

**RISK MANAGEMENT STRATEGIES AND DETERMINANTS OF POULTRY FARMERS
ADOPTION OF AGRICULTURAL INSURANCE IN ABAK LOCAL GOVERNMENT AREA OF
AKWA IBOM STATE NIGERIA.**

Udo U. J¹, Nkeme K¹ Okon, E E¹.

¹Department of Agricultural Economics and Extension Akwa Ibom State University, Obio Akpa Campus

ABSTRACT

Agriculture sector is characterized by a strong exposure to risk. Incidence of risk in agriculture is important to policy makers at both national and international levels. Fluctuations in producer's income and the threat of catastrophic losses in particular can present difficult welfare problems for producers, national governments and the international community. Agriculture is a very risky business and it depends on the vagaries of nature. Farmers employ various risk management strategies to minimize farm risks. Agricultural insurance is one of the major risk management strategies. The study was aimed at identifying different Risk Management Strategies and determinants of Poultry Farmers Adoption of Agricultural insurance policy in Abak Local Government Area of Akwa Ibom State. Both primary and secondary data were used for the study. A structured questionnaire was employed to obtain information from one hundred (100) stratified randomly selected poultry farmers in Abak Local Government Area of Akwa Ibom State. Descriptive statistics, and logit regression model were used to analyze the data. The use of clean and safe drinking water for the birds was identified as the most adopted risk management strategy, followed by appropriate feed provision, proper ventilation and avoidance of overcrowding. Though the farmers were aware of agricultural insurance as a risk management avenue, the level of adoption was very low. Contract production, rotation of stock and obtaining agricultural insurance were the least risk management strategies that were used by the poultry farmers. The result of the logit regression model showed that age, marital status, level of education, household size, annual income and flock size were significant variables that influenced the probability of participation of the farmers in agricultural insurance scheme while, membership of association. Gender, farm experience and access to credit were found to be insignificant in influencing the farmers' participation in agricultural insurance scheme. The pseudo R² of the logit regression was 77%. Farmers should be encouraged to increase their flock size and adopt insurance as an important and more effective risk management strategy. The farmers need to be sensitized to erase the poor perception of insurance policy in the study area.

Keywords: Risk, Agricultural Insurance, Risk management, Poultry, Adoption.

INTRODUCTION

A very important problem faced by farmers and operators of agricultural business enterprises is that agriculture is characterized by considerable risk and uncertainties which stem from its predominant dependence on nature. Agriculture requires extensive, direct and continuous contact with the forces of nature. Agricultural insurance policy is one of the risk management strategies which farmers can share or transfer the risks and uncertainties associated with their farming enterprise and this will encourage them to make greater investment in agricultural production, (Eleri et al 2012) asserted that although insurance scheme exists in Nigeria, it covers less than 1% of the total population of farmers. According to Phillips (1988), Nigerian farmers are not very excited about taking an insurance policy. This can be traced to the less than satisfactory image of the insurance industry regarding loss compensations, and this problem has created mixed feelings towards agricultural insurance by prospective farmers and hence, the farmers become reluctant in their willingness to take an insurance cover; and also considering the very low incomes, the small sizes of holdings aimed at subsistence production, large scale ignorance and poverty and the adverse view of other people's experiences with activities of insurance companies in other sectors, Risk is the possibility of adversity of loss and refers to "uncertainty that matters" Consequently, risk management involves choosing among alternatives to reduce the effects of risk. Understanding risk is a starting point to help producers make good management choices in situations where adversity and loss are possibilities (Harwood *et al.*, 1999).

Bokusheva *et al.* (2006) asserted that the presence of risk influences several factors not only production output but also producers' behaviour, primarily with regard to input use. Sonka *et al.* (2000) defined risk management as the identification, evaluation and economic control of risk that threaten the assets and earnings of a business. Risk management according to Harwood *et al.* (1999) is an important element in the farmer's decision making process given alternative production possibilities with limited resources. Understanding risk in farming is important for two reasons. First, most producers are averse to risk when faced with risky outcomes. Sometime a risk averse

farmer is willing to accept a lower average return for lower uncertainty, with the tradeoff depending on the person's level of risk averseness. This means that strategies cannot be evaluated solely in terms of average or expected returns, but that risk must also be considered. Second, identifying sources of risk and uncertainty helps farmers and others address to the most important strategies for mitigating risk and aids in circumventing extreme outcome such as bankruptcy.

Risk management implies different things for different people depending on their attitudes toward risk; their financial situation and the opportunities available to them. In some cases managing risk involves minimizing risk for a given level of expected output or revenue. In other cases, it involves keeping risk within bounds while seeking higher expected returns. More generally, the goal of risk management is to obtain the best available combination of expected income and income certainty given the individual's resources and risk preference Udo *et al.* (2015).

Risk has always been inherent in agriculture, because; it depends on the vagaries of nature. Poultry farmers face a variety of risk ranging from marketing risk, production risk, financial risk, credit and investment risk, operational risk and physical risk. According to Hazel (1992), risk in agriculture depending on degree, frequency and severity of loss, may lead to long term poverty. It can even spill over into the rural non-farm economy when people who earn incomes in the agricultural sector cannot afford to purchase other goods and services for their households. Over time, several risk management tools were created by producers to manage these risks, including insurance schemes. Under some insurable conditions, the insurance allows an individual to turn a future and an uncertain expenditure (loss), which is usually high into an anticipated, certain and lower expenditure (premium) (Booth *et al.*, 1999).

Agricultural production decisions are generally made subject to the interaction of many factors, some of which are not under the control of the farmers. Some of the factors include, weather, disease, insect infestation, technology, private and public policies, yields, products and inputs prices which are usually not known with certainty, when investment decision are made. The non-existence of perfect knowledge subjects farmer's production activities and decision making to two problems. These are the twin problems of risk and uncertainty (Olayide *et al.*, 1981). These often result in returns displaying high variability or farm income which are unstable (Umoh 2000).

Ajakaiye (2001) stated that small enterprise farmers in many developing countries of the world including

Nigeria are trapped in a vicious cycle of poverty. This cycle is characterized by low productivity and low farm income which leaves them with virtually no saving as capital required in the transformation of their production technology is insufficient. The vicious cycle of poverty is nurtured by unstable income and aversion to risk as rain fed agriculture which is their primary occupation is highly characterized by risk. As a result of the devastating effect of risk and uncertainties, stakeholders have developed several structures and schemes over the years to reduce, manage and cope with this fearful phenomenon.

The Nigerian agriculture just as that of most developing countries of the world is anchored mainly on subsistence farming methods (Salami, 1994) due to various factors which include among others the risk involved in agricultural business. Michael *et al.* (2011) posited that farming has always been a risky business, the risk in agriculture today particularly in crop and livestock production, is greater than it was in the past, but there is an opportunity to be rewarded positively for taking such risk.

Risky situation has been further sub-divided into two classes First is a *priori* probability (risk) which prevails when sufficient information is known in advance about the general possibilities that the probability of an event occurring can be specified. The second is statistical risk which prevails when the probability of a future event can only be stated on the basis of the observed results of many observations, experiments and replications. The possibilities for the assignment of prior and statistical probabilities to risk situations enable farmers to have some defense against risk (Olayide *et al.*, 1981), The defense is through series of insurance schemes that enable farmers to assign costs to risk. Such schemes include property insurance, liability insurance, yield insurance, life insurance, and health insurance. Risk can also be managed by the use of various forms of contracts arrangements such as long-term land-lease with payments either in cash or kind, commodity sales contracts with specified prices or price ranges, commodity processing and storage contracts, commodity trucking contracts, farm inputs (feeds) supply contracts. These solutions to minimize risk situations are commonly not within the reach of producers in rural communities. Consequently, the rural producers' insurance against risk may be found in intercropping, multiple cropping, and small-scale nature of production to attain farm family subsistence with a small marketable surplus. The successful introduction of more efficient methods of averting risk situations to rural producers in Abak Local Government Area is a serious problem of rural development.

Poultry can be defined as domestic fowl including chickens, turkeys, geese and ducks, raised for the production of meat or eggs and the word is also use for the fresh meat of these birds used as food material. Chicken (Broilers and layers) is the common type of poultry kept by farmers in Abak Local Government area of Akwa Ibom State. Mabawonkwu (1998) stated that Nigerian poultry farmers have been coping with risk associated with poultry production before the establishment of Nigeria Agricultural Insurance Scheme (NAIS) in 1988.

Michael *et al.* (2011) stated that Risk for a farming operation generally comes from two sources-operations and financing. Operational risk results from price, cost, and yield fluctuations, whereas financial risk is created by interest obligations on debt funds used to finance the business. Blair (2005) however opined that disease outbreaks still occur no matter how much a firm tries to avoid it; it does not deter all risk from the organization, risk management can only aid decision making and does not make decisions.

The objective of risk management as stated by Oyekole *et al.* (2002) is to make the most efficient pre-loss arrangement for post-loss balance between resources needed and resources available to preserve the effective operation of the business. Agricultural insurance assist farmers who are able to insure their business against shocks take advantage of profitable but risky opportunities, while others may be limited to low risk, low return production and activities due to unidentified factors. The scheme insures farmers against losses due to outbreak of pest, disease, drought or some natural catastrophe. Akinola (2004), asserted that government effort has not made much impact despite the fact that various governments introduced incentives to ensure that farmers embrace agricultural insurance scheme as a risk management measure.

There are certain risk situations that could not be covered by insurance owing to the difficulty of securing data that would be used in establishing fair premiums and owing to prohibitive administrative costs involved by the nature of such risk. Typical examples of such risk situations include grain wastage through spillage, crop losses to pests and insects, breakage of eggs, epidemic losses in livestock enterprises, but our farmers face all these possibilities whether coverable by conventional insurance schemes or not. The only remedy is to institute control measures which can be accounted as production costs. (Olubiyo et al 2009) posited that despite the existence of insurance services rendered by Nigerian Agricultural Insurance Corporation and other private firms in Nigeria, there has been a low level of participation of farmers buying insurance premium and in view of this, there is the need to examine the level

of awareness of farmers about agricultural insurance scheme and the factors influencing farmers' willingness to participate in agricultural insurance scheme. It is against this backdrop that the study seeks to identify risk management strategies and determinants of poultry farmer's adoption of the agricultural insurance scheme as a means of risk management. This is very relevant for farmers and policy actions in Abak Local government area of Akwa Ibom state to mitigate risk and increase production.

Theoretical Framework

The term risk refers to a situation whereby the future can be predicted with a specified degree of probability. This situation has been further sub-divided into two classes First is a *priori* probability (risk) which prevails when sufficient information is known in advance about the general possibilities that the probability of an event occurring can be specified. The second is statistical risk which prevails when the probability of a future event can only be stated on the basis of the observed results of many observations, experiments and replications. The possibilities for the assignment of prior and statistical probabilities to risk situations enable farmers to have some defense against risk (Olayide *et al.*, 1981). The defense is through series of insurance schemes that enable farmers to assign costs to risk. Such schemes include property insurance, liability insurance, yield insurance, life insurance, and health insurance. Risk can also be averted by the use of such contracts as long-term land-lease contracts with payments either in cash or kind, commodity sales contracts with specified prices or price ranges, commodity processing and storage contracts, commodity trucking contracts, farm inputs (feeds) supply contracts, etc. These solutions to minimize risk situations are not within the reach of producers in rural communities. The successful introduction of more efficient methods of averting risk situations to rural producers in Africa is a serious problem of rural development.

Bodie *et al.* (1998) noted that Risk is uncertainty that affects an individual's welfare, and is often associated with adversity or loss. Risk is uncertainty that "matters" and may involve the probability of losing money, possible harm to human health, repercussions that affect resources (irrigation, credit) and other types of events that affect a person's welfare. Uncertainty (a situation in which a person does not know for sure what will happen) is necessary for risk to occur, but uncertainty need not lead to a risky situation.

Hardaker *et al.* (1997) noted that Managing risk in agriculture does not necessarily involve avoiding risk, but instead involves finding the best available combination of risk and return given a person's

capacity to withstand a wide range of outcomes. Effective risk management involves anticipating outcomes and planning a strategy in advance given the likelihood and consequence of events not just reacting to those events after they occur. Hardaker, *et al.* (1997) identified four main aspects of risk management to include: Identifying potentially risky events, anticipating the likelihood of possible outcomes and their consequences and taking action to obtain a preferred combination of risk and expected return.

Risk and uncertainties often used interchangeably, but they have different connotations. Mabawonkwu (1998) defined risk as variability's in outcome which are measurable in an empirical or quantitative manner. Such situations are generally characterized by measurable probability, and he however viewed uncertainty as a situation or outcome without quantitative variation that can be measured with any degree of accuracy. Colman *et al.* (1998) reported that farmers in the developing countries are risk averse. This implies that they are willing to for-go some income in order to avoid some risk. It is imperative at this point to add that not all risk is insurable. The conditions of agricultural risk to be insurable in Nigeria were identified by Mabawonkwu (1998) thus: insurable risk:

- Must be of fortuitous character
- It should be measurable in large number.
- The cost of insurance or premium should be within the means of the average farmer.

Events (Perils) that Can Be Covered Under Agricultural Insurance Scheme include:

Under crops: Fire, lightening, windstorm, flood, drought, pest and disease . Under livestock, the perils covered are death and injury due to accidents, disease, fire, lightening, storm, and flood. Losses caused by negligence or by willful damage are not covered. Similarly, political risks and losses resulting from social risk example riot, mutiny, and revolution are not covered. The insured under the scheme is required to meet the conditions for the insurance covered (in which he purchased) as laid down in the guidelines / policies as provided by NAIC.

Empirical Framework

In a study conducted by Abdulmalik *et al.* (2013) to identify the determinants of crop farmer's participation in agricultural insurance scheme in the Federal Capital Territory, Abuja Nigeria. It was reported that though majority of the respondents (78.3%) were aware of the agricultural insurance scheme, only 35% of the respondents participated in the scheme. The result of the *logit* regression analysis showed according to the study indicated that at 10% level of significance, age,

educational level and accessibility to credit facilities were significant variable that influence the participation of the farmers in agricultural insurance scheme. Also, farm size was a significant variable at 5% level of significance while household size, membership of association and contact with extension agents were not found to be significant variables in influencing the farmer's participation in agricultural insurance scheme.

In a study conducted by Ajieh (2010) to examine the response of poultry farmers to agricultural insurance scheme in Delta State it was discovered that there was a low response (37%) and participation of poultry farmers to agricultural insurance scheme. According to this report, the poultry farmers agreed that agricultural insurance is beneficial and is needed to cushion the effect risk. The study identified the constraints to poultry farmers adoption of the scheme to include: fear that claims may not be paid, inadequate knowledge on the benefits of agricultural insurance, the delay in the payment of compensation, high premium rate and low level of compensation paid which may not cover loss.

In a study conducted by Akinola (2014) to identify the determinant of farmer's adoption of agricultural insurance in Abeokuta metropolis of Ogun state, Nigeria it was discovered that only 46% of the farmers were aware of the agricultural insurance policy and only 44% had adopted the scheme. The result of the *logit* regression analysis showed that farmers' adoption of agricultural insurance increased with increase in formal and extension education, higher level of awareness of insurance policy, and years of experience in farming.

Adeyinka (2015) conducted a study titled: analyses of risk and mitigating strategies amongst poultry farmers in Kaduna metropolis The study showed that the poultry farmers in Kaduna metropolis with optional responses under poultry risk were either averse to such risk or preferred them. Poultry farmers that exhibited risk aversion attitudes had risk mitigating strategies through which they reduced risk adverse effects. The regression result of the study indicated that household size of respondent, non-farm income, years of poultry farming and flock size were significant variables that influenced farmers adoption of agricultural insurance scheme.

RESEARCH METHODOLOGY

Study Area

The research was carried out in Abak Local Government Area. Abak Local Government area is one of the 31 Local Government Areas in Akwa Ibom state Nigeria. The local Government area was previously part of Cross River State and became a Local Government Area in Akwa Ibom state following

the creation of Akwa Ibom state in September 1986. Abak is one of the parents Local Government areas in Akwa Ibom state, who gained a status of Divisional council Headquarters since 1902. It was later sub divided into other Local government areas such as *Oruk Anam, Etim Ekpo, Ukanafun* and *Ika*. The people are generally *Annang*. They are reputed for their resourcefulness and highly mobilized for economic development and political integration within the state and the Nigerian Federation. Abak has a coordinates of 5^o1 N, 7^o37 E, and 5.017^o N, 7.617^o E. Abak is classified under humid tropical rainforest zone. There are two distinct seasons characterized by seven months (April – October) of wet season and five months (November- March) of dry season. Mean annual rainfall is 3500mm while temperature ranges from 29^o C -33^o C. Rural households keep few sheep, goats, pigs and local chicken. Extensive rearing of birds is also inhibited by farmers of Abak Local government area.. The Local Government Area has a total population of 139090 people, with males 73578 and females 65512 (according to 2006 census). It has a total land mass of 304 square kilometers.

Sample Size and Sampling Technique

Multi-stage stratified random sampling techniques were used in selecting the respondents for this study. Firstly, the five clans of Abak, namely: *Afaha obong, Otoro*, Abak urban, *Midim* and *Ediene* were used as a sampling frame. A list of villages in each of the five clans was compiled and this served as another sampling. From this list, two (2) villages in each of the five clans were randomly selected making a total of 10 villages for the study. Lastly, in each of the 10 villages, a list of farm household were compiled with the assistance of village heads and AKADEP extension agent for the area, this list served as respective sampling frames for the villages. From each village, 10 farming households were randomly selected for the study. On the whole, a total of 100 poultry farmers were selected for the study.

Sources and Types of Data

For the purpose of this study, only primary data was used. Information that was collected includes: Socio-economic characteristics of the respondents such as age, gender, level of education, household size, experience in poultry farming, contact with extension agents, income of the farmer, Access to credit facilities, types of risk in poultry farming and methods of risk mitigation.

Method of Data Collection

Primary data were obtained through field survey using a well-structured questionnaire administered to each of the selected poultry farmers. This was complimented

with personal interview schedules to those who could not read and write.

Analytical Techniques

The study employed descriptive statistics and the *logit* model. The logit model was used to identify the determinants of farmers’ participation in Agricultural insurance scheme. Rahman et al (2003) stated two advantages of logit model over linear probability and probit models as follows:. Logit model ensures production of probability of choice within (0 to1) range. This is an advantage over linear probability model and it is easier and more convenient to compute than probit model. The logit model is based on cumulative logistic probability function and it is computationally tractable. According to Gujurati and Porter (2009), the model is expressed as follows:

$$P_i = E(Y=1/X_i) = \beta + \beta_2X_2 + \beta_3X_3 \dots\dots(1)$$

For ease of estimation equation (1) is further expressed as:

$$P_i \frac{1}{1 + e} = \frac{e_2}{1 + e_2} \dots\dots(2)$$

Where P_i = Probability of an event occurring

$$Z_i = \beta_1 + \beta_2X_2$$

The empirical model of the logistic regression for this study assumed that the probability of the farmers’ participation in Agricultural insurance scheme is expressed as;

$$P_i = \frac{e^{(\beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \dots \beta_{10}X_{10})}}{1 + e^{(\beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \dots \beta_{10}X_{10})}} \dots\dots\dots(3)$$

P_i range between zero to one and it is nonlinear related to Z_i . Z_j is the stimulus index which range from minus infinity to plus infinity and it is expressed as:

$$Z_i = \frac{\ln(P_i)}{1 - P_i}$$

$$= \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \dots \beta_{10}X_{10}$$

Where P_i = Probability of poultry farmers adopting Agricultural Insurance.

$1-P_i$ = Probability of not adopting agricultural insurance.

B_0 = intercept.

$B_1(1, 2, 3 \dots 10)$ = regression coefficients

$X_1(1, 2, 3 \dots 10)$ = independent variables

e = error term

The independent variables specified as factors affecting the adoption of agricultural insurance and are defined thus:

X_1 = Age (years)

X_2 = Gender

X_3 = Marital status

X_4 = Level of Education

X_5 = Household size

X_6 = Farming experience

X_7 = Cooperative membership

*** -----1%

The result of the logistic regression showed that out of the 10 explanatory variables used in specifying the model, six (6) were significant at different levels of significance. These six (6) variables includes: age, marital status, level of education, household size, annual income and flock size. The result presented above shows that as the age of the farmers increases, they are more unlikely to adopt insurance as a risk management strategy. Flock size and household size were both significant at 5% respectively and had a positive coefficient, implying that as flock size and household size increases, there is a higher probability of the farmers adopting agricultural insurance. Marital status and annual income were both significant at 10% respectively. The result indicated that as the annual income of the farmer's increases, the probability of the farmers adopting insurance scheme became lower. The marital status of farmers had a positive coefficient and is significant. The result showed that level of education has a positive coefficient and is significant at 1%. This implies that if the level of education of farmers in the study area is raised, most of them are likely to adopt agricultural insurance as a risk management strategy.

CONCLUSION

Agriculture is a very risky business and it depends on the vagaries of nature. Farmers employ various risk management strategies to minimize farm risks. Agricultural insurance is one of the major conventional risk management strategy. The study has shown that farmers in Abak Local Government Area applied various risk management strategies to mitigate the effect of risks. The risk management strategies that were identified in the study area were: obtaining stock from good source, appropriate provision of feed, providing proper ventilation in the poultry pen, avoiding overcrowding and practice of enterprise diversification as well as adopting Agricultural insurance. The result of the logit regression showed that age, marital status, level of education, household size, annual income and flock size were significant variables that influenced the probability of participation of the farmers in agricultural insurance scheme. The pseudo R^2 of the logit regression was 77% which indicated the predictive power of the variables. It is recommended that Farmers should be encouraged to increase their flock size and adopt insurance as an important and more effective risk management strategy. The farmers need to be sensitized to erase the poor perception of insurance policy in the study area. Insurance firms should reduce their premium for agricultural policies so as to make it affordable to rural farmers who may not afford exorbitant premiums.

REFERENCES

- Abdulmalik R. O, Oyinbo O, Sami RA, (2013). Determinants of Crop Farmers Participation in Agricultural Insurance in the Federal Capital Territory, Abuja, Nigeria. *Greener Journal of Agricultural Sciences*. 3(1):021-026
- Adeyinka J.T (2015). "Analysis of Risk and Mitigating Strategies Amongst Poultry Farmers in Kaduna Metropolis". (unpublished M.SC thesis). Department of Agricultural Economics and Rural Sociology. *Ahmadu Bello University, Zaria, Nigeria*.
- Ajakaiye M. B., (2001). Banking industry and the development of Agricultural. An Assessment and future prospects.
- Ajeh, P. C. (2010). Poultry Farmers Response to Agricultural Insurance In Delta State. *Nigeria Journal of Agricultural Science* 1(1): 43-47.
- Akinola B. D., (2014). Determinants of Farmer's Adoption of Agricultural Insurance: A case of Poultry Farmers in Abeokuta Metropolis of Ogun State, Nigeria. ISSN 1995-901X. Babcock University, Ogun state.
- Blair, T. (2005). Commission for Africa; Our Common Interest, London. UK Department for International Development (DFID), March 2005.
- Booth P, Chadburn R, Cooper D, Haberman S, James D (1999) Modern actuarial theory and practice. Chapman and Hall/CRC, London.
- Bodie Z., and Merton R. C., (1998). Design of financial systems: towards a synthesis of function and structure. Published in the journal of investment management, vol. 3 no. 1, (2005).
- Colman D., Young T., (1998). Principle of Agricultural Economics, Marketing and Price in less developed countries. Cambridge University Press.
- Durojaiye, B.O (1991). Multi objective farm planning for small-scale in Ogun state, Nigeria. Issues in African Rural Development eds. Doss R. Cheryl and Carol Olson, Winnrock International Institute for Agric Dev. pp. 175-195.
- Effiong E. O, Enyenihi E A, George A. A. (2014). Analysis of farming risk among small scale poultry farmers in Etim Ekpo Local Government of Akwa Ibom State. Nigeria. *Journal of Agriculture, food, and environment* 10(1): 59 – 64.

- Eleri O. E, Uduka IK, Akuto N, Onuvae P, Anwara O (2012). Towards a Climate-based Agricultural Insurance Reform in Nigeria. Presented at the Workshop on Legal and Regulatory Frameworks for Agricultural Insurance Reform in Nigeria-Protecting Nigeria's Farmers from Climate Change Kano Hall, Transcorp Hilton Hotel, February 27, 2012. pp. 1-53.
- Gujarati DN and Porter CD (2009). Basic Econometrics (5th Edition). McGraw-Hill, New York.
- Hardaker J. B., Hurine R. B. M., and J. R. Anderson (1997). Coping with risk in Agriculture, Wallingford, CAB international .1997
- Harwood, J., Heifner, K., Coble., J, Perry and A, Somwana (1999). Managing risk in Farming Concepts, Research and Analysis, Agricultural Economics Report number 774 (Washington D.C., Economics research service. U.S. department of Agriculture).
- Hazell P. B., (1988). Risk and Uncertainties in Domestic Production and Price: Agricultural Price Policy for Developing Countries, Baltimore Maryland, John Hopkins University Press, U.S.A.
- Hazell, P., (1992). The Appropriate Role of Agricultural Insurance in Developing Countries. *Journal of International Development*, 4(6): 567-581
- Mabawonkwu A. F., (1998). 'The Concept of Insurance With Particular Reference to Agricultural Enterprise in Nigeria'. Workshop Paper on Risk Management and Administration of Insurance in Nigeria, Department of Agricultural Economics, University of Ibadan.
- Michael R. C., Cheng, L., and Alexander Sarris. (2011). "The Impact of Interlinked Index Insurance and Credit Contracts On Financial Market Depending on Small Farm Productivity". Unpublished Manuscript.
- Moss C. B., (2010) Risk Uncertainty and the Agricultural Firm. World Scientific Publishing Co. Plc Ltd. USA; 2010.
- Nwaru, O. O., Ezech, C.C. and Olukosi, J.O. (1993). Farmers' Perception of Risks and their Responses in Dry Season Farming: A Study of the Kano River Project. *The Nigerian Journal of Agricultural Extension*, 6(1&2): 12-17.
- Olayide S.O., Ogunforuwa O, Essang SM, Idachaba F. S., (1981). Elements of Rural economics. Ibadan University Press Publishing House; 1981.
- Olubiyo SO, Hill GP, Webster JPG (2009). Econometric Analysis of the Impact of Agricultural Insurance on Farming Systems in the Middle Belt, Nigeria. *African Journal of Food, Nutrition and Agriculture* 9(6): 1406 – 1418.
- Osoka O. (2002). "Risk Management and Insurance". Insurance and the Nigeria Economy, Panacle Publications.
- Oyekole O. D., (2002). 'Agricultural Risk Management, an Insurance Option'. *The Farmers Shield: A House Journal the Nigeria Agricultural Insurance Company*, 2002.
- Payne O.O., Bamire, O. S. and Oludimu, O. L.,(2001). Determinants of Risk among Smaller Holder Farmers: A Nigerian Case Study. *The Interface* 1(1): 72-80.
- Phillips D. O. A (1988). An empirical Review of the Proposed Agricultural Insurance Scheme in Nigeria, *African Review of Money, Finance and Banking* 1: 5-15.
- Salami, O.A. (1994). An Econometric Analysis of the Nigeria Agricultural Insurance Company (NAIC) In Ondo State, Nigeria. (Unpublished M.SC Thesis). The Department of Agricultural Economics, University of Ibadan.
- Sekumade A. B., and Ogunro V. O., (2013). "Risk Assessment and Management for Agribusiness Enterprises Investment In Ondo State, Nigeria." Published In *European Journal of Business And Management*. ISSN 2222-2839 Vol. 5 No 1, (2013).
- Sonka,S.and Patric G(2000). Risk Management Analysis Development, Performance; Process MSU Bureau of Business And Economic Research Graduate School of Business Administration. Michigan State University.
- Udo, U. J., Nkeme K. K., Igwe K. C.,(2015). Optimizing Farm Plans for Arable Crop Farmers in Selected Agricultural Zones of Akwa Ibom State, Nigeria: An Application of Linear Programming and T-MOTAD Models. *Journal Of Basic And Applied Research International*, 11(1): 40 – 52, 2015.
- Umoh G S. Economics of wetlands farming in Akwa Ibom State Nigeria. An unpublished Ph.D. Thesis Dept of Agricultural Economics University of Ibadan Nigeria; 2000.