if loan amount increases, poultry owners become motivated to purchase insurance for their farms to compensate loss. The estimated coefficient of LOAN is 0.0000781, which is positive and significant at less than 1% level. Unit increase of loan increases odds favouring poultry insurance at a level $(\exp(0.0000781)-1)*100= 0.0078$ percent. Table 3 confirms the fact that increase in the amount of loan at Rs.10000 increases probability of poultry insurance 19 percent.

Table -2: Binary logit, using observations 1-133
(Standard errors based on Hessian)

	Coefficient	Std. Error	Z	p-value
Const	3.5686300	3.4750800	1.0270000	0.30
FAMSIZE	-0.0457828	0.2180280	-0.2100	0.83
LEVEDU	-0.191289	0.1468150	-1.303	0.19
AVG_REV	0.0000774	0.0000736	1.0510000	0.29
SUBSIDIARY	-0.616417	0.5600840	-1.101	0.27
LOAN	0.0000781	0.0000189	4.1430000	<0.0001
AGE	-0.0947079	0.0399498	-2.371	0.02
MED	1.2387400	1.0596900	1.1690000	0.24
EXPEDU	0.0032411	0.0013263	2.4440000	0.01
FIXED_COST	-0.0000592711	0.0000461	-1.286	0.20

Mean dependent var	0.330827	S.D. dependent var	0.472290
McFadden R-squared	0.469404	Adjusted R-squared	0.350953
Log-likelihood	-44.79476	Akaike criterion	109.5895
Schwarz criterion	138.4930	Hannan-Quinn	121.3348

Number of cases 'correctly predicted' = 109 (82.0%)

f(beta'x) at mean of independent vars = 0.472

Likelihood ratio test: Chi-square(9) = 79.2574 [0.0000]

Source: Authors' own calculation based on survey data

Age acts as a proxy of experience. Therefore age of poultry farmers is expected to affect poultry production and profitability positively. Consequently age of the poultry farmers is supposed to play negative role in determining insurance decision of the poultry units. This reasoning is reflected in our empirical flight. The coefficient of AGE is negative and significant at 1.7% level. One year increase in age lowers the odds favouring poultry insurance at 9.04% level. Table 3 confirms that one year increase in age decreases probability of poultry insurance at the 0.2 percent level. This finding, the negative and significant coefficient of age of the poultry farmers, is consistent with the findings of Mishra and Godwin (2006), Oyinbo *et al.* (2012), Farayola *et al.* (2013) and Adjei *et al.* (2016) while contradicts the findings of Akintunde (2015).

Medical facilities used from government hospitals are less likely to improve poultry farmers' health due to quality compromisation ((Lewis (2006)). Government healthcare users are therefore more prone to use insurance. This is reflected in the coefficient of MED which is positive, 1.23874, but significant only at 24% level.

Table-3: Marginal Probability evaluated at mean

<i>Variable</i>	<i>Probability</i>
FAMSIZE	0.0114447
LEVEDU	0.0478182
AVG_REV	0.0000193
LOAN	0.0000195
AGE	0.0236749
EXPEDU	0.0008102
FIXED_CAP	0.0000148

Source: Authors' own calculation based on survey data

Expenditure on children's education put an extra burden to the parents. To meet this rising burden parents are supposed to avert risk associated in the job of poultry farming and more prone to purchase poultry insurance. This is reflected in estimation result where the binary logit estimate of EXPEDU is positive and significant at 1.4% level.

Table -4: Variance Inflation Factors (VIF)

Minimum possible value = 1.0

Values > 10.0 may indicate a collinearity problem

	VIF
FAMSIZE	1.245
LEVEDU	1.055
AVG_REV	1.533
SUBSIDIA RY	1.085
LOAN	1.179
AGE	1.107
MED	1.035
EXPEDU	1.146
FIXED_C AP	1.396

Source: Authors' own calculation based on survey data

High market value of fixed capital generally plays discouraging effect on choice of purchasing insurance. That is reflected in the estimation result so that the coefficient of FIXED_CAP is negative, although significant only at 20% level. In our model, no multicollinearity problem is there since Variance Inflation Factors are close to unity.

In conclusion, there are only three main determinants of poultry insurance in the districts of East Burdwan, Birbhum and Hooghly. Among them, outstanding loan plays the proximate role in determining decision of purchasing insurance for poultry farming.

IV

Conclusion

Insurance is a prime avenue by which poultry farmers share or transfer their risks and uncertainties to the poultry insurance providers. Various studies identified various factors affecting poultry farmers' decision to insure poultry farms. But our study does not stand for favouring all of them. Based on 133 poultry owners in the districts of Hooghly, Birbhum and East Burdwan in West Bengal, our binary logit regression shows that outstanding loan, in addition to the age of poultry owners and children's educational expenditures mostly influence the poultry farmers' willingness to insure their poultry units.

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