

FARMING RISKS AND SECURITY CHALLENGES IN VEGETABLE PRODUCTION IN ORLU, IMO STATE



Osuji, E.E.¹⁺
N.C. Ehirim.²
M.A.Y Rahji³
T.T. Awoyemi⁴
K.K. Salman⁵
M.A.C.A Odi⁶
S.C. Onyemuwa⁷
Ibeagwa, O.B.⁸
C. Chikezie⁹
M.O. Okwara¹⁰

¹*Dept of Agricultural Economics, Michael Okpara, University of Agriculture Umudike, Abia State, Nigeria*

^{2,6,7,8,9,10}*Department of Agricultural Economics, Federal University of Technology Owerri, Imo State, Nigeria*

^{3,4,5}*Department of Agricultural Economics, University of Ibadan, Ibadan-Oyo State, Nigeria*



(+ Corresponding author)

ABSTRACT

Article History

Received: 7 November 2016

Revised: 24 January 2017

Accepted: 8 February 2017

Published: 23 February 2017

Keywords

Farming risk

Security

Management strategies

Vegetable crops

Risk intensity

Linear model

Farming risk is a security challenge that reduces the actual outcome from farmers expected outcome. Predominant farming risk is the reason for deviations from planned production in Imo State. Food supply gap becomes reduced if the farming risk associated with vegetable production is reduced and the effect on output increased through this study. A total of 152 farmers from 10 communities across three (3) local government areas of Orlu agricultural zone were used for data analysis. Data were obtained using a well-structured questionnaire and analyzed using descriptive statistics and econometric tools. Majority (98.7%) and (94.7%) of farmers planted fluted pumpkin, bitter leave respectively in a mixed cropping pattern to withstand risk and security challenges with 96.7% and 95.4% of them adopting correct planting distances and soil fertility amendments as coping strategies. The perceived risk intensity equation showed the linear model as the best fit with F-statistics of 15.182, greater than its tabulated value of 4.689 at $p < 0.05$ critical value, hence the lead equation. The model has only 5 significant explanatory variables at $p < 0.05$ with a co-efficient of multiple determination of 0.697, implying that 69.7% of the total variations in perceived farming risk intensity in vegetable production in the area were due to the included explanatory variables. Farmers perceived risk intensity increased significantly by 0.212%, 3.60% and 0.735% with a unit increase in farmer's age, access to credits and household size respectively but decrease significantly by 5.87% and 2.6×10^{-6} with a unit decrease in risk mitigation measures and income at $p < 0.05$ critical levels. Intensifying risk mitigation measures and encouraging younger vegetable farmers in vegetable production in the area can reduce farming risk in the area.

Contribution/ Originality: This study documents that perceived risk intensity of farmers engaged in vegetable crop production can be reduced or eliminated through the adoption of adequate risk management strategies which enhances the profitability and output of the farmers thereby engendering food security among household farmers in the area.

1. INTRODUCTION

Vegetable production is a risky farming enterprise either because of its rapid perishable nature, short supply period or its inelastic demand nature (Hardwood *et al.*, 1999) hence planned outcome continually deviates from the actual outcome. According to Reddy *et al.* (2004) farming risk refers to perfect knowledge of the probability of a possible outcome of an event, while uncertainty exists when the probability of such event is not known. It produces an adverse variation in an expected outcome (Binswanger, 1982). Ehirim *et al.* (2006) noted that the risk factors are so adverse on farmers' livelihood and food security status as the actual output or returns of the farmer is forced to drop below an expected or desired level for food security. Chances of farming risk pose security challenges with much pressure on contingency plans and cost of production, decline in farm outputs and farm inefficiency. Other areas where risks are eminent is in processing, distribution and marketing of farm products.

Moscardi and Janury (1977) observed evidence of high risk aversion among food crop farmers. Security position of farm enterprise is always threatened when the risk factors is seriously challenging the viability of farmers' enterprise such that production is unsustainable (Ehirim *et al.*, 2006). Overcoming security challenges of the farm due to certain risk is guided by past experiences or knowledge of such risk occurrence by the farmer just as prediction about the risk occurrence in the farm is usually very difficult and cost ineffective. Vegetable production in Nigeria, though practiced as backyard farming by some farmers, is faced with a fairly large capital and a considerable investment on lands, soil amendments and watering equipment. Often times, farmers are confronted with risk despite their short and long term production and marketing decisions (Hardaker *et al.*, 1997). Vegetable productions are risk-prone with high degree of uncertainty especially in pest and diseases attack with total crop failures (Ronmasset, 1976). This explains why the cost of vegetable production poses a challenge to expected profits (Wik and Holden, 1996; Kimura *et al.*, 2010).

Farm enterprises usually adopt a number of strategies to avoid risk or rather to reduce its adverse effect upon occurrence. Hardwood *et al.* (1999) noted risk management as choosing among alternatives that which reduces the effects of risk. Risk management is a process of measuring or assessing risk and then developing strategies to manage the risk. However, in ideal risk management priority, the processes that follow each other whereby the risk with the greatest loss and its probability of occurring are handled first while risks with lower probability of occurrence are handled later. This is an element of farm business management that deals with making decision that aimed at eliminating or avoiding the incidence of risk or rather minimizing its adverse effects. Hence vegetable crop farmers should assess management strategies that aim at minimizing adverse risk effects such as; choosing a reliable enterprise, enterprise diversification, intercropping, irrigation, flood control, sales of assets, etc (Hazell and Valdes, 1985). Alderman and Paxson (1994) further opined that risk management strategies in vegetable crop production aims at identification, assessment, and prioritization of risk followed by coordination, economical application of resources to minimize, monitor, and control the probability and/ or impact of unfortunate events or to maximize the realization of opportunities.

On the other hand, government has also provided a range of risk management programs for farmers which includes; crop insurance, price stabilization, livestock feed subsidies and emergency relief (Miller *et al.*, 2004; Boehije and Lins, 2010). These strategies despite its good intentions have failed to effectively manage risk that farmers face due to its poor implementation in Orlu, Imo State. Consequently, the inability of most farmers to achieve planned output depends on the management of risk factors facing them such as insufficient capital to purchase farming inputs, land tenure problems, weather variations and climate change challenges, unstable government policies and global markets influences. The security position of vegetable production due to some of these challenges are not known with certainty and farmers ability to predict their outcomes are the reason for unstable vegetable supply in Imo State. Hence this study focused on assessing farming risks and security challenges associated with vegetable production in Orlu agricultural zone, Imo State, hence isolating the measures that can reduce their occurrences for increased food supply in the State.

2. MATERIALS AND METHOD

This study was carried out in Orlu Agricultural zone of Imo State, Nigeria. The zone has 11 local government areas, namely; Egbema-Oguta, Oru East, Orlu, Orsu, Isu, Ideato North, Ideato South, Nkwere, Nwangele, Oru West, and Njaba. A multi-stage random sampling technique was employed for this research. The first stage involved a purposive selection of 3 (three) local government areas from the 11, local government areas which include Ideato South, Isu and Egbema-Oguta local government areas from the Orlu north, central and south respectively. This selection was because of the dominant farming activities and vegetable production in those areas selected. The second stage involved a random selection of 3 communities from each of the 3 selected local government areas. This gave a total of 9 communities for the study. Finally, from a list of vegetable crop farmers with agricultural department of selected local government headquarters, 20% of vegetable farmers were randomly selected from each communities. This gave a total 87 farmers in Ideato north, 62 farmers in Isu and 51 farmers in Egbema-Oguta local government areas. A total of 200 farmers were selected for the study. A well structured questionnaire was used to elicit information on some perceived risk occurrences, quantity of inputs used and their levels of output, risk mitigation measures and socio-economic features of the farmers. Only 152 responses were found useful for data analysis.

Data were analyzed using both descriptive statistics and econometric tools. The level of production of vegetable crop farmers and their risk management strategies were analyzed using descriptive statistics such as frequency and relative frequency. While determinant of perceived risk intensity of vegetable crop farmers were isolated using the ordinary least squares multiple regression model. The perceived risk intensity and their determinants were fitted into four functional forms. These models were explicitly specified as follows;

Linear function;

$$Y = f(b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + b_6 x_6 + b_7 x_7 + U) \text{ -----eqn.(1)}$$

Double – log function;

$$\ln Y = f(b_0 + b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + b_4 \ln x_4 + b_5 \ln x_5 + b_6 \ln x_6 + b_7 \ln x_7 + U) \text{ ----- eqn.(2)}$$

Semi – log function;

$$Y = f(b_0 + b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + b_4 \ln x_4 + b_5 \ln x_5 + b_6 \ln x_6 + b_7 \ln x_7 + U) \text{ ----- eqn.(3)}$$

Exponential function;

$$\ln Y = f(b_0 + b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + b_4 \ln x_4 + b_5 \ln x_5 + b_6 \ln x_6 + b_7 \ln x_7 + U) \text{ ----- eqn.(4)}$$

Where Y = Percieved risk intensity index

x_1 = age of the farmers in years

x_2 = gender (Femal is “1” and “0” otherwise)

x_3 = Level of formal education attainment (number of years spent in formal education)

x_4 = farming experiece in years

x_5 = household size from nominal value of member of the household

x_6 = access to credit (dummy variable 1 – access and 0’ otherwise)

x_7 = farming as a major occupation (dummy variable 1 for faming and 0’ otherwise)

$b_1 - b_7$ are the co-efficient parameters to be estimated

e = stochastic error variable

A priori expectations showed that $X_1, X_2, X_3, X_4, X_5, X_6, X_7, > 0$;

3. RESULTS AND DISCUSSION

3.1. Production of Vegetable Crop by Farmers in Imo State

The result in Table 1; showed that (98.7%) of the vegetable crop farmers planted Fluted pumpkin (*telfairia occidentals*) while (94.7%) planted Bitter leave (*vernonia amygdalina*). Majority (90.8%) of them planted Scent leave (*ocimum grattissimum*), (89.5%) planted Water leave (*talinum triangulare*), while (88.5%) planted Green (*omocestus viridulus*). Again, (86.8%) planted Okro (*Abelmoschus esculentus*), (86.8%) of the vegetable

farmers planted Pepper (*Piper nigrum*), also (82.9%) of them planted Curry (*Murray akeonigii*), and lastly, (32.9%) of the vegetable crop farmers planted Tomatoes (*Solanumly copersicum*). This implies that Tomatoes' has the lowest production and the rate of Tomatoes production is very low in the study area.

Table-1. Distribution of Farmers based on Vegetable Crop Produced in the Area

Level of Production	Frequency	Relative Frequency (%)
Okro – Okra, Gumbo (<i>Abelmoschus esculentus</i>)	132	(86.8)
Water Leave – Galaghati. (<i>Talinum triangulare</i>)	136	(89.5)
Pepper (<i>Piper nigrum</i>)	129	(84.9)
Scent Leave – Efinrin (<i>Ocimum grattissimum</i>)	138	(90.8)
Green (<i>Omocestus viridulus</i>)	134	(88.5)
Tomatoes (<i>Solanumly copersicum</i>)	50	(32.9)
Curry – Kadipatta (<i>Murray akeonigii</i>)	126	(82.9)
Bitter Leave – Ewuro, Etidot (<i>Vernonia amygdalina</i>)	144	(94.7)
Fluted Pumpkin – Ugu (<i>Telfairia occidentails</i>)	150	(98.7)

Source: field survey data, 2013.

3.2. Risk Management Strategies of the Vegetable Crop Farmers in the Area

The result in Table 2; showed that majority (96.7%) of the farmers adopted adequate plant distance or spacing in the planting of vegetable while (95.4%) adopted the use of fertilizers as risk management strategy. The use of adequate planting distance and application of fertilizer was commonly used of all strategies. According to [Allemann and Young \(2008\)](#) fertilizer is recommended in situations where vegetable crops are grown without the soil being analyzed. Thus, on very poor soils, vegetable crops would be improved by even higher fertilizer application rates. Application of lime during raining season was the least (12.5%) of all the risk management strategy used by the farmers. According to [Allemann and Young \(2008\)](#) liming should be considered in areas where there is high rainfall as such soils tend to be inherently infertile and more acidic. The use of lime becomes very important in this case. The study therefore, suggest that farmers should be encouraged to apply lime in a correct proportion to ensure that the soil is not exposed to risk. Insurance policy is also a low (17.1%) strategy used by these farmers as a cover to the losses made in vegetable production. The low frequency of insurance policy could be the reason why most farmers finds it difficult to set up another farm as soon as there is emergency due to crop failure or adverse weather condition in the area.

Table-2. Risk Management Strategies of the Vegetable Crop Farmers.

Risk Management Strategies	Frequency	Relative Frequency (%)
Correct spacing/ planting distance.	147	(96.7)
Mixed cropping/ Inter cropping.	99	(65.1)
Construction of Drainages cut off ditches/ trench.	120	(42.8)
Avoidance of bush burning.	132	(86.8)
Application of Manure (organic and inorganic).	145	(95.4)
Security against theft and poaching.	102	(65.4)
Application of lime during Raining season.	19	(12.5)
Taking insurance policy against crop failure or damages.	26	(17.1)
Construction of bars across furrows or contour ridges on slope.	144	(94.7)
Complete clearance of borrowed debt before payback period.	91	(59.9)
Early planting/ harvesting.	98	(59.9)
The use of pesticides, herbicides, and fungicides.	50	(32.9)

Source: Field survey data, 2013.

3.3. Determinant of Risk Intensity of Vegetable Crop Production in Imo State

Table 3; showed that the linear functional form was chosen as the lead equation based on econometric and statistical criterion. The coefficient of multiple determination (R^2) shows that 69.7% of the variation in risk

management strategy is been determined by the included independent variables. The F-statistics at $p < 0.01$ critical level is 15.182. This value is greater than the tabulated value of 4.689 at $p < 0.05$ critical level. It implies that the null hypothesis is rejected in the study. Therefore there is no significant relationship between the socio-economic characteristics of the vegetable crop farmers and perceived farming risk associated with vegetable crop production in the State.

It could be seen from the table that age and access to credit have a positive and significant relationship with perceived risk at $p < 0.01$ critical level. This indicates that as the farmers get older and as the volume of credit used increase, the level of perceived risk rises. Net income from vegetable production have negative values but significant at $p < 0.05$ critical level. This implies that a unit increase in this variable will reduce perceived risk associated with vegetable production in the area. Household size has a positive relationship with risk management strategy and is statistically significant at 5% level indicating that as the number of people in the household increase, the ability of the farmer to manage risk increases. This variable is highly important to risk management strategy. Other variables like education, farm experience and risk diversion rate have a negative relationship with risk management strategy but was not significant even at $p < 0.1$ critical level. Although these variables were not significant in the study, it shows that a unit increase in any of them will reduce perceived risk. Education and farming experience can increase farming skills among which are risk management strategies of the farmers.

Gender has a positive relationship with risk management strategy but was not statistically significant at 1%, 5% or 10% level indicating that the involvement of women in vegetable production increases the risk management ability of vegetable production in the area. This is true as vegetable production is women's crop. Although this variable was not influential in the study. Farming as a major occupation has a negative relationship with risk management strategy and significant at 10% level. This indicates that the more the farmers choose vegetable production as a major occupation, the lesser the ability of the family to manage risk. This may be as a result of the inability of the farmer to learn management skills than venturing into other businesses.

Table-3. Determinants of Risk Intensity in Vegetable Crop Farmers in Orlu Agricultural Zone Imo State

Factors	Linear	Exponential	Cob-Daugls	Semi-log
	Co-efficient	Co-efficient	Co-efficient	Co-efficient
Constant	60.095*** (9.666)	4.159*** (28.681)	4.906*** (17.433)	92.381*** (7.649)
Age	0.212*** (-3.173)	0.005*** (-3.069)	0.216*** (-2.991)	9.605*** (-3.099)
Gender	1.464 (1.011)	0.033 (0.967)	0.024 (0.721)	1.141 (0.785)
Education	-0.017 (-0.078)	-0.0003 (-0.056)	0.015 (0.321)	0.606 (0.299)
Farming experience	-0.48 (-0.947)	-0.003 (-1.029)	-0.042 (-0.909)	-1.576 (-0.789)
Household size	0.735** (2.384)	0.017** (2.329)	0.060 (1.745)	2.669 (1.800)
Credit	3.599*** (-2.668)	0.091 (-2.882)	0.103*** (-3.248)	4.116*** (-3.015)
Farming as major occupation	-3.577 (-1.754)	0.086* (1.812)	0.069 (1.562)	2.891 (1.504)
Risk mitigation rate	-5.872*** (-3.872)	-0.151 (-1.959)	-0.149 (-1.358)	-5.829 (-1.740)
Net income	-2.6E-06** (-2.107)	-6.8E-8** (-2.326)	-0.024** (-2.509)	-0.943** (-2.318)
R ²	0.697	0.678	0.259	0.246
Adj. R ²	0.584	0.460	0.212	0.198
F-statistics	15.182***	5.550***	5.515***	5.153***
No of observation	152	152	152	152

(**) significant @ 5%; (***) significant @ 1.0% and t-value are in paranthesis

Source: field survey, 2013

4. CONCLUSION AND RECOMMENDATIONS

The study concluded that vegetable farmers adopted modern, old and traditional method of risk management like construction of drainages, fertilizer application, complete clearance of borrowed debts before payback period, correct spacing, mixed cropping, etc. Hence four variables identified as determinants of risk intensity were age, credit, gender, and household size. However, It was discovered that the low frequency of insurance policy could be the reason why most most farmers finds it difficult to set up another farm as soon as there is emergency due to crop failure or adverse weather condition in the area. The study recommends a functional insurance agencies to take up farmers risk to enable them stay in food and vegetable production in the area. Also Increase in net income reduces percieved risk; hence measures to increase farmers profit such as input subsidy and efficienct input management should be encouraged to ensure a reduced risk in vegetable farming in the State.

Funding: This study received no specific financial support.

Competing Interests: The authors declare that they have no competing interests.

Contributors/Acknowledgement: All authors contributed equally to the conception and design of the study.

REFERENCES

- Alderman, H. and C. Paxson, 1994. Risks management intensity of farmers. A Paper Presented at International Economics Association Conference Moscow. pp: 23-29.
- Allemann, L. and B.W. Young, 2008. Risks control measures among crop farmers in Pretoria. *Journal of Agricultural Systems*, 4(1): 31-57.
- Binswanger, H.P., 1982. Empirical estimation and use of risk preferences: Discussion. *American Journal of Agricultural Economics*, 64(2): 391-393. [View at Google Scholar](#) / [View at Publisher](#)
- Boehije, M. and D. Lins, 2010. Risk management in an industrialized agriculture. *Journal of Economic Review*, 2(1): 12-17.
- Ehirim, N.C., S.N. Odurukwe, J. Ajaero and C.A. Emenyonu, 2006. Socio-economic analysis of farming risk in cassava based enterprise in Imo State. *International Journal of Natural and Applied Science*, 2(2): 89-95.
- Hardaker, J.B., R. Huirne, J.R. Anderson and G. Lien, 1997. *Coping with risk in agriculture*. Thailand: CABI Publishing. pp: 14-23.
- Hardwood, J., R. Heifner, K. Coble, J. Perry and A. Somwaru, 1999. *Managing risk in farming: Concepts and analysis*. *Agricultural Economics Report No. 774*. Economics Research Service. USDA, 3(2): 31-34.
- Hazell, P. and A. Valdes, 1985. *Crop insurance for agricultural development: Issues and experience agricultural Insurance*. Baltimore: IFPRI/John Hopkins University Press, 2: 3-5.
- Kimura, S., J. Anton and R. Martini, 2010. Risk management in agriculture in Canada. *OECD Food, Agriculture and Fisheries Paper*, No. 40 OECD: 24.
- Miller, A., M. Mayhew and A. Susan, 2004. *Dictionary of geography and business article*. London: Oxford University Press. pp: 12-14.
- Moscardi and Janury, 1977. Evidence of food crop farmers' risk aversion strategies? *Journal of Agricultural Science*, 2(4): 23-27.
- Reddy, S., P. Raghu-Ram, T.V. NeelakantaSastry and I. Bhavani-Devi, 2004. *Concepts of Agricultural economics*. Chicago: Oxford University Press. pp: 23-26.
- Ronmasset, K., 1976. *Risk is business decision*. London: Longman Press. pp: 19-21.
- Wik, M. and S. Holden, 1996. Experiment studies of peasants. Attitude towards risk in Northern Zambia; Discussion Paper No. 10-14. Department of Economics and Social Science. Norway: Agricultural University of Norway.

Views and opinions expressed in this article are the views and opinions of the author(s), Asian Development Policy Review shall not be responsible or answerable for any loss, damage or liability etc. caused in relation to/arising out of the use of the content.