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Original Review Article

Effect of Socioeconomic Characteristics and Income Status on Onion Farmers Risk Attitude in Sokoto State, Nigeria

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Abstract

The study evaluates the effect of the socioeconomic variables and income on farmers risk attitude in Sokoto State. Data were elicited with the use of a structured questionnaire. The primary data used were obtained from structured questionnaire administered to 120 randomly selected farmers. Binary Logistic regression model was used in the analysis of data. The results showed that farmers' age, farm size and access to extension service significantly influenced the farmers' risk attitude. These were found to be statistically significant at ($P < 0.05$) level. The study therefore suggests that there is an apparent need for serious extension work to raise the awareness level of the farmers and to identify solutions to their problems as well as suggest ways on how such solutions can be achieved.

Keywords: Production constraints; determinants of risk-aversion; Binary Logistics; vegetable crops.

INTRODUCTION

The greater part of agricultural production in Nigeria takes place in the rural areas and atypically, the level and incidence of poverty is very obvious in these areas (UNDP, 2009). In agricultural production, where farmers' crop yields and income are dependent on various exogenous factors such as weather conditions and price fluctuations, risk is ubiquitous in farming decisions (Menapace et al. 2012). The agricultural sector is exposed to a variety of risks which occur with high frequency. These include climate and weather risks, natural catastrophes, pest and diseases, which cause highly variable production outcomes. However, people of course differ in the way they take judgments involving risk and uncertainty and these differences are often labeled as differences in risk attitude. Understanding individual risk preferences is a criterion to understand economic behavior (Reynaud and Couture, 2012).

Vegetable crops play an important role in contributing to food security of the nation (Anonymous, 1993). In addition to the nutritional value, these crops generate employment opportunities for the poor households (Anonymous, 1993). In most irrigated fields, farmers achieved better income by improving the production of vegetable crops. Onion is one of the important vegetable crops grown by farmers mainly for market purpose in Sokoto State.

The bulk of onion production is from the dry season cropping system particularly under irrigation in the Northern States. The importance of irrigation as a means of increasing agricultural productivity necessitated the establishment of River Basin and Rural Development Authorities by the Federal Government of Nigeria in 1979 after which the Middle Rima Valley Irrigation Project, Goronyo was embarked upon in 1984 (Ojo et al.). The study area has tremendous potential for onion cultivation. Due to availability of ample irrigated farmland as compared to other areas, many of the farmers in the area have engaged themselves in the cultivation of onion through irrigation. However, not much attempts have been made to look into the effect of various socioeconomic characteristics and income status on the farmer's attitude to risk in onion production in the state. The hypothesis was therefore subjected to further empirical validation:

- Ho: Socioeconomic characteristics such as age, education, farm size as well as institutional factors such as extension contact do not affect the farmers risk attitude

It is in the light of the foregoing that the study provided answer to the research question;

- Does the socioeconomic characteristics and income status of the farmers' influence their risk attitude?

MATERIALS AND METHODS

Study area

Sokoto is located in the extreme north west of Nigeria, near the confluence of the Sokoto and Rima Rivers. It is situated between Latitudes 10°40′ and 13°55′N and

longitudes 3°30′ and 7°06′E (Singh, 2000). It is one of the hottest cities in the world. The maximum day time temperatures are most of the year generally under 40 °C (104.0°F), and the dryness makes the heat bearable. The State is divided into 23 Local Government Areas (L.G.As).

The area falls within the semi-arid region where rainfall range is from 400 to 700 mm per annum and is erratic and poorly distributed (Singh, 1995). The average rainfall is about 550 mm per annum. Relative humidity is between 15–20% during the dry season and up to 70–75% during the rainy season (Arnborg, 1988). The rainy season is from June to October, during which showers are a daily occurrence. The showers rarely last long and are a far cry from the regular torrential showers known in many tropical regions. From late October to February, during the 'cold season', the climate is dominated by the Harmattan and wind blowing Sahara dust over the land (Arnborg, 1988). The region's lifeline for growing crops is the flood plains of the Sokoto-Rima river system, which are covered with rich alluvial soil. For the rest, the general dryness for the region allows for few crops, millet perhaps being the most abundant, complemented by maize, rice, other cereals and beans.

Sokoto State occupies an area of short-grass savanna vegetation in the south and thorn shrub in the north. It is a generally arid region that gradually merges into the desert across the border in Niger republic. Farming is the major occupation of the inhabitants and the crops cultivated include both food and cash crops such as millet, sorghum, rice, groundnut, cotton, cowpea, cassava and sweet potatoes. In addition, vegetable crops such as onion, tomato, as well as sweet and hot peppers are grown during the dry season under irrigation.

Sampling technique

Data for the study were obtained through well-structured questionnaire by applying a three-stage sampling procedure. The first stage was a purposive selection of two LGAs (Wammakko and Kware). The second stage involved the random selection of two villages (Kwalkwalawa, Kalambiana, Rugar Liman and More) respectively, from each of the two selected LGAs. The third stage involved proportionate selection of respondents using the formula below; this however, gave the sample size for the study (23, 26, 40 and 31), respectively.

$$P = x\, n \quad (1)$$

Where:
P = Proportion, S = Desired sample size, N = Total population, n = Population of the villages in LGA in question.

Analytical technique

The binary logistic regression model was used, however, marginal effect of the variables were analyzed for further empirical validations.

Specification of the model

The model for the analysis was specified as:

Binary logistic regression model

The implicit form of the equation is given as:

$$\text{Log}\,[Pi/(1 - Pi)] = Z\beta + E \quad (2)$$

Where:
Z = matrix of observations of the explanatory variables, β = column vector of the coefficients; and E = disturbance term.
Pi = probability that a particular condition occurs.

Table 1. Variables and a priori signs for risk attitude of onion farmers, Sokoto State

Variables	*A priori*	Remark
Age	Negative	Farmers that are old are expected to be less risk averse. This might be attributed to the experience they might have acquired along the process.
Farming experience	Negative	Farmers who have more years of farming experience are expected to be less risk averse. This is because they are more knowledgeable concerning environmental factors and seasonal price variations of various agricultural products.
Household size	Negative	The larger the household size, the less risk averse the farmer is expected to be. A large number of household members provide family labour to the farmer and some extra income from off-farm activities
Years of schooling	Negative	The more educated an individual is, the less risk averse the individual is expected to be, probably because they have other sources of income, more access to agricultural institutions, and other skills.
Farm size	Positive/ Negative	Under favourable condition, farmers with large farm sizes are hypothesized to be less risk averse. The converse is however true under unfavourable condition due to the fear of uncertainty
Income	Negative	High income farmers are expected to be less risk averse
Extension contact	Negative	Farmers with more extension contact are hypothesized to be less risk averse. This might be attributed to farmers' access to technological learning and improved production inputs that will lead to increased productivity.

Table 2. Descriptive Statistics of the Respondents in the Study Area

Variables	Mean	Standard deviation	Variance
Age (years)	38.25	8.52	72.59
Farming experience(years)	13.31	7.85	61.54
Household size (No)	10.67	4.15	17.23
Extension visit (No of times)	0.68	1.12	1.26
Income level (₦)	192,997.50	81,751.41	6683292347
Farm size (hectare)	0.93	0.35	0.11

Source: Field Survey, 2016

This equation was further expanded in the estimation as:

$$K = F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, U) \quad (3)$$

$$K = \beta o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + + \beta_7 X_7 + U \quad (4)$$

Where:
K = Log [PKA/ (1 – PKA)] = risk attitude parameter
PKA = probability that a farmer is risk averse, X_1 = Farmer's age (years), X_2 = Farming experience (years)), X_3 = Household size (no), X_4 = Years of schooling of the farmer (years), X_5 = Farm size (ha), X_6 = Income (naira), X_7 = Extension contact (no of visits) and U = random term
The farmers risk attitude depends on their socioeconomic variables (farmers specific and the institutional factors). The farmers' characteristics that are hypothesized to influence their attitude towards risk are shown in Table 1.

RESULTS AND DISCUSSION

Summary of descriptive statistics of some socioeconomic characteristics of the farmers

The results in Table 2 reveal that the mean age of the farmers was 38 years which implies that they are still young and energetic to meet the labour requirements in the accomplishment of farm operations. The experience in onion production of a typical farmer was thirteen years. Experience indicates the ability to acquire skills and adopt new innovation. The years of experience of a typical farmer were reasonably good. Experience also enables an entrepreneur to set realistic targets. It was however observed that the mean household size was ten (10) persons. Small household size indicates increase in the cost of labour as regards to more hired labour employed by the farmers but this might not be the case as the mean household size is adequate.

Improvements are needed as regards the extension education as the farmer earns an income of ₦192,997.50 as shown in Table 2. The need to increase production requires increase in the hectares of land cultivated as the farmers in the study area cultivate at average of 0.93 hectares of land. Also, the mean of the extension visit was one time which reduces the ability to acquire skills and adopt new innovations.

Effect of socioeconomic variables and income status on risk attitude

The effect of socioeconomic variables and income status on farmers' attitude towards risk in the study area was investigated and the result of the analysis is presented in Table 3. Nagelkerke R Square was 0.259. This implies that about 25.9% of the variation in

Table 3. Logistic regression of socioeconomic variables and income status on farmers risk attitude

Independent variables	B coefficient	S.E.M.	Wald	Exp (B)/odd ratio	Sig
Constant (β_0)	4.289	1.835	5.461	72.903**	0.019
Age (β_1)	–0.122	0.037	10.698	0.885**	0.001
Farming experience (β_2)	0.043	0.040	1.161	1.044	0.281
Household size (β_3)	0.055	0.066	0.683	1.056	0.409
Education level (β_4)	0.233	0.319	0.532	1.262	0.466
Farm size (β_5)	2.060	0.994	4.296	7.849**	0.038
Income (β_6)	0.000	0.000	0.001	1.000	0.970
Extension contact (β_7)	–1.480	0.485	9.313	0.228**	0.002
		Model summary			
-2 Log likelihood	Cox and Snell R square	Nagelkereke R square		Chi-square	Sig
130.360[a]	0.188	0.259		25.027**	0.001

Source: Computed from survey data, 2016
Note: ** Significant at 5%

Table 4. The marginal effect of the socioeconomic variables on farmer's risk attitude

Independent variables	Marginal effect dy/dx	Standard error	Z value	P>/Z/
Age	–0.0224**	0.0056	–3.94	0.000
Farming experience	0.0079	0.0072	1.10	0.273
Household size	0.0100	0.0120	0.83	0.405
Education level	0.0427	0.0582	0.73	0.463
Farm size	0.3782**	0.1715	2.21	0.027
Income	2.4e-08	6.31e-07	0.04	0.970
Extension contact	–0.2717**	0.0758	–3.58	0.000

Source: Computed from survey dara, 2016
Note: ** 5% significant level

farmer risk attitude was explained by the independent variables included in the model. The remaining variation 74.1% was as a result of non-inclusion of some important explanatory variables or due to error. The chi-square test of the regression model was significant at alpha level of 0.01 and this means that income status and the other socioeconomic variables have significant composite effect in explaining farmers risk attitudes. From the table, the test of beta coefficients of the predicting variables in the model shows that, age, farm size, and extension contact were significant at 0.05 alpha level in explaining the probability of farmer risk-averse attitude. Age was found to be inversely related to risk-averse attitude. This implies that the lower the age of the farmer, the more risk averse he will be. This is in line with the finding of Samuel and Henry (2012). According to Aye and Oji (2007), older farmers are more likely to have accumulated more wealth than younger farmers. Also older farmers are more likely to have greater social capital and incentives which can serve as some form of traditional insurance or fall-back strategies in the process of decision making.

The coefficient of farm size was also significant and positively related to risk-aversion status of the farmers. However, their size conform to the a priori, that is, it occurs as expected. The implication of this is that as the farm size increases, the scale of operation increases also and the farmers would not wish to commit their huge investment to chance.

The coefficient of extension contact in a farming season is statistically significant and negatively related to risk-aversion status of the farmers. This conforms to a-priori and it implies that as the number of times the extension agents visit the farmers increases, their risk aversion level reduces or their tendency to take risk in their farming activities increases. This is because extension education enhances farmers' access to technological learning and improved production inputs that will lead to increased productivity, farmer's management ability and efficiency (Chikaire et al., 2011). Thus farmers deprived of access to extension services are prone to being more risk averse.

Marginal effect of socioeconomic variables on risk attitude

The marginal effect of the independent variables in the binary logistic regression analysis is presented in Table 4. The marginal effects (ME) explains by how many units the risk aversion level of the farmers changes if the explanatory variable changes by one unit. On the response scale, it was observed that age as an inverse relationship with the risk aversion of the farmer. This therefore suggests that if the age of the farmers increases by one unit, the risk aversion level of the farmer tends to decrease by 0.0224 units. This is highly significant with a Z value of 3.94.

On the response scale for farm size, the marginal effect as a positive value of 0.3782. This implies that as the size of the farm increases by one unit, the risk aversion level of the farmer increases by 0.3782 units. This is significant with Z value of 2.21. Extension education is found to be significant having a Z value of 3.58. However, it explains that the risk aversion level of the farmer tends to decrease by 0.2717 units as the extension contact increases by one unit.

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Production constraints

Onion farmers in the study area are faced with some challenges in their farming activities. Some of these problems are identified and presented in Table 5. It was shown that the most pressing constraints militating against onion production in the study area in decreasing magnitude of importance are inadequate capital, high price of fertilizer, diseases and pest problem, yield decline as very important factors. This corroborate with the finding of Ayinde (2008) who reported that inadequate capital or poor access to capital are the most risky variable affecting farm operations irrespective

Table 5. Constraints faced by farmers in the study area

Production constraints	VI	I	NS	NI	NVI	WS	MS	MPS	RANK
Inadequate land	41 (34.2)	34 (28.3)	14 (11.7)	23 (19.2)	8 (6.7)	437	3.64	72.88	7th
Inadequate labour	44 (36.7)	48 (40.0)	7 (5.8)	14 (11.7)	7 (5.8)	468	3.90	78.02	6th
Inadequate capital	74 (61.7)	43 (35.8)	2 (1.7)	1 (0.8)	0 (0.00)	550	4.58	91.68	1st
Low price of output	60 (50.0)	38 (31.7)	21 (17.5)	0 (0.00)	1 (0.8)	516	4.30	86.02	5th
Yield decline	65 (54.2)	32 (26.7)	21 (17.5)	2 (1.7)	0 (0.00)	520	4.33	86.74	4th
Lack of improved seeds	36 (30.0)	24 (20.0)	11 (9.2)	9 (7.5)	40 (33.3)	367	3.06	61.18	8th
Diseases and pests problem	69 (57.5)	44 (36.7)	5 (4.2)	2 (1.7)	0 (0.00)	540	4.50	90.06	3rd
High price of fertilizer	65 (54.2)	50 (41.7)	5 (4.2)	0 (0.00)	0 (0.00)	540	4.50	90.08	2nd

VI = Very important; I = Important; NS = Not sure; NI = Not important; NVI = Not very important; WS = Weighted score; MS = Mean score; MPS = Mean percent score. Figures in parenthesis are in percentages.
Source: Field Survey, 2016

of the crops under cultivation and as such small scale farmers therefore rely greatly on their personal savings which is so small. Inadequate capital could be attributed to the lack of access to agricultural credit. The availability of credit will increase the purchasing power of the farmer to having in their possession items that would improve and enhance their productivity. Although, opportunities still exist for improving these constraint as revealed. Obalola (2013) also reported incidence of pest and diseases, poor remunerative prices as very important constraint in onion production.

CONCLUSION

The study looked at the effect of socioeconomic characteristics and income status on the farmers risk attitude. However, binary logistic regression model was used in achieving the determinants of farmer's attitude to risk. The socioeconomic characteristic of the farmers reveals that the farmers are still very young, having no formal education with mean household size of 11 persons. Three of the exogenous variable (Age, Farm size and Extension contact) modeled were statistically significant ($P < 0.05$) in clarifying the likelihood of farmers risk averse attitude. Among the problems of importance are inadequate capital, diseases and pest problem, fertilizer price and yield decline. The following recommendations are therefore put forward from the research:

- Extension contact should be more frequent. This can go a long way in reducing the risk aversion level of the farmers. In other words, the farmer's tendency in taking risk increases.
- Investments in rural education through effective extension delivery program will provide farmers with skills essential to reducing their risk aversion attitude.
- Owing to the fact that capital was recorded as very significant problem, providing credit should be considered vital in planning for an effective small-scale production.

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