ECONOMIC EVALUATION OF FARMERS' PARTICIPATION IN THE NIGERIANAGRICULTURAL INSURANCE SCHEME IN KADUNA STATE,NIGERIA

BY

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A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA, IN PARTIAL FULFILMENTOF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN AGRICULTURAL ECONOMICS

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MARCH, 2016

DECLARATION

I hereby declare that this dissertation titled **"Economic Evaluation of Farmers' Participation in the NigerianAgricultural Insurance Scheme in Kaduna State, Nigeria"** has been written by me and it is a record of my research work. No part of this work has been presented in any previous application for another degree or diploma in this or any other institution. All borrowed informationhas been acknowledged in the text and a list of references provided.

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CERTIFICATION

This dissertation titled **"Economic Evaluation of Farmers' Participation in the NigerianAgricultural Insurance Scheme in Kaduna State, Nigeria"** by AlexanderAbisanANTHONY meets the regulations governing the award of Master of Science Degree Agricultural Economics of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This dissertation is dedicated to God Almighty and to my adorable parents Mr. and Mrs. Anthony Adamu. Thank you for your unfading love.

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ABSTRACT

The study was conducted to evaluatethe economics of farmers' participation in the Nigeria agricultural insurance scheme in Kaduna State of Nigeria. A multistage sampling technique was used to select 148farmers.Primary data were collected with the aid of structured questionnaires.The data were analyzed using descriptive statistics, logit regression model and t-statistic test. The results showed that the mean age of the farmers was 44years. Majority of respondents (95%) were literateand most (74%) of themcultivated small-scale farms (0.1-3.0ha).Majority (67%)of the farmers had a mean farming experience of 9 years, 53% were not members of any cooperative group, 35% had no access to loans and of the 73.7% of the farmers that were aware of the Agricultural Insurance Scheme only 38.5% participated in the scheme. Results from the logit regression analysis showed that age, educational level, farm size, and amount of loan obtained were significant variables that influenced farmers' participation in the agricultural insurance scheme while gender, household size, membership of cooperative organization, contact with extension agents and farming experience were found to be insignificant in influencing farmers' participation in agricultural insurance scheme. Results of the t-statistic test revealed that farmers that participated in the Agricultural Insurance Scheme have had increased farm income compared to farmers that did not participate in the scheme. Major constraints encountered by the farmers participating in the Agricultural Insurance Scheme were fears expressed in indemnity payment, administrative bottlenecks, delay in assessment of losses, rigorous procedures in claim settlement, inaccessibility to insurance personnel and inadequate information dissemination.On the other hand, the major constraints faced by the administrators of the scheme were; inadequate infrastructure and administrative facilities, adverse selection and paucity of data, farmer apathy towards insurance, moral hazard, and spatial dispersion. It was therefore recommended thatextension agents and the Nigerian Agricultural Insurance Corporation (NAIC) staffs should make deliberate efforts to educate the rural populace especially on the benefits of the scheme. NAIC should also evolve strategies for dealing with the existing apathy against insurance by improving their services to farmers, removing existing bureaucratic bottlenecks and thus, rendering more timely and efficient services to the farmers. Payments of compensations should be publicized on the media to erase farmers' apathy against insurance. Cash crops should be considered for inclusion in the scheme to encourage broad based participation. More staff should be engaged in the Nigeria Agricultural Insurance Corporation to enable them reach out to a vast majority of farmers to enhance participation.

CHAPTERONE

INTRODUCTION

1.1 Background to the Study

The agricultural sector is a major economic sector and a critical source of livelihood in many developing countries (Mahul, 2011). Agricultural production has long been characterized by risk and exposure to such perils as drought, flood, fire outbreaks, and pests and diseases (Phillip and Ezeh, 1988). Risks and uncertainty have adverse effects on the effectiveness of decision making, particularly as relating to input use and output supply (Agada*et al*., 1997). As a result, farmers in every agricultural system have remained largely active, devising ways to cope with the various unfavourable events within their production settings (Phillip and Ezeh, 1988).

While risk elements have differed with commodities, places, and even time, the consequence has largely been reflected unambiguously in non-optimal allocation of resources at farm levels. Actually, in the case of empirically more prevalent risk-averse behaviour, farmers have responded to risk by under-employing resources and, of course, under-supplying outputs (Phillip and Ezeh, 1988).

Natural and biological events, often of catastrophic and epidemic proportions, some of which have potential for recurrence, have been witnessed in Nigeria. Examples include: (i) the drought, which caused considerable financial losses in crops and livestock, and (ii) the attack on groundnut crop by aphids, which both occurred in the early 1970s. These two prominent events together contributed immensely to Nigeria's exit from the World groundnut market (Phillip, 1988).

Other events which have occurred during the past decades, and could therefore be regarded as risk elements in the Nigerian agricultural sector include erosion and flood in the southern parts of the country, locust attacks on crops in the northern (especially the semi-arid) parts, and the ravaging of farmlands by accidental fires, particularly in the savannah (grassland) areas of the country (Phillip, 1988). Several more cases can be cited to press the point that agricultural production in Nigeria, like in most other ecological sub-regions in the world, is characterized by risk elements, many of which have (and could still) manifest themselves unfavourably (Phillip, 1988).

Insurance has long been identified as one of the logical options, whenever an economic activityis subject to knowledge imperfection that is no more than risk (Heady, 1952). Essentially, when a farmer buys an insurance policy, he sells his risk to the insurer. The farmer moves out of a risky world into certainty with respect to the peril he insured against. If the farmer suffers a loss, he receives compensation according to the terms of the insurance policy. Otherwise, he keeps his earnings, less the amount paid as premium (Hey, 1979).

1.2 Problem Statement

Insurance is one of the tools that farmers and other stakeholders can use to manage risks that are too large to manage on their own (risk layering) (World Bank, 2011). Part of that risk is transferred to another party, who takes it in return for a fee (or premium). Where available and affordable, agricultural insurance (crop or livestock) can provide great benefits to farm households (World Bank, 2011):

(i) Insurance can (and should) be used to complement other risk management approaches. Farmers can rely on informal household and community-level strategies such as crop and labour diversification to manage small to moderate risks. In the event of a major weather shock, insurance can be designed to protect against revenue or consumption losses. This enables households to avoid selling livelihood assets or drawing on savings.

(ii) Insurance can assist farmers in accessing new opportunities by improving their ability to borrow either money or in-kind credits. In doing so, farm households may potentially experience safer and possibly higher returns.

Insurers have tended to concentrate on urban and industrial risks and therefore often do not have networks in rural areas. Where agricultural insurance can be provided, risks are often highly spatially correlated and therefore financially difficult for insurers to manage (World Bank, 2011).

At present, most households in Africa do not buy insurance for a variety of reasons, namely: (i) people are unaware of the availability of insurance; (ii) insurance products are not well designed for them; (iii) people cannot afford to buy currently available services; and (iv) people consider insurance schemes dubious because of the well-known inefficiencies and delays in claim processing (Markowski, 2001).

Thus, arising from the above are several research questions which this study seeks to address. They are:

i. What are the socio-economic characteristics of the respondents in the study area?

ii. What is the proportion of respondents that are aware as well asparticipating inNigerianAgricultural Insurance Scheme?

iii. What are the socio-economic characteristics of farmers influencing participation in Nigerian Agricultural Insurance Scheme in the study area?

iv. What is the impact of participation in Nigerian Agricultural Insurance Scheme on farmers' income?

v. What are the constraints associated with implementationof NigerianAgricultural Insurance Schemein the study area?

1.3 Objectives of the Study

The general objective of the study is to evaluate farmers' participation in Nigerian Agricultural Insurance Scheme in Kaduna State. The specific objectives are to:

i. describe the socio-economic characteristics of the respondents in the study area.

ii. determine the proportion of respondents that are aware as well asparticipating inNigerianAgricultural InsuranceScheme.

iii. determine the socio-economic characteristics of farmers influencing participation in Nigerian AgriculturalInsurance Scheme in the study area .

iv. determine the impact of participation in Nigerian AgriculturalInsurance Scheme on farmers' income.

v. identify and describe the constraints associated with implementation of NigerianAgricultural Insurance Scheme in the study area.

1.4 Justification for the Study

In many developing countries, farmers operating all sizes of farms retain the risk of crop and livestock losses (Herbold, 2010). The occurrence of unfavourable events in agriculture could be accompanied by substantial costs to society, if there are no proper risk management and reallocation of risk-bearing (Phillip, 1988). Akinola-Bello (1985) argues that protection against financial losses through insurance enhances (i) the efficiency of resource allocation; (ii) the productive capacity of society; and (iii) confidence in business transactions. Appropriate risk management tools for agriculture such as agricultural insurance systems are, therefore, critical for agricultural development.

In order to contribute to knowledge on agricultural insurance in Nigeria, it is important to determine, amongst other objectives, the extent of participation of farmers in the scheme, farmers' preferences of insurance cover for crop, livestock or both enterprises, the impact of the scheme on farmers' income and to obtain quantitative estimates of the factors influencing participation in agricultural insurance schemes and to assess the

policy implications for further development of the schemes. It is envisaged that the results of this study will provide useful information on the workings of agricultural insurance schemes to farmers, policy makers, researchers, government agencies, the general public as well as international agencies interested in the improvement of agricultural production and rural development through the development of innovative and sustainable agricultural insurance products and services. This will help address some of the problems of rural-urban migration, poverty, and food insecurity in the rural sectors of developing countries.

1.5 Research Hypotheses

The research hypotheses which are postulated for testing in this study are stated in the null form as follows:

(i) Farmers' socio-economic characteristics do not influence their participation in Nigerian Agricultural Insurance Scheme.

(ii) Farmers' participation in NigerianAgricultural Insurance Scheme has no significant impact on their income.

CHAPTERTWO

LITERATURE REVIEW

2.1 The Concepts of Risk and Uncertainty in Agriculture.

2.1.1 Risks in agriculture.

Olayide and Heady (1982) regard risk as one of the two eventualities the farm operator-producer normally faces, whose outcomes modify production relationships in view of their strong bearings on future plans, yields, prices and net income. They defined risk as variabilities or outcomes which are measurable in an empirical or quantitative manner. The variability or outcome, according to them, need not be exactly predictable for any given product or output, but the probability of outcome or loss must be capable of being established for a large number of cases or observations. Empirical probabilities of outcome (or loss) for risk situations, they argued, can be established either by the use of *a priori* probabilities when the characteristics of the eventuality are known beforehand, or by statistical probability of outcome based on large samples of cases of replicable observations which are randomly and independently distributed.

Olayide and Heady (1982) further pointed out that farm eventualities classifiable as risk include the year-to-year variabilities in crop yields that are normally associated with fluctuations in weather. Such variabilities, they argued, may be classified as risks in farming communities where (i) the climate is fairly highly stable; (ii) only small random variations occur from year to year; and (iii) the complete range of yield is repeated frequently enough to enable the farm operator to establish the mean or modal outcome and the range or variance of outcomes.

Hardaker*et al*. (1997) identified several primary causes of risk in agriculture to include: (i) production risk, stemming from the unpredictable weather and uncertainty about the performance of crops or livestock due to pests and diseases; (ii) price or market risk, arising from farmers having to make decisions about input uses without knowing the price of the inputs, or more importantly, outputs; (iii) governments as a source of institutional risk for farms, when they change the policy environment in which farms function; (iv) human or personal risk as issues associated with individuals that may affect the farm business such as death of the business owner, divorce, prolonged illness, and carelessness of a hired employee; and (v) financial risk, related to the sources and methods of financing the farm operation.

Chavas (2004) defines risk as representing any situation where some events are not known with certainty. He argued that there is no clear distinction between risk and uncertainty. According to him, there are two schools of thought: one is that risk and uncertainty are not equivalent and that the distinction between the two is the ability to make a probability assessment; and the other is that the debate about the distinction between risk and uncertainty ultimately boils down to an argument about the existence and interpretation of probability. He concluded that this discussion is insightful, but has not led to much empirical analysis and thus, does not draw a sharp distinction between risk and uncertainty.

Huirne*et al*. (2000) and Hardaker*et al*. (2004) distinguished two major types of risk in agriculture: (i) business risk and (ii) financial risk. Business risk includes production, market, institutional and personal risks. Production risk is due to unpredictable weather. Market risk is related to uncertainty about the price of outputs and, sometimes also

inputs, at the time production decisions are taken. Institutional risk is due to government actions and rules such as laws governing disposal of animal manure, use of pesticides, tax provisions and payments. Personal risks are due to uncertain life events such as death, divorce, or illness. Financial risks result from different methods of financing the farm business. The use of borrowed funds means that interest charges have to be met and there is financial risk when interest rates rise or loans are unavailable.

Musser and Patrick (2001) and Baquet*et al*. (1997) defined five major sources of risk in agriculture:(i) production risk, which concerns variations in crop yields and in livestock production due to weather conditions, diseases and pests; (ii)marketing risk which is related to variations in commodity prices and quantities that can be marketed; (iii) financial risk which relates to the ability to pay bills when due, and to have money to continue farming and avoid bankruptcy; (iv) legal and environmental risk which concerns the possibility of lawsuits initiated by other businesses or individuals and changes in government regulations related to the environment and farming practices; and (v) human resource risk which concerns the possibility that family or employees will not be available to provide labour or management.

2.1.2 Uncertainties in agriculture

Olayide and Heady (1982) described uncertainty as the second of the two production-modifying eventualities faced by the farmer. They stated that in the case of uncertainty, we usually cannot establish the probability of an outcome in an empirical or quantitative sense. They described uncertainty as a situation where the knowledge of the future is less than perfect in the sense that the parameters of the probability distribution such as mean, mode, range, variance, skewness, kurtosis, and so forth, cannot be determined.

Uncertainty thereby becomes a "subjective" knowledge situation, and we can only work with anticipations of the future.

Olayide and Heady (1982) identified four factors that may result in uncertainty and that these may be endogenous or exogenous: (i) price uncertainty for factors of production or for farmoutput. In agriculture, price uncertainty may be due to fluctuations in national income or prosperity, or it may be due to recurring commodity cycles generated by discontinuous production cycles for farm products as in the hog cycle, or to random disturbances growing out of fluctuations in weather and so forth; (ii) technical or yield uncertainty, which essentially refers to variations in the production coefficients for a given technique. This type of uncertainty is universally present in the various lines of agricultural production, but may be absent or not so serious in some non-agricultural industries; (iii) technological uncertainty, which leads to variabilities in the prices and outputs of farm products, which affects both agricultural and non-agricultural industries; (iv) socio-legal uncertainty in which the farm-firm operates. Laws specifying compulsory and free primary education for all children above six years have been known to have serious impact on farm labour and farming population in developing peasant economies. Farms also face socio-legal uncertainties in the form of tenural changes, purchase contracts, character of individuals entering and leaving farm business, employer-employee relationships in corporate farms, farm credit and loan schemes, and various forms of government programmes.

Moschini and Henessy (2001) have identified four different sources of uncertainty in agriculture as: (i) production uncertainty, in which the amount and quantity of output that will result from a given bundle of production decisions are not known with

certainty. Uncontrolled elements such as weather conditions play a fundamental role in agricultural production; (ii) price uncertainty, in which production decisions have to be made far in advance of realizing the final product. The price of the output is typically not known at the time production decisions are taken. Inelastic demand is often cited as the main explanation for agricultural price variability; (iii) technological uncertainty, in which the evolution of production techniques may make quasi-fixed past investments obsolete. Research and development efforts are typically not made at the farm level but at the input-supplier firm level; (iv) policy uncertainty, where, besides the general economic policies that affect agriculture as any other sector (taxes, interest rates, exchange rates), agriculture is typically characterized by an intricate system of government interventions and changes which may create risk for agricultural investment.

2.2 Risk Management Instruments and Strategies

The farmer is the agent that is best positioned to know the dimensions, characteristics and correlations of the risks that affect his farm. He is also best positioned to evaluate the availability of different strategies to deal with these risks. It is the farmer's responsibility as manager of his own farming business to take the appropriate decisions to manage the risks associated with his economic activity: farming. The basic principles behind the generic strategies to reduce risk (risk-sharing, risk-pooling and diversification) are simple and well known to economists. Furthermore, they have been, historically, extensively used by farmers. The theory of choice under uncertainty is the basis for understanding the advantages of strategies such as risk-sharing and risk-pooling (Newbery, 1989):

(i) Risk-sharing involves spreading risk over a number of agents instead of concentrating it in one agent. For example, share-cropping arrangements allow production risk to be shared between the worker/tenant and the owner of the land, in a way that the total costs in terms of the sum of their premiums are reduced.

(ii) Risk-pooling involves bringing together the risk returns of two farmers that will then share the resulting outcome. The variance of the corresponding share of the pool is then smaller than the variance of each risky return. The reduction in variance will be larger with a smaller correlation between the returns of the two farmers. The variance will be equal only in the unlikely case of perfect correlation between returns. Insurance companies operate by pooling risks and then sharing them among a large number of shareholders. The more correlated across farms the risks are, the more difficult to develop economically viable risk-pooling instruments.

(iii) Diversification strategies also follow the same principle. A farmer diversifies when he uses his resources in different activities and/ or assets, instead of concentrating them on a single one. If returns of these activities or assets are not perfectly correlated, the variance of the overall returns is reduced and, therefore, the costs associated with risk are also reduced. There can also be diversification strategies in the input side of production. For instance in developing countries, small holders typically have developed methods to diversify the gene pool of crops in order to be able to cope with adverse shocks.

Olayide and Heady (1982) identified five precautions for minimizing uncertainty in farm business:

(i) The variabilities resulting from uncertainty in the farm decision-making problem can be minimized by the selection of products and production processes with low variability. This precaution emphasizes a full knowledge of the product-product relationships in working out enterprise combinations in farm business.

(ii) The use of single-valued expectations and discounted returns in decision-making processes. To handle expectations in a single-valued manner, the decision-maker will have to pick out say, some particular expected price or yield, and assume that 'exactly this and no other' value will be realized. He thus has to view the future with subjective certainty, the payoffs or losses will depend on the magnitude of judgemental errors.

(iii) Attempts to minimize the harmful effects of uncertainty by forward contracts have yielded some positive results through employment of contracts in money and/or in kind.

(iv) Employment of the operational practice of diversification. The principle of diversification enables the farmer not to put all his eggs in one basket. It may be attained by the selection of multiple products, by minimizing loss in any single year, by yield correlations and price correlations.

(v) Flexibility designed to prevent the sacrifice of large gains. Flexibility may be approached with respect to time, cost, factor, product and liquidity or asset structure of the farm-firm. For example, in the case of liquidity, the holding of reserves and the maintenance of liquidity implies that the firm could increase output and profit by reducing the proportion of assets held in the form of money, or operator equity, if the future could be foreseen more perfectly.

More concrete risk management strategies can be grouped into three categories: prevention strategies to reduce the probability of an adverse event occurring; mitigation strategies to reduce the potential impact of an adverse event; and coping strategies, to relieve the impact of the risky event once it has occurred (Holzmann and Jogersen, 2001). Prevention and mitigation strategies focus on income smoothing, while coping strategies focus on consumption smoothing (Holzmann and Jogersen, 2001). Strategies can be based on arrangements made at different institutional levels: farm household or community arrangements, market-based mechanisms, and government policies (Holzmann and Jogersen, 2001).

2.3 Agricultural Insurance.

In general, insurance is a form of risk management used to hedge against a contingent loss. The conventional definition for insurance is the equitable transfer of a risk of loss from one entity to another in exchange for a premium or a guaranteed and quantifiable small loss to prevent a large and possibly devastating loss (Iturrioz, 2009).

Insurance refers to the use of contracts to reduce and redistribute risk. In return for the paymentof a premium, an insurer or underwriter agrees to compensate the insured in the

event of his suffering a specified loss. The main principle underlying insurance is 'the pooling of risk', a large number of people contributing to a fund out of which compensation can be paid to those experiencing a particular type of loss (Hanson, 1977).

Agricultural insurance, in its widest sense, may be defined as the stabilization of income, employment, prices and supplies of agricultural products by means of regular, deliberate savings and accumulation of funds in small installments by many in favourable time periods to defend some or a few participants in bad time periods (Arene, 2005). Hansel (1998) defines insurance as a social device providing financial compensation for the effects of misfortune, the payment being made from the accumulated contributions of all parties particularly in the scheme. The main principle underlying insurance is 'the pooling of risk', a large number of people contributing to a fund out of which compensation can be paid to those experiencing a particular type of loss (Hanson, 1977).

Some of the commoner risks which it is usual for businessmen and private individuals to insure against are the destruction of property or stock by fire, losses arising from burglary or other causes, goods in transit, motor vehicles, and 'third party' claims arising out of accidents (Hanson, 1977). In life insurance the event insured against is the death of the insured, or his or her survival to some agreed age. In insurance for fire and theft the event insured against is damage by fire or theft to the insured's property. In motor insurance the event insured against is loss by fire, theft, or damage to 'third parties', that is, anybody except the insured and the insurer. In health insurance the event insured against is medical expenses and/or loss of earnings through ill health.

In every insurance contract the insured exchanges one evil for another. Without insurance there is a small chance of a large loss; with insurance there is a certain small loss, that is the premium, and possibly some further loss if the damage done by the event insured against exceeds the sum insured (Hardaker*et al*., 2004). The insurer makes the reverse exchange, accepting a new risk for the sake of the premium. Insurers are willing to take on risk in this way for two reasons. One is that they may be risk neutral, or at least less risk-averse than the people they are insuring. The other factor which induces insurers to take on risks is that if they take on a number of risks of the same general type which are largely independent, the proportional dispersion of their returns will be smaller than the average of the individual risks they take on. Insurance thus both reduces overall risk, and transfers risk to those with a comparative advantage in risk-bearing (Hardaker*et al*., 2004).

2.4 Basic Model of Insurance

In any insurance market, the insured essentially transfer his risk to the insurer (Phillip, 1988). Suppose that an individual has W in risky asset, W_0 in risk-free asset, and let P represent the probability of completely losing W, while R is the maximum premium the individual is willing to pay to protect W. (W, W_0 and R are all expressed in monetary terms).

$$R = P(W) + P(W_0) \quad \text{..... (1)}$$

The assumptions which underline this model include the following (Phillip, 1988):

(i) The insurer will fully compensate the insured if W is lost.

(ii) The insurer will honour this agreement.

(iii) The insured will not alter his behavior such as to increase the value of P (moral hazard).

Then, under the foregoing conditions, the maximum premium an individual is willing to pay can be obtained by equating the expected utilities of insuring and not insuring, and solving for R (Hey, 1979). To make profits, each insurance company will want R to exceed PW, the actuarially fair premium. Conceptually, if the insured accepts the condition that R > PW, he is risk-averse. If he accepts that R = PW, he is risk-neutral. And, if he would insure only if R < PW, he is risk-loving or risk-seeking (Henderson and Quandt, 1980). Intuitively, the maximum premium a person is willing to pay will be influenced by such considerations as the size of his riskless wealth W_0, the riskiness of the asset to be insured as embodied in parameter P, and the degree of confidence placed in the insurer (Phillip, 1988).

2.5 Benefits of Agricultural Insurance

Some of the benefits of agricultural insurance to farmers include:

(i) Farmers' protection against financial disasters after suffering any of the insured risks for which indemnity (compensation) is paid. Thus, the farmer is not only able to continue in business but also the stability of his income is enhanced.

(ii) Improvement of the position of the farmers in relation to agricultural credit in the sense that it guarantees protection against crop and/or livestock failure. Thus, the insured farmers have greater confidence when applying for a loan.

(iii) Giving the farmers greater confidence in venturing into new and improved farming practices and in making greater investment in agriculture.

(iv) Facilitation of better planning and project implementation, since there is a high level of assurance of continuing in farming business (Chikwendu*et al.*, 1995).

The benefits of agricultural insurance are not limited to farmers alone. Banks and other financial institutions who lend to farmers for agricultural purposes are assured of higher repayment of their loans (Chikwendu*et al*., 1995). The income of the rural community as a whole is stabilized through the stabilization of farmers' income. Government obligation of providing relief materials to affected farmers in the event of disasters and other adverse occurrences is also significantly reduced due to insurance indemnity payments (NAERLS, 1991).

2.6 Insurability of Agricultural Risks.

Economics literatures typically give a standard solution to the management of uncertainty: developing markets (insurance markets) that facilitate the exchange of risk with other agents and realizing the potential gains from pooling or sharing the risk (Skees and Barnett, 1999). However not all risk that affect agriculture have a corresponding insurance market, that is, not all risks are insurable. Insurance contracts for some risks do not exist because the insurance premium covering all the costs would be prohibitive. There are some conditions that are required–at least to some extent–for the insurability of a risk. They are not always expressed in the same terms but could be grouped as follows (Skees and Barnett, 1999):

(i) The corresponding risks for different agents have to be independent or idiosyncratic. Risks that are highly correlated cannot be easily pooled and can generate large potential losses with very large liabilities for the insurer. These large–scale liabilities are very difficult and expensive to reinsure.

(ii) There must be information available or some method to estimate the probability of the risky event occurring and to evaluate the financial costs associated with each event. Estimating the distribution of risk is needed in order to be able to calculate the correct premium.

(iii) Information has to be widely available among the agents in the market so that the potential for moral hazard and adverse selection is minimized.

(iv) The probability of occurrence needs to be in a "medium" range: if it is too high, the premium will not be affordable; if it is too low, it will not be possible to use the record of occurrences to estimate the likely distribution as accurately as possible.

There is hardly any agricultural risk that complies with these strict requirements of insurability. Emphasis has often been placed on the symmetric information condition (Chambers, 1989). Miranda and Glauber (1997) emphasize the need for risk to be independent among the insured, arguing that due to correlations among individual yields, crop insurers face portfolio risk that is about ten times larger than that faced by private insurers offering more conventional lines of insurance (automobile, fire...).

Reinsurers are reluctant to take portfolios with a probability of very large obligations. They draw a continuum of risks along an axis that moves from perfectly independent risk to perfectly correlated risk. Automobile, life and fire risks are very near the perfectly correlated extreme, and more suitable for options and future markets. Crop yields are somewhere in the middle. Some particular weather hazards affecting yields such as hail or frost are more independent than others. Insurance against animal diseases, including contagious diseases, is also available in some countries (MAP, 2008).

2.7 Scope of Agricultural Insurance.

Basically, agricultural insurance is designed to provide covers for financial losses incurred due to reduction in expected outputs from agricultural products. The major products are crops and livestock. Others include fisheries and forestry. Crop insurance and livestock insurance provide the two broad categories for which commercial insurance covers are designed (Epetimehin, 2011).

2.7.1 Crop insurance

Crop outputs are affected by weather conditions which in many cases are unpredictable both in terms of frequency of occurrence and severity. The most serious hazards to which crops are exposed include drought, flood, wind-storms, fire and pest infection. A crop insurance policy guarantees indemnity for insured losses resulting from these factors (Epetimehin, 2011).

At the beginning of each agricultural production season, the insured takes a policy, with sum insured as the value of expected revenue from his anticipated harvest at the end of

the season. Premiums are then calculated using his expected income. In the event of a claim, the proportionof damage is estimated. At the end of the crop season, the rest of the crops are harvested and sold. Claims are then settled using the average price of the proportion sold to estimate the revenue that would have been generated from the damaged portion. Having done this, the premium for the year is then adjusted on the basis of the revenue from sales and the claims settled (Epetimehin, 2011).

Crop insurance policies

(i) ***"All Risk" Insurance Policy:*** The "all risk" insurance policy as the terminology implies is a policy that covers all risks of physical loss or damage to the crop caused by the insured perils. The most common risks to which crops are susceptible are fire, flood, wind, drought and pests.

(ii)*Harvest Policy:* A harvest policy will cover loss up to the value of the expected harvest. Usually the unit price of the crop is specified as a percentage of the expected yield. Unlike the "all risk" policy where the indemnity is related to the actual loss suffered by the farmer, the harvest policy could be likened to the "agreed value" policy of marine insurance which stipulates what the insurer has agreed to pay in the event of a claim under the policy.

(iii)*Credit Policy:* A crop credit insurance covers the amount of loan given to the farmer. The sum insured under the policy is limited to the farmer's production costs upon which the loan is based. The credit policy, unlike the "all risk" policy and harvest policy is ascertainable in terms of the measure of indemnity at the time the insurance is

contracted. Another major distinction is that the credit policy is provided as part of a broader credit programme in the promotion of agriculture.

2.7.2 Livestock insurance

Livestock is primarily exposed to the risk of death caused by various types of diseases. In many cases, epidemic diseases can cause catastrophic losses from deaths of an entire stock of livestock. In 1984, millions of naira were lost as aresult of rinderpest attack on cattle in Borno State of Nigeria (Epetimehin, 2011). Losses may also be incurred from accidents which could occur due to transportation or natural hazards, or from the rejection of animals at slaughter houses. All these losses could be covered by various relevant types of livestock insurance. Farmers, therefore, need an alternative source of assistance which enables them withstand sudden and unexpected losses of their livestock with the least possible disturbance to their normal pursuit and profession. Such an alternative is to be found in insurance (Abechi, 1989).

Losses on livestock can be minimized if adequate feeding and veterinary services are available. Also, the spread of infectious diseases would be reduced if quarantines are available where infected ones can be kept away from the rest (Epetimehin, 2011).

The problems of underwriting livestock insurance are enormous. The insured farmer has to provide satisfactory protection to his stock and is also expected to keep records of his cattle and present them for regular cross-checking. Such information includes owner's name and address, types of breed, animal's history, disease history, sex, age, weight and number, and identification marks. Information about the feeding methods, breeding

history and environmental conditions are also important for underwriters (Epetimehin, 2011).

Animals' need plenty of water to survive and remain healthy, insurers must be satisfied that there will be adequate provision of water at all times. Acclimatization is also a very important factor in underwriting. The insurer has to be convinced that the animal can survive under the climatic conditions where it will be raised. Rating, like in crop insurance, is based on the expected revenue from the stock over a period of time. The claim settlement and adjustment of premiums are carried out using the same procedure illustrated under the section on crop insurance (Epetimehin, 2011).

2.7.3 Other insurance covers

Insurance covers are necessary for the heavy machinery and equipment that are used in modern agricultural ventures. Tractors, trailers, ploughs and other implements used for cultivating and harvesting cost a lot of money. Farmers need insurance covers on these to meet the mortgagor's security demands as well as for the protection against public liability. It is highly probable that in the process of moving this equipment from one place to the other, a serious damage is done to public high ways. Covers for the risks can be taken under vehicle insurance (Epetimehin, 2011).

A lot of agricultural ventures require the building and erection of solid structures. These include silos for cereals and warehouses for various types of crops. Conventional property insurance covers have to be taken to protect the farmer from losses incurred from damages to such structures (Epetimehin, 2011).

Public liability insurance is essential particularly in situations where farms are not isolated. Risks in this category include damages done to other farmers' crops by straying cattle of the insured. In Nigeria, cattle are transported by road. Careless handling by the rearers can result in damages attracting claims (Epetimehin, 2011).

Personal accident and sickness policies are essential for the staff working on the farms. If a key employee is injured or falls sick, it will affect the activities of the farm, resulting in a reduction in the activities of the farm, hence a reduction in the volume of products. With a personal accident insurance, the farmer can be indemnified for the cost of a temporary retention of another skilled person. It is necessary to note that most conventional insurance covers are applicable to a comprehensive agricultural insurance scheme. The requirement for underwriting is that the risks are those related to and restricted to the risks which the farmers are exposed (Epetimehin, 2011).

2.8 History of Agricultural Insurance in the World.

Mutual sharing of risks in informal ways has been practised in various societies since time immemorial (UNCTAD, 1994). At the formal level, one of the first statements on agricultural insurance was made by Benjamin Franklin in 1788 (UNCTAD, 1994). Observing the effects of natural hazards on French farmers, he argued that insurance would have prevented the hardships. Subsequently, specific peril cover was introduced in the United States of America and in Europe by commercial companies and farmers' mutual insurance societies. Efforts to introduce multi-risk or all-risk covers in the United States of America towards the end of the nineteenth century failed as indemnity was on the basis of any loss of income including prices (UNCTAD, 1994).

In the 1920s, the International Institute of Agriculture, the forerunner of the United Nations Food and Agriculture Organization (FAO), made several studies of agricultural insurance. The Assembly of the League of Nations initiated a survey of agricultural insurance systems in the world by asking its Economic and Financial Organization "to undertake a study of systems of agricultural credit and insurance with a view to elaborating principles that could strengthen internal and external credit suitable for adoption by countries contemplating a modification of their existing legislation". A report of the study was made by Louis Tardy in 1938 (UNCTAD, 1994).

Crop insurance laws were passed in the United States of America and Japan in the same year. The compulsory cotton insurance programme in Brazil which started in 1939 and the establishment of the Banana Insurance Board in Jamaica through an enactment in 1943 are two early efforts of institutionalized agricultural insurance in the developing world (UNCTAD, 1994).

The subject of agricultural insurance has attracted attention in recent years. Several discussions and working groups, conferences and seminars have been organized to examine the issues and make recommendations (UNCTAD, 1994). Awareness of the need to develop agricultural insurance is increasing, and at the same time there is a better appreciation of the attendant problems (UNCTAD, 1994).

2.9 Historical Background of Agricultural Insurance in Nigeria.

The idea to establish an agricultural insurance scheme in Nigeria dates back to 1976 (Phillip and Ezeh, 1988). Following preliminary and extensive deliberations, a technical committee was set up in 1980 to formulate proposals for introducing an agricultural

insurance scheme in Nigeria. In 1984, an implementation committee was set up by Government to consider the set of recommendations made by the technical committee. The final report submitted by the implementation committee formed the datum for the Nigerian Agricultural Insurance Scheme, which was inaugurated on December 12, 1987 (Phillip and Ezeh, 1988).

In Nigeria, commercial agricultural insurance was pioneered by Niger insurance in May 1987 (Aina and Omonona, 2012). The National Insurance Corporation of Nigeria (NICON), fully owned by the Federal Government and the National Cooperative Insurance Society of Nigeria (NCISN), were also known to have operated insurance schemes on a limited commercial scale (Aina and Omonona, 2012).

The Nigerian Agricultural Insurance Scheme (NAIS), which was formally launched on the 15th of December, 1987, was later followed by the incorporation of the Nigerian Agricultural Insurance Company (NAIC) in 1988 to implement the scheme (Aina and Omonona, 2012). In 1993, Nigeria established the Nigerian Agricultural Insurance Corporation (NAIC) through Decree Number 37 witha governing board to be known as the Board of Directors. The Board consists of:

(i) a Chairman;

(ii) the Managing Director of the Corporation;

(iii) the Executive Directors of the Corporation;

(iv) the Governor of Central Bank of Nigeria or his representative;

(v) the Director-General of the Federal Ministry of Agriculture or his representative;

(vi) the Commissioner of Insurance to represent the Federal Ministry of Finance or his representative; and

(vii) two persons who have experience in agricultural production to represent farmers.

The Chairman and other members of the Board who are not ex-officio members shall:

(i) be appointed by the President, Commander in Chief of the Armed Forces; and

(ii) hold office for a period of four years and be eligible for reappointment for one further period of four years.

The Board shall be responsible for:

(i) managing and superintending the affairs of the Corporation;

(ii) the overall policy and general administration and shall act in the name of the Corporation;

(iii) providing effective liaison between the Corporation and the Federal Government;

(iv) formulating policies and guidelines for operating the Agricultural Insurance Scheme and ensuring its implementation;

(v) working closely with the Management of the Corporation to ensure smooth operation of the affairs of the Corporation;

(vi) deciding on and approving the borrowing power and credit limitsof the Corporation;

(vii) making policy decisions on the insurance operation and on thewelfare of the employees of the Corporation;

(viii) approving annual reports and statement of accounts of the Corporation;

(ix) appointing and approving fees for auditors; and

(x) carrying out such other activities connected or incidental to the other functions of the Board.

The Nigerian Agricultural Insurance Scheme was set up to carry out the following functions:

(i) To implement, manage and administer the Agricultural Insurance Scheme, established by section 6 of this Decree;

(iii) To subsidize the premiums chargeable on selected crops and livestock policies from the grants obtained from the Federal and State Governments and the Federal Capital Territory, Abuja;

(iv) To encourage institutional lenders to lend more for agricultural production having regard to the added security for their loans provided by the Corporation;

(v) To promote increased agricultural production generally in order to minimize or eliminate the need for ad hoc assistance previously provided by Governments during agricultural disasters;

(vi) To operate other types of insurance business as may be permitted by the Commissioner of Insurance at competitive premiums; and

(vi) To do anything or to enter into any transaction which in the opinion of the Board is calculated to facilitate the due performance of its functions under this Decree (Epetimehin, 2011).

The broad objective of the Nigerian Agricultural Insurance Scheme is to protect the Nigerian farmer from the effects of natural disasters and to ensure payment of appropriate compensation sufficient to keep the farmer in business after suffering a loss (Aina and Omonona, 2012). The specific objectives of the scheme are to (NAIA, 1987):

(i) provide financial support to farmers in the event of crop and livestock losses arising from natural hazards such as crop failure;

(ii) encourage the provision of credit by financial institutions to farmers;

(iii) promote agricultural production; and to minimize or eliminate the need for emergency assistance provided by government during agricultural disasters (Phillip and Ezeh, 1988).

The perils covered under the crop sub-sector are fire, lightning, windstorm, flood, drought, pests and diseases. For livestock, the perils covered are death or injury due to accident, disease, fire, lightning, storm and flood. Losses caused by negligence or by willful damage are not covered. Similarly, political risks and losses resulting from social risks, for example, riot, mutiny, revolution, etc. are not covered. The insured under the scheme is required to meet the conditions for good crop and livestock husbandry as laid down in the guidelines/policies provided by NAIC (Aina and Omonona, 2012).

2.10 Review of Some Empirical Studies on Agricultural Insurance

Phillip (1988) in an empirical review of the proposed agricultural insurance scheme in Nigeriasurveyed a total of 70 poultry farmers in Kaduna State of Nigeria. The study found that:

(i) All 70 respondents indicated awareness of the existence and operations of the Nigerian insurance market, but 6 respondents were unaware of the proposed agricultural insurance scheme.

(iii) For the types of insurance purchased during the past 5-year period, 1981/82 – 1985/86, 56 respondents had motor and/or life insurance policies, while 10 respondents had no insurance policy at all during the period.

(iv) On the problems respondents anticipated in the proposed agricultural insurance scheme, more than half of the respondents (46) expect that losses would be partially compensated and administratively delayed and ten respondents expect that agricultural insurance firms would totally refuse to settle claims. 8 respondents expect that there would be prompt but partial loss compensation and 6 respondents expect that there would be full but delayed loss compensation.

(iv) For the maximum amount a respondent would pay to insure ₦10,001 worth of birds in the first year, the actuarially fair premium to pay was ₦10,001P, where P was the probability of a loss of the poultry flock valued at ₦10,001. Twenty nine respondents indicated a lack of interest in agricultural insurance (at the time of survey), and would therefore not pay any amount in insurance premium. At all probability P, most respondents generally opted for lower premium brackets, and as P increased, more and more respondents spread their premium options over higher premium classes.

For the maximum premium respondents would pay if (i) they luckily escaped losses in year 1, and (ii) the value of birds at risk was still ₦10,001 in year 2, it was noted that respondents opted for lower premium brackets in year 2, relative to year 1, even for the same probability levels. At each probability P of a loss, no respondent would pay more than the actuarially fair premium.

Chikwendu*et al.* (1995) investigated farmers' response to agricultural insurance in Niger State, Nigeria. One hundred and sixty small-scale farmers were randomly selected from four villages in Bida LGA of Niger State namely, Ndaloke, Fembo, Bangbora and Afumadami. Their results showed that:

(i) Majority of the respondents (72.5 percent) were not aware of the Nigerian Agricultural Insurance Scheme and the benefits derivable from it. Of the 27.5 percent that were aware of the scheme, only 7.5 percent actually took agricultural insurance cover. Thus, 92.5 percent of the respondents did not take insurance cover. All the respondents who took agricultural insurance cover explained that they were compelled to do so by the banks from which they obtained agricultural loan.

(ii) Among the respondents who were previously aware of the Nigerian Agricultural Insurance Scheme, radio was the major source of information about the scheme. As much as 36.4 percent of the respondents first heard of the scheme through the radio. Neighbours and friends and banks were the second most important source of information about the scheme (22.7 percent in each case). Extension agents and television were the least important sources (9.1 percent each).

(iii) The results further showed that only 2.5 percent of the farmers received any form of training on agricultural insurance. Also, among 20 extension agents interviewed, only 15 percent received some education on the scheme which they got by attending training workshops during which the topic was treated.

(iv) Based on respondents' willingness to take agricultural insurance cover, the results showed that even after the researchers explained the benefits of agricultural insurance to the farmers, majority of them (57.5 percent) were still not willing to take agricultural insurance cover. Most farmers were skeptical about the insurance company being able to pay their indemnity.

(v) The results of the logit regression analysis of the determinants of farmers' willingness to take insurance cover showed that age, literacy level, membership of cooperative and extension contact were significantly related with farmers' willingness to take insurance cover at the 5 percent level of probability.

Agada*et al.* (1997) used a logit model to evaluate poultry farmers' participation in the agricultural insurance scheme in Kaduna State, Nigeria. The results showed that number of birds, years of education, amount of loan and years of experience in farming were significantly related with participation in agricultural insurance.

Olubiyo*et al.* (2009) conducted an econometric analysis of the impact of agricultural insurance on farming systems in the middle-belt of Nigeria. The study compared farming activities between farmers that insured their farms against those that did not. The study tested the broad hypothesis that insured farmers can be differentiated from

the uninsured farmers according to their response to risk, production practices used on the farm and farm output generated in the process. The results showed that:

(i) For the insured farmers, two of the parameter estimates of the Cobb- Douglas production function (value of assets owned by the farmers and the labour utilized in the farm) were significantly related with output at the 1 percent level of probability while the use of fertilizer was significantly related with output at the 5 percent level of probability.

(ii) For the uninsured farmer, three of the included explanatory variables were significant at the 1 percent level of probability. These variables were the stock of assets owned, the value of local seeds and fertilizer used in production. The use of farm labour was found to be significant at the 5 percent level of probability.

(iii) The pooled estimates revealed that labour, the value of the stock of assets owned by farmers, the use of local planting materials and holding of insurance policy were significant at the 1 percent level of probability and the use of fertilizer was significant at the 5 percent level of probability. All the variables were positively signed implying that they were positively contributing to output but at different rates.

(iv) The R^2 values which indicated the proportion of the total variation in output that is accounted for by the included independent variables showed that an R^2 value of 81.55 percent was obtained for the specified function for the insured farmers,

97.34 per cent for the uninsured farmers, and 90.33 per cent was obtained for the pooled estimates of the two farm groups.

(v) The uninsured farmers were more efficient in the bundle of resource use than the insured farmers.

(vi) The F-values of 38.68 and 394.06 were obtained for the insured and uninsured farmers' production functions, respectively, and an F-value of 170.12 was obtained for the pooled farms. All the F-values were significant at the 1 percent level of probability.

Nwosu *et al.* (2010) examined the output performance of food-crop farmers under the Nigerian Agricultural Insurance Scheme in Imo State, South-East, Nigeria. The results showed that:

(i) There was a positive and significant change in the farmers' output after insurance. The average farm output before insurance was 16.01 metric tonnes but rose to 21.66 metric tonnes after insurance.

(ii) Age, farming experience and farm size were the socio-economic variables that significantly influenced output of insured farmers.

Ajieh (2010) examined poultry farmers' response to agricultural insurance in Delta State of Nigeria and found that:

(i) Forty four (37%) of the 120 respondents insured their poultry farms, while 76 (or 63%) did not insure their poultry farms.

(ii) The results of respondents' attitude towards agricultural insurance showed that respondents agreed to the following statements: agricultural enterprise is faced with risks and uncertainties; agricultural insurance is beneficial; agricultural insurance reduces farmers' worries and stress; and recovering farmers' losses is government liability. Respondents, however, disagreed with the statements that agricultural insurance should be mandatory; agricultural insurance is not beneficial to small-scale farmers; agricultural insurance is not needed to cushion the effects of losses or damages; and that losses in agricultural enterprises are acts of God.

(iii) Eight of the 11 constraints to the poultry farmers' participation in agricultural insurance were important, while the remaining 3 constraints were less important. The important constraints included: fears that claims may not be paid; high premium rate; inadequate knowledge on the benefitsof agricultural insurance; difficulty in implementing insurance policy; late payment of compensation and long bureaucracy in making an insurance contract. The less important constraints included: lack of information about availability of agricultural insurance; beliefs of farmers in predestination and destiny; and low income of poultry farmers.

(iv) There were significant differences in perception of constraints to agricultural insurance between participating and non-participating poultry farmers in the

following three constraints: inadequate knowledge on the benefits of agricultural insurance; agricultural insurance is not a priority to farmers compared to other needs; and beliefs of poultry farmers in predestination and destiny.

Falola*et al.* (2013) in their study of the willingness to take agricultural insurance by cocoa farmers in Nigeria found that:

(i) About 76.7% of the farmers were faced with risk of pest attack, 79.2% were faced with disease risk, 77.5% with risk of excess rainfall, 73.3% with risk of too high temperature, 70% with risk of variation in yield, 3.3% with risk offlood, 6.7% with risk of fire outbreak, 69.2% with risk of drought and 78.3% with risk of poor access to inputs.

(ii) About 15.8% of the farmers were strongly aware of agricultural insurance, 34.2% were partially aware, 27.5% were fairly aware, while 22.5% were not aware at all. Overall, this means that 77.5% of the farmers were aware of agricultural insurance. However, despite the fact that a larger percentage of the farmers were aware of agricultural insurance, only 50% of them were willing to take it.

(iii) The evaluation of average willingness-to-pay for agricultural insurance services showed that 88.3% of the willing respondents were willing to pay ₦5,000 - ₦10,000 per hectare as insurance premium, and 11.7% were willing to pay ₦10,001 - ₦20,000 per hectare as insurance premium. Overall, the average willingness to take agricultural insurance by the respondents was ₦1,1087.5/ha ($69.85).

(iv) Age of household head, educational level, access to extension services and farm income were the significant factors influencing willingness to take insurance by the farmers.

Farayola*et al.* (2013) in their study of the determinants of participation of small-scale commercial poultry farmers in agricultural insurance scheme in Kwara State of Nigeria found that:

(i) Majority of the poultry farmers (74%) were aware of agricultural insurance scheme while 26% were not aware of the scheme. However, only half of those aware of the scheme (32.7%) participated in the insurance scheme. Thus, 67.3% of the farmers did not participate in the agricultural insurance scheme. Most of the farmers who participated in the agricultural insurance scheme revealed that they were compelled to do so by the banks from whom they obtained agricultural loans.

(ii) The results of the determinants of poultry farmers' participation in agricultural insurance scheme showed that age, educational level and accessibility to credit were the variables that significantly influenced the participation of the farmers in agricultural insurance scheme at the 10% level of probability while farm size was a significant variable at the 5% level of probability.

(iii) The major problem encountered by the farmers in their participation in agricultural insurance scheme from the most important to the least important were delay in indemnity payment, administrative bottlenecks, delay in

assessment of losses, rigorous procedures in claim settlement, inaccessibility to insurance personnel, and inadequate information dissemination.

Tsikirayi*et al.* (2013) carried out a study on the uptake of agricultural insurance services by the agricultural sector in Zimbabwe. Their results showed that:

(i) There was a total of 25 registered insurance companies in Zimbabwe. Of these, 15 insurers, representing about 60%, currently provide agricultural insurance. It was further noted that the branch network of agricultural insurance providers is limited, with most of the branches located in Harare, the capital city, and in a few major towns. A survey of both farmers and insurers revealed that the location of most insurers makes it difficult for farmers to access insurance service providers or vice versa. This had an overall effect of reducing uptake of farming insurance policies.

(ii) The study further showed a general agreement among insurers that the economicdownturn experienced from 2000 up to 2009 in Zimbabwe had negative effects on the insurance sector. This was aggravated by the direct shocks experienced by the agricultural sector from the Fast Track Land Reform Programme (FTLRP).

(iii) The survey revealed that only named peril insurance for crops, livestock, farm implements and farm comprehensive cover are the forms of agricultural insurance provided in Zimbabwe. The named peril insurance covers such risk as hail, fire, theft in transit, accident and malicious damage. For all the insurers, crop insurance, in particular – tobacco hail insurance – ranked as the most

purchased cover and contributed the greatest percentage in the agricultural insurance portfolio. No insurer was found to provide Multiple Peril Crop Insurance (MPCI), index insurance, and revenue insurance.

(iv) The research also showed that insurers do not provide specialized agricultural insurance packages but packages that are more general as property, motor or commercial insurance. This was mainly attributed to lack of agricultural underwriting skills and lack of data to form the basis for efficient and effective underwriting.

(v) A number of factors were found as determinants of taking up insurance or not. Collateral requirements by financiers for farm insurance was the major determinant, followed by past losses experienced by farmers and degree of risk aversion. Other determinants mentioned were increasing insurance awareness through marketing of available insurance products; cost of insurance–affordable premiums; nature of farming enterprise, level of production, herd behaviour and geographical location. In addition, purchase of inputs could be given priority over insurance uptake due to limited resources.

(vi) The farmer respondents pointed out that they use mixed farming as a risk management tool through diversification of farm activities. This has an overall effect of reducing agricultural insurance uptake. The study generally showed more uptake of crop insurance than livestock insurance.

(vii) The constraints cited by insurers and farmers as preventing high uptake of farm insurance were: limited knowledge on insurance, unaffordability of insurance, low income levels, low agricultural production, remoteness of farms from service providers, and negative perceptions about insurance in general.

(viii) The survey revealed that besides agricultural insurance, the majority of farmers (94%) manage farm risk through diversification of crop and livestock enterprises. Other means of risk management mentioned were: formation of farm cooperatives (19%), pooling of resources with other farmers (13%) and others (6%). It was also noted that for those farmers using diversification as a risk management tool, they only took insurance on such lucrative crops as tobacco, while other grain crops and livestock remain uninsured.

(ix) Insurers suggested that in order to improve uptake of agricultural insurance, these following measures should be taken: improving farmer awareness on the importance of agricultural insurance, research and development to develop insurance products that are affordable and meet customer needs, contractors to purchase insurance on behalf of farmers, insurers to locate close farmers, government intervention, and increased agricultural production that provides an agricultural pool to form the basis for affordable premiums. Farmers also suggested that in order to improve uptake of agricultural insurance these following measures should be taken: affordable premiums, improving farmer awareness on the importance of agricultural insurance, insurers to locate close to farmers, fair practices by insurers, cooperation with local institutions, and government intervention.

Abdulmalik*et al.* (2013) conducted a study on the determinants of crop farmers' participation in agricultural insurance in the Federal Capital Territory, Abuja. Their results showed that:

(i) Majority of the crop farmers (78.3%) were aware of agricultural insurance scheme. However, only 35% of the farmers participated in the insurance scheme.

(ii) The result of the determinants of crop farmers' participation in agricultural insurance show that age, educational level and accessibility to credit were the significant variables that influenced the participation of the farmers in agricultural insurance scheme at 10% level of probability and farm size was a significant variable at 5% level of probability.

(iii) The major constraints encountered by the crop farmers in their participation in agricultural insurance scheme were delay in indemnity payment, administrative bottlenecks, delay in assessment of losses, rigorous procedures in claim settlement, inaccessibility to insurance personnel and inadequate information dissemination.

2.11 ProblemsAssociated with Agricultural Insurance in Nigeria.

There are understandable limitations that prevent rapid growth of insurance business in rural areas. According to UNCTAD (1994), a large number of insurers in developing countries like Nigeria are undercapitalized. Consequently, their capacity to assume risks is limited. Reinsurance for agricultural risks is not easily available. Furthermore, skilled

personnel, at both the managerial and operational levels, are scarce and entering into agricultural insurance increases the strain on the available manpower.

There are also many constraints inherent in the rural environment and some special operational problems have to be surmounted. Spatial dispersion, the large number of potential customers, the small size of the holdings, and the lack of adequate information make quick expansion difficult (UNCTAD, 1994).

Jafiya and Toro (1998) and Jafiya (2002) pointed out that the following problems might hinder the smooth operation of the agricultural insurance scheme in Nigeria:

(i) Inadequate infrastructure and administrative facilities

(ii) Shortage of trained manpower

(iii) Ignorance of farmers on the functions and merits of the scheme

(iv) Non-availability and unreliability of data useful for insurance purposes, and;

(v) Inadequate and untimely funding

(i) Inadequate infrastructure and administrative facilities: Inadequacy of infrastructural facilities such as good roads and other efficient means of transportation, good communication facilities, and uninterrupted power supply could hamper the successful operation of the scheme. These facilities are needed in order to facilitate prompt and speedy reporting of losses by the farmers for assessment and payment of indemnities.

(ii) Shortage of trained manpower: The scheme requires the availability of personnel trained in agriculture and insurance at the national, state and local government levels as

evaluators, supervisors, loss adjusters, salesmen and extension staff. The country is short of this cadre of personnel.

(iii) Ignorance of farmers on the functions and merits of the scheme: The ignorance and lack of awareness by the majority of farmers of the need, practice and values of agricultural insurance, constitute problems to the scheme.

(iv) Non-availability and unreliability of data useful for insurance purposes: A major problem affecting the scheme is the dearth of data on farm operations, particularly on crop yields and losses arising from natural hazards. These data are necessary for the computation of premiums and indemnities.

(v) Inadequate and untimely funding: Adequate and timely funding of the scheme will be essential for its success. Agricultural insurance is a very costly venture and as such, arrangements for adequate funding should be made. Delay in approving and releasing funds and especially undue political interference in funding and management of the scheme will affect its success.

Phillip and Ezeh (1988) examined the potential problems of operating a viable agricultural insurance scheme in Nigeria and identified the following as having potential impacts on the take-off of the scheme at the farm level, farmer participation in the scheme, and the long-term continuity of the scheme:

(i) Farm sizes and cropping patterns not covered by existing agricultural insurance policy.

(ii) Farmer apathy against insurance

(iii) Adverse selection and paucity of data

(iv) Moral hazard

(i) Farm size and cropping patterns not covered by existing agricultural insurance policy: Small farm sizes and cropping patterns not covered by the agricultural insurance policy are impediments in the operation of the agricultural insurance scheme. The Nigerian agricultural sector has been described as being dominated by a large number of small-scale farmers. Another notable and relevant feature of the Nigerian agricultural sector is the prevalence of mixed cropping among farmers. The four crop and livestock enterprises piloted under the scheme are rice, maize, cattle and poultry. This means that if a farmer hopes to qualify for the scheme, he is implicitly expected to either grow sole maize or rice or maize/rice crop mixture which are the crop enterprises covered by the scheme. But rice is seldom planted in mixtures and neither is the production of sole crop maize a popular option among small-scale farmers. The implication is that since farmers prefer mixed cropping of a variety of crops which may not be covered by the scheme and have small farm sizes, the pilot crop insurance policy may not be available to most farmers without further policy modification.

(ii) Farmer apathy against insurance: Nigerian farmers are not presently very excited about taking an insurance policy. This can be traced to the less-than-satisfactory image of the insurance industry regarding loss compensations. This problem has created mixed feelings toward agricultural insurance by prospective farmers. A study by Okorie (1986) showed that the amount of losses compensated by the non-agricultural insurance

companies in Nigeria between 1978 and 1982 was small relative to the total premium income earned.

(iii) Adverse selection and paucity of data: It is often a problem when an insurance company lacks enough information to establish the riskiness of the venture being insured. In such a situation, the insured may know enough (say, through personal experience) to assess how much risk he is exposed to, but fail to disclose this to the insurer. This phenomenon is called adverse selection.

In agriculture, the phenomenon called adverse selection has the potential for occurrence, especially where there is lack of data on the set of technical and economic variables (yields, prices, weather, and so forth) for which relative frequencies of occurrence, possibly by ecological regions, must be established.

As indicated in the study, the premium rates for the pilot livestock enterprises, poultry and cattle, ranges between 3.5 and 7.5 percent. Conceptually, this was also the probability range of occurrence of each insurable peril to which these enterprises were exposed. The following question arose: does this probability range identically apply to all the insurable perils across all the regions in Nigeria? The answer to this question which borders on the availability of a sound information base for the establishment of objective probabilities of occurrence of each peril has non-trivial implications for farmer participation in the agricultural insurance scheme.

There was paucity of a comprehensive data-across sectional or time series for establishing empirical or objective probabilities of occurrence of those agricultural

perils which were indicated to be covered under the pilot agricultural insurance scheme. Thus, there was potential problem that farmers across the country will likely respond to the above probability ranges as they see them relevant to their respective risk situations. Suppose, for sake of argument, that a farmer A and farmer B each wishes to insure ₦10,000 worth of poultry under the Nigerian Agricultural Insurance Scheme. Farmers A and B, from previous experience, 'believe' that the probabilities of occurrence of a poultry disease in a given season are 1.5 and 9.5 percent, respectively. The corresponding amounts of premium due, allowing for 50 percent state subsidy, were ₦75 and ₦475 per annum, respectively. If the Nigerian Agricultural Insurance Agency (NAIA) enforces the 3.5- 7.5 percent probability range then farmers A and B were each expected to pay (allowing for 50 percent subsidy) between ₦175 and ₦375 per annum. Intuitively, farmer B will likely buy an insurance policy while farmer A will probably not, even with state subsidy.

The inferences from this simple example were noteworthy. Specifically, the number of poultry farmers whose situations were represented by either farmer A or farmer B will ultimately determine who buys and who does not buy agricultural insurance. More generally, the long-term viability of the Nigerian insurance scheme will largely depend on the extent to which farmers' own assessments of their riskiness are accommodated by official premium rates.

(iv) Moral hazards: The reward system in most insurance contracts is that the insured first pays a premium to the insurer, on the understanding that the latter will compensate the insured on his financial losses. During the life of this contract, the insurer demands that the insured behave in ways that does not enhance the probability of incurring loss.

In practice however, most of those insured show tendencies toward less-careful dispositions. This phenomenon called moral hazard poses a danger to the survival of an agricultural insurance scheme, particularly where the enterprise being insured is classifiable as high-risk.

Nigerian farmers, under varying risk exposures, have deviced mostly indigenous methods of minimizing the incidence of farm losses. Each device has tended to vary according to the specific peril to which the enterprise is exposed. A few examples (drawn largely from various issues of monthly crop and weather reports of Kano, Kaduna, Plateau and Sokoto States) are presented as follows.

In the savannah grassland areas, random and uncontrolled bush burning poses fire risk to adjacent cropped lands. Thus, farmers have been noted to clear strips of land (about 2-3 metres wide) to separate cropped lands from uncultivated or fallow lands.

The devises against pests are more varied, some of which borders on non-affordability of more conventional control methods. In some communities, empty cans (metallic) are bunched together and hanged by suitable threads from one or more tree branches in the farm. When the wind blows, the cans collide with each other and the resulting noise serves to frighten off birds, rodents and other animals.

In the more open areas of the savannah, some farmers create human-like statues, dress them up in colourful costumes, and locate them conspicuously within farms or at farm boundaries. The statues essentially help to deceive and scare off rodents and large animals.

Farmers also employ iron-made traps in their effort to control animal pests. The traps are hidden in the soil subsurface, with the hope to catching small to medium-sized animals. In this case, the crop organ to which the animal is attracted – grains, tubers, leaves, etc – is positioned as bait near or on the trap. In other cases, the bait may be poisoned if there are reasons to believe that the trap will be capable of over-powering the animal.

In an investigation, Agwudagwu and Oloke (1988) found that wheat farmers in Kano State, in efforts to frighten off quelea birds, positioned themselves strategically in their respective farms with empty metallic containers, which they beat at intervals of time.

Farmers who could afford the costs have also adopted additional, more conventional, yield-enhancing practices, for example, chemical spraying for pest and weed control, irrigation of farms with either shadoof or pump, and application of recommended levels and types of fertilizers.

The relevance of the foregoing is the danger that farmers may stop applying the listed devices in their farms once they become insured against financial losses. That is, some farmers may refuse to spray to control pests, diseases and weed (even if they could afford the costs), refuse to irrigate in time, irrigate too frequently to enhance water logging, apply wrong levels and types of fertilizers, refuse to create a fire-free strip around farmlands, or even start the fire.

CHAPTER THREE

METHODOLOGY

This chapter provides background information on the study area as well as gives information on how data with respect to this research were collected and analysed.

3.1 The Study Area

This study was conducted in Kaduna State of Nigeria. The State is located in the north-western zone of the country and comprises 3 senatorial zones, 23 Local Government Areas and 4 ADP zones. Kaduna lies between latitudes $10^0 21^{'}$ and $10^0 33^{'}$ North of the Equator and longitudes $7^0 45^{'}$ and $7^0 75^{'}$ East of the Greenwich meridian (Kaduna State Government, 2011). Kaduna State occupies a total land mass of about 46,053 square kilometres and has an estimated population (projected to 2014 based on 3.2% growth rate per annum) of 7,646,028 people (NPC, 2006). Kaduna State shares common boundaries with Abuja in the South-east, Katsina, Kano and Zamfara States in the North, Nassarawa and Plateau States in the North-east and Niger State in the North-west.

The climate of the State is characterized by two main seasons: the wet season which starts in April in the southern part of the State and between May and June in the northern part of the State to the month of October, and the dry season which starts from the month of November to April and is marked by dry harmattan winds. In Kaduna State, rainfall is heaviest in the south and decreases northwards, with the mean annual rainfall varying between 880 mm and 1200 mm (Kaduna State Government, 2011). The rainfall lasts from April to October. The length of the growing period is 150-210 days. The hottest months are March and April which are the peaks of the dry season while the

coldest months are December and January. The mean annual temperature ranges between 25-27^{0}C. The relative humidity is low, ranging from 13-19% in the dry season to 53-75% in the rainy season (Ojanuga, 2006).

The vegetation in Kaduna is divided into Northern Guinea Savannah in the North and the Southern Guinea Savannah in the South. The dominant soil parent materials are the weathered remains (saprolites) of the varied basement complex rocks, which have been deeply and markedly altered for a long time such that bedrocks apart from where it emerges as inselbergs or lower rock outcrops, is several metres (more than 15 metres in most uplands) below the surface (Ojanuga, 2006).

The State occupies an important position in the agricultural economy of Northern Nigeria. The major economic activity of the inhabitants is farming. The major crops (cereal and legume) grown include maize, sorghum, millet, rice, cowpea, groundnut,soyabean, melon and pigeon pea. Root and tuber crops such as yam, cassava, and potatoes as well as vegetables such as tomatoes, pepper,okra, ginger and onions are also produced. Livestock reared include poultry, goats, sheep, cattle and swine. Some fish farming is also done.

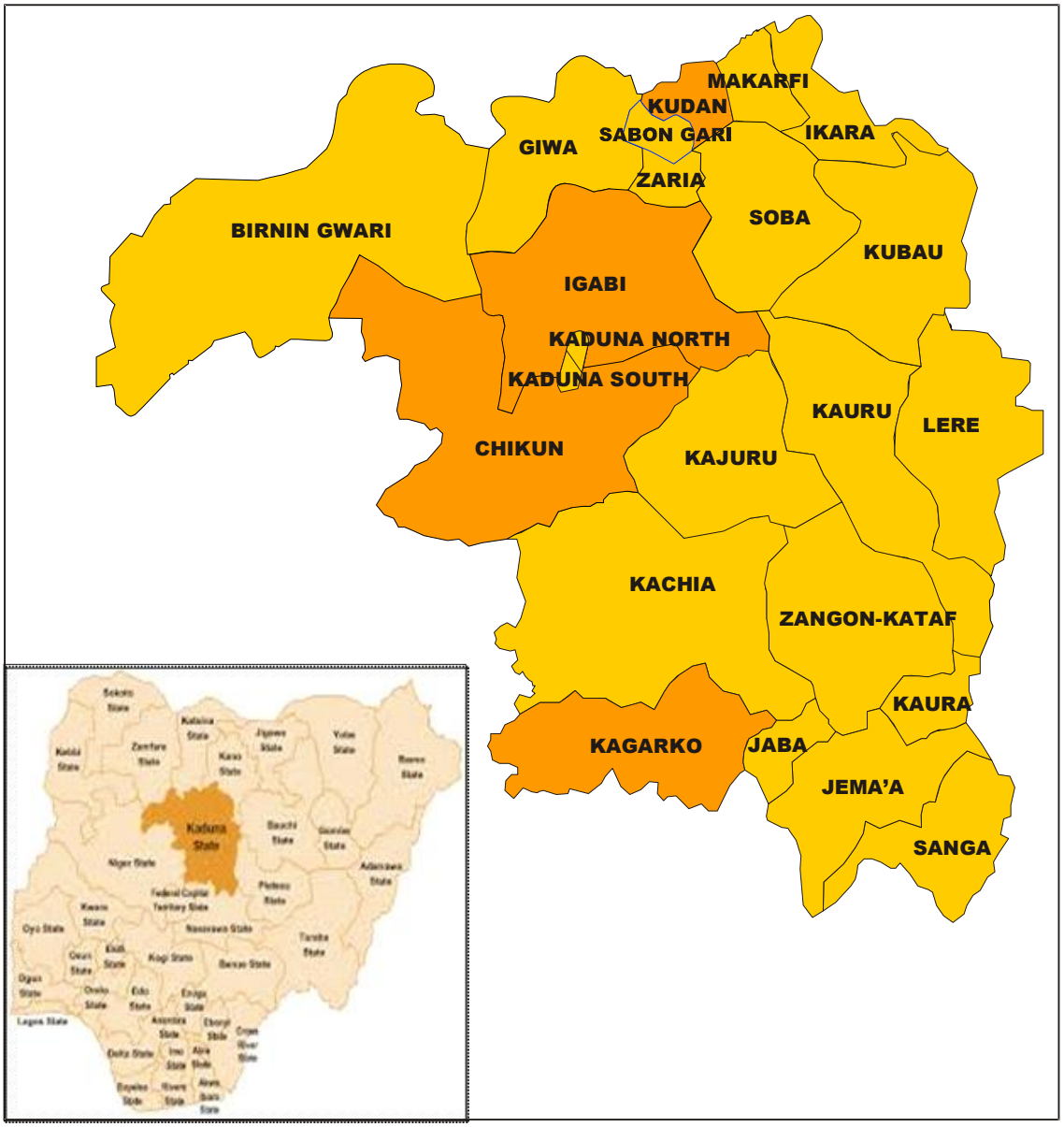


Fig. 3.1 Map of Kaduna State showing the Study area.
Source: Google search files

3.2 Sampling Procedure

A multi-stage sampling technique was used in selecting the respondents for this study. The first stage involved a purposive selection of all the four ADP zones in Kaduna State in view of their participation in agricultural insurance, based on the reconnaissance survey conducted by the researcher during the 2013 agricultural season. The second stage involved a random selection of one Local Government Area from each of the ADP zones by lottery method. Kagarko Local Government was selected from the seven (7) Local Government Areas that make up Samaru zone, Igabi Local Government from the three (3) Local Government Areas that make up Lere zone, Chikun Local Government from the four (4) Local Government Areas that make up Birnin Gwari zone, and Kudan Local Government from the eight (8) Local Government Areas that make up Maigana zone of the Kaduna State Agricultural Development Project. The third stage involved aproportionate selection of equal number of participating and non-participating farmersin each of the selected Local Government Areasfrom a list of farmers obtained from the ADP and NAIC offices based on the accessibility of the farmers. This gave a total sample size of 148 farmers (Table 1).

Table 3.1: Distribution of farmers in the study area

ADP Zone	**LGAs**	**Population of farmers**	**Number of farmers selected**
Samaru	Kagarko	204	41
Lere	Igabi	243	49
BirninGwari	Chikun	183	37
Maigana	Kudan	104	21
Total		**734**	**148**

Sources: KADP, NAIC.

3.3 Method of Data Collection

The study relied on primary data. The primary data was obtained using structured questionnaireadministered onthe farmers in the study area as well as administrators of the agricultural insurance scheme.Data collected included:

(i) socio-economic characteristics of the farmers such as age,gender, farming experience, household size, education, farm size,extension contact, membership of associations and amount of loan obtained;

(ii) farm outputand income of participating and non-participating farmers in agricultural insurance;

(iii) crop and livestock enterprises insured against risk;

(iv) farmers' strategies for managing farm risks;

(v) constraintsassociated with participation in agricultural insurance.

3.4 Analytical Techniques

The following tools were used to analyze the data:

3.4.1 Descriptive statistics:

Descriptive statistics such as means, frequency distributions, percentages and ranges were used to achieve objectives (i), (ii), and (v).

3.4.2 Logit regression model

This was used to achieve objective (iii). The logit regression model is a unit or multivariate technique which allows for estimating the probability that an event occurs or not by predicting a binary dependent outcome from a set of independent variables. The logit model is based on cumulative logistic probability function and it is computationally tractable. According to Gujarati and Porter (2009), it is expressed as:

$$P_i = E(Y = 1|X_i) = \beta_1 + \beta_2 X_2 + \beta_3 X_i \text{..} (2)$$

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

$$P_i = \frac{1}{1+e^{-z_i}} = \frac{e^z}{1+e^z} \text{..}(3)$$

Where: P_i = Probability of an event occurring

$$Z_i = \beta_1 + \beta_2 X_i$$

The empirical model of the logistic regression for this study will assume that the probability of the farmers' participation in agricultural insurance scheme is expressed as:

$$P_i = \frac{e^{b_0+b_1X_1+b_2X_2+b_3X_3+b_4X_4+\cdots+b_9X_9}}{1+e^{b_0+b_1X_1+b_2X_2+b_3X_3+b_4X_4+\cdots+b_9X_9}} \text{..} (4)$$

P_i ranges between zero and one and it is non-linearly related to $Z_{i.}$ $Z_i$is the stimulus index which ranges from minus infinity to plus infinity and is expressed as:

$$Z_i = \ln\left(\frac{P_i}{1-P_i}\right) = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \cdots + b_9X_9 + e \text{..}(5)$$

To obtain the value of $Z_{i,}$the likelihood of observing the sample will be formed by introducing a dichotomous response variable. The explicit logit model is expressed as:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 +$$

$$b_7X_7 + b_8X_8 + b_9X_9 + e \quad \text{..... (6)}$$

Where:

Y = Dichotomous response variable (1 for farmers whoparticipated in agricultural insurance scheme; 0 otherwise).

b_0= Constant term

$b_1 - b_9$= Coefficients to be estimated

X_1 = Age of farmers

X_2 = Gender of farmers

X_3= Formal educational level of farmers

X_4 = Farm size of farmers

X_5=Household size of farmers

X_6 = Farmers' membership of cooperatives or associations

X_7 = Amount of loan obtained by farmers

X_8 = Extension contact of farmers

X_9= Farming experience of farmers

e= Error term

3.4.3 The Z-test

This was used to achieve objective (iv). The impact of participation in agricultural insurance on farmers' income was determined using the Z-test specified as (Spiegel, 1972):

$$z = \frac{\bar{X}_1 - \bar{X}_2}{\sigma_{\bar{X}_1 - \bar{X}_2}} \quad \text{.....(7)}$$

But $$\sigma_{\bar{X}_1 - \bar{X}_2} = \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}} \quad \text{..... (8)}$$

Hence $z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$ ..... (9)

Where:

$\bar{X}_1$ = Mean income of participating farmers

$\bar{X}_2$ = Mean income of non-participating farmers

S_1 = Standard deviation of participating farmers

S_2 = Standard deviation of non-participating farmers

n_1 = Sample size of participating farmers

n_2 = Sample size of non-participating farmers

If the calculated Z-value is greater than the tabulated Z-value, it implies that agricultural insurance has a significant impact on the income of farmers participating in insurance. We would then have to accept the alternative hypothesis of a significant difference between the incomes of farmers participating in agricultural insurance and non-participating farmers and reject the null hypothesis. But if calculated Z-valueis less than Z-tabulated, then we would accept the null hypothesis of no significant difference between the incomes of farmers participating in agricultural insurance and non-participating farmers and reject the alternative hypothesis.

Rationalization of independent variables in the Logit regression model for participation in the agricultural insurance scheme.

(i) Age: The age of the respondents was measured in years. This variable is expected to be negatively related with participation in agricultural insurance. The reason

is that older farmers seem to be more risk averse and somewhat less inclined to adopt innovative farm management practices such as insurance than younger ones (Njoku, 1991). Younger farmers tend to be more adventurous and flexible in their decision making and adopt new ideas more readily (Obeta and Nwagbo, 1991). Thus, older farmers are likely to participate less in agricultural insurance than the younger ones.

(ii) Gender: The gender of the respondent was measured as a dummy variable that takes the value of 2 for male and 1 for female. The expected sign of the coefficient of gender is positive. The reason is that women are generally discriminated against in terms of access to farm inputs and information (Dey, 1981). For example, women's exclusion from local groups such as farmers' groups may prevent them from receiving credit, extension and insurance advice. Also, women tend to be involved in the production of relatively low-return crops that are not included in formal sector lending or insurance programmes (Quisumbing*et al.*, 1999). This implies that males are more likely to participate in insurance than females.

(iii) Level of education: This was measured as the number of years spent in acquiring formal education. The expected sign of the education variable is positive. This is because education is an investment in human capital that can raise the skill and quality of the farmer, narrow information gaps and increase the level of efficiency and productive performance of the farmer (Patel and Anthonio, 1981). This will encourage greater participation in agricultural insurance.

(iv) Farm size: This was measured as the hectares of land for agricultural production under the insurance scheme by the respondent. The expected sign of the coefficient for

farm size is positive. The reason is that farmers who grow crops and livestock covered by the agricultural insurance scheme are provided protection against financial losses arising from natural disasters. Thus, farmers who cultivate larger farm sizes for the crops and livestock covered by the insurance scheme will participate more in agricultural insurance than farmers who grow crops and livestock not covered by the insurance scheme (Shiverly, 1997).

(v) Household size: This was measured as the number of wives, children, relatives, and dependents actually living with the respondent at the time of the study. The household size variable is expected to have a positive sign. The reason is that households with larger sizes attach greater importance to food security than households with smaller sizes (Njoku, 1991). Since the purpose of the agricultural insurance scheme is to promote agricultural production, large households are more likely to participate in agricultural insurance than small households.

(vi) Membership of cooperatives and associations: This was measured in years of membership of farmers' cooperatives and associations. The expected sign of the coefficient for membership of cooperative is positive. The reason is that membership of associations enhances access to information on insurance and credit for acquisition of innovations (Akpoko and Yiljep, 2000). This will positively influence greater participation in agricultural insurance.

(vii) Amount of loan obtained: This was measured as the amount of loan (in Naira) received by the respondents. The expected sign of the coefficient for credit is positive. The reason is that it is mandatory for any farmer who acquires institutional loan for

investment in agriculture to purchase an insurance cover. Thus, the larger the amount of loan received, the greater the participation in agricultural insurance.

(viii) Contact with extension agents: This was measured as the number of times of contact between the farmers and extension agents. This variable is expected to have a positive sign. This is because extension contact exposes farmers to availability of information on insurance and will therefore be expected to stimulate participation in insurance (Polson and Spencer, 1990).

(ix) Farming experience: This was measured as the respondents' years of experience in farming. The expected sign of the coefficient for farming experience is positive. The reason is that farmers who are more experienced in farming are more conversant with the reality that agricultural production is a very risky business, hence they are expectedly more willing to insure against such risk than new entrants into the business (Agada *et al.*, 1997).

CHAPTERFOUR

RESULTS AND DISCUSSION

4.1 Socio-economic Characteristics of the Respondents

Socio-economic characteristics of farmers in the study area were considered in this study because of their perceived effects on their participation in agricultural insurance. These included: age, gender, educational level, farm size, household size, membership

of cooperative organization, amount of loan obtained, extension contact andfarming experience.

4.1.1 Age

Age in correlation with farming experience, has a significant influence on the decision making process of farmers with respect to risk aversion, adoption of improved agricultural technologies, and other production-related decisions. According to Obeta and Nwagbo (2010) younger farmers tend to be more adventurous and flexible in their decision making and adopt new ideas more readily. Age distribution presented in Table 4.1 revealed an age range of 28 - 72 years. The mean age of sampled farmers was 44 years. This means that the respondents were not too old, and so, they are still in their active age. Majority (45%) of the farmers were between the age bracket of 41 – 50 years old, while 24% of the farmers were between 51 - 60 years of age. On the other hand, farmers with age range of 31 – 40 years were 17.6%, 21 – 30 years were 7.4% and 6.8% were over 61 years old. This implies that with a mean age of 44 years, more of the farmers should participate in the Nigeria Agricultural Insurance Scheme as they tend to be more adventurous and more flexible in their decision making willing to adopt innovations readily.

Table 4.1: Distribution of respondents according to Age

Age (years)	**Frequency**	**Percentage**
21-30	11	7.4
31-40	26	17.6
41-50	66	44.6
51-60	35	23.6
Over 61	10	6.8
Total	**148**	**100**

Mean	44
Minimum	28
Maximum	72

4.1.2 Gender

Gender refers to the identification of the sexes. It influences the cultural factors like religion, politics, social factors and education. Incorporating gender into agricultural programmes and activities can encourage the formulation of gender based innovations and technological development which can enhance agricultural productivity. It was observed from the data that about 39% of the farmers were females and about 61% males. This confirms the assertion by Adewale*et al.* (2003) that gender is no hindrance to the active involvement in agricultural production and by extension, participation in the Nigerian Agricultural Insurance Scheme.

Table 4.2: Distribution of farmers according to Gender

Gender	**Frequency**	**Percentage**
Female	57	38.5
Male	91	61.5
Total	**148**	**100**

4.1.3 Educational level

Adoption of innovations can be influenced by education. Therefore, education plays an important role in agricultural operations. Ojuekaiye (2001) reported that education is an essential socio-economic factor that influences farmer's decision because of its effect on the awareness, perception, reception and quick adoption of innovation that can increase productivity. The findings of the study revealed that of the 96% of participating farmers that had post-primary education, over 77% had tertiary education as against the 13.5%

of the 81% of the non-participating farmers who had post-primary education.This implies that the attainment of tertiary education further broadened the understanding of the participating farmers with regards to the benefits and workings of agricultural insurance and hence their participation.

Table 4.3: Distribution of respondents according to Educational level

Educational level	**Participants**		**Non-participants**	
	Frequency	**Percentage**	**Frequency**	**Percentage**
No formal education	0	0	7	9.5
Primary	3	4.1	7	9.5
Secondary	14	18.9	50	67.5
Tertiary	57	77.0	10	13.5
Total	**74**	**100**	**74**	**100**

4.1.4 Farm size

Size of farm cultivated is a function of population pressure, family size and financial back ground of the farmer. One of the major characteristic of small-scale farming is fragmented land holding. The result of this study shows that 18.9% of the respondents cultivated on 1 hectare and below while 55.4% cultivate between 1.1 and 3.0 hectares each whereas 25.7% of the respondents farmed above 3.0 hectares of land per farmer. This implies that most of the farmers were mostly small-scale farmers. This result negates the assumption by Shiverly (1997) that farmers who cultivate larger farm sizes for crops and livestock covered by the insurance scheme will participate more in agricultural insurance than farmers who cultivate crops and livestock not covered by the insurance scheme.

Table 4.4: Distribution of respondents according to Farm size

Farm Size	**Frequency**	**Percentage**

0.1 – 1.0	28	18.9
1.1 – 3.0	82	55.4
3.1 – 6.0	28	18.9
6.1 – 9.0	10	6.8
Total	**148**	**100**

A cross-tabulation of farmers' age against their farm sizes as presented on Table 4.5 shows that majority (14.9%) of the farmers within the age category of 31 – 40 years operated on farm sizes of 0.1 – 1 hectare, 28.4% of the respondents within the age range of 41 – 50 years being the majority, operated on farm sizes of 1 – 3 hectares, another majority (12.2%) of the respondents within the age range of 41 – 50 years operated on farm sizes of 4 – 6 hectares, and respondents within the age over 60 years operated farm sizes of 7 – 9 hectares. This implies that farmers within the age category of over 60 years had larger farm sizes even though farmers within the age category of 41 – 50 years had a larger aggregate farm lands operated upon within the study area.

Table 4.5: Cross-tabulation of Age against Farm size of respondents

			Farm Size (ha)				**Total**
			0.1-1	1-3	4-6	7-9	
Age (years)	21-30	Frequency	0	11	0	0	11
		%	0.0	7.4	0.0	0.0	7.4
	31-40	Frequency	22	4	0	0	26
		%	14.9	2.7	0.0	0.0	17.6
	41-50	Frequency	6	42	18	0	66

		%	4.1	28.4	12.2	0.0	44.6
	51-60	Frequency	0	25	10	0	35
		%	0.0	16.9	6.8	0.0	23.6
	Over 60	Frequency	0	0	0	10	10
		%	0.0	0.0	0.0	6.8	6.8
Total			18.9	55.4	18.9	6.8	100

4.1.5 Household size

The result presented in Table 4.6 clearly shows that majority of the farmers (50.7%) had household size of 6 - 8 people while 30.3% had household size of between 3 - 5 people. The result also showed that only about 19% of the farmers had a household size that was made up of 9 people and above. This result shows that the farmers have smaller household size which implies that the farmers had smaller household sizes which could be attributed to their appreciable level of education. Smaller household size means extra funds at the disposal of the household head which could enable him/her deploy such funds into the acquisition of an insurance policy to hedge against any eventual loss.

Table 4.6: Distribution of farmers according to Household size

Household size	**Frequency**	**Percentage**
3 – 5	45	30.3
6 – 8	75	50.7
9 – 11	18	12.2
>11	10	6.8
Total	**148**	**100**

4.1.6 Membership of cooperativeorganization

The results presented in Table 4.7 show the distribution of the respondents according to their membership of cooperative organization. The result revealed that the mean years spent in cooperative organization was 8 years with 53.4% not belonging to any cooperative organization while 16.2%, 22.3% and 8.1% have stayed between 1-3 years, 4-6 years and between 7-12 years as members of cooperative organization. More than half of the respondents were not members of cooperative organization. This implies that farmers had less opportunity of interacting with other farmers to enhance diffusion of information among the farmers and as such could not be properly sensitized as to the core benefits of the agricultural insurance scheme in terms of their social and economic welfare, hence less participation.

Table 4.7: Distribution of respondents according to Membership of Cooperative organization

Cooperativeorganization (Years)	**Frequency**	**Percentage**
0	79	53.4
1 – 3	24	16.2
4 – 6	33	22.3
7 – 9	5	3.4
10 – 12	7	4.7
Total	**148**	**100**

*Arithmetic Mean = 8

4.1.7 Amount of loan obtained

The results presented in Table 4.8 showed the distribution of the respondents based on the amount of loan obtained and the sources of such loans. The results reveals that 35.1% had no access to loans, 22.3% had between ₦1-50,000, 16.2% received between ₦50,001-100,000, 7.4% received 100,001-150,000, 6.8% received ₦150,001-200,000, and 12.2% received above ₦200,000. Accessibility to credit may increase farmers' liquidity which may enhance their ability to purchase inputs and pay for hired labour. As a matter of policy, farmers who access loans are mandated to obtain an insurance cover which enhances their participation in the scheme but the results have shown that much of the farmers did not obtain any loans and even those that obtained such loans were from informal lending agents. This therefore affected their participation in the agricultural insurance scheme.

Table 4.8: Distribution of respondents according to Amount of loan obtained

Loan obtained (₦)	**Frequency**	**Percentage**
Informal loans		
No loan	52	35.1
1-50,000	25	16.8
50,001-100,000	12	8.1
100,001-150,000	2	1.4
Formal loans		
1-50,000	8	5.4
50,001-100,000	12	8.1
100,001-150,000	9	6.1

150,001-200,000		10	6.8
200,001 and above		18	12.2
Total		**148**	**100**
Mean	₦80,705.76		
Minimum	₦20, 000.00		
Maximum	₦870, 00.00		

4.1.8 Contact with extension agents

A larger proportion of the farmers have had access to extension service on monthly basis while 17.6% of the farmers have had no contact with extension agents. Where 36.5% of the farmers had contact with extension agents once a month, 39.8% had contact twice a month and 6.1% had contact thrice in a month. This result shows that a majority of the farmers had the opportunity to access more information on agricultural insurance that will further enhance their participation in insurance.

Table 4.9: Distribution of respondents according to Contact with extension agents

Number of contact	Frequency	Percentage
No contact	26	17.6
Once in a month	54	36.5
Twice in a month	59	39.8
Thrice in a month	9	6.1
Total	**148**	**100**

4.1.9 Farming experience

This is the number of years a farmer has spent in agricultural production. Majority of the farmers (63.5%) as shown in Table 4.10 had between 4 - 9 years of farming experience while 16.9% and 19.6% of the participating farmers had 10 – 12 years and over 12 years farming experience. This result is in consonance with Agada*et al.* (1997) who stated that farmers who are more experienced in farming are more conversant with the reality that agricultural production is a risky business, hence they are expectedly more willing to insure against such risk than new entrants into the business. Having had experiences in agricultural production within the various periods, the farmers should participate more in agricultural insurance to hedge against any loss from risk and uncertainties due to their knowledge of the reality of such risk. However, this might not be the case as most experienced farmers have continued to devise alternative risk-management strategies ranging from risk-pooling, risk-sharing, diversification e.t.c.

Table 4.10: Distribution of respondents according to Farming experience

Farming experience (years)	**Frequency**	**Percentage**
4 – 6	49	33.1
7 – 9	45	30.4
10 – 12	25	16.9
Over 12 years	29	19.6
Total	**148**	**100**

4.2 Proportion of Farmers Aware of and Participating in Agricultural Insurance

The results of findings based on therespondents' awareness of the NigerianAgricultural Insurance Scheme shows that high proportions (73.7%) of the farmers wereaware of the NigerianAgricultural Insurance Scheme while 26.3% of the farmers were not aware. However, only 38.5% of the farmers participated in the scheme. Thus 61.5% of the farmers did not participate in the NigerianAgricultural Insurance Scheme and this implies that the lack of awareness of the NigerianAgricultural Insurance Scheme by some of the respondents deprived them of the opportunity of participating in the insurance scheme. As a policy and one of the requirements by banks for obtaining loans, most of the farmers participating in the NigerianAgricultural Insurance Scheme revealed that they were mandated by the policies of the banks to pick up an agricultural insurance policy in order to obtain the required loans.

4.3 Socio-economic Characteristics of Farmers Influencing Participation in Agricultural Insurance Scheme

The parameters of the logit regression model were estimated using SPSS statistical package (Version 20). A variable is termed "significant" if its t-coefficient is greater than the tabulated t-coefficient at a chosen level of significance.

The result of the logit regression in Table 4.13 shows that age, educational level, and amount of loan obtained were significant variables that influenced the participation of farmers in agricultural insurance scheme at 10% level of significance while farm size was significant at 5% level of significance. Gender, household size, membership of

cooperative organization, contacts with extension agents and farming experience were found not to be statistically significant in influencing the farmers' participation in Nigeria Agricultural Insurance Scheme.

The coefficient of age of the farmers which was found to be negative and statistically significant at 10% implies that the older the farmers, the lower their participation in Nigeria Agricultural Insurance Scheme and this could largely be due to less receptivity of older farmers to innovation unlike young educated farmers who have high receptivity to innovations. This result is consistent with similar studies by Piyasiri and Ariyawardana (2002) and Mishra and Godwin (2006). The coefficient of the level of education of the farmers which was found to be positive and statistically significant at 10% level of significance implies that farmers who have attained one form of formal education or the other can raise their skill and quality, narrow information gaps and increases farmers' level of efficiency and productive performance and hence are more likely to adopt innovations more readily than their counterparts with no education at all. This is in conformity to the result on a similar study by Abdulmalik *et al.* (2013).

The coefficient of amount of loan obtained by the farmers was found to be positive and statistically significant at 10% which conforms to the *a priori* expectation that it is mandatory for any farmer who acquires institutional loan for investment in agriculture to purchase an insurance cover and hence will participate more in agricultural insurance. This was evident in the response of most farmers that access to loans from banks is better facilitated when they have insurance cover and as such, they subscribe to agricultural insurance scheme so as to increase their accessibility to loans.

Table 4.11: Results of logit regression analysis on influence of socio-economic characteristics on farmers' participation in agricultural insurance

Variable	**Coefficients**	**T value**	**Exp$^{(b)}$**
Age (X_1)	-2.422	2.120**	0.086
	(1.143)		
Gender (X_2)	0.872	1.320	0.362
	(0.744)		
Educational level (X_3)	0.507	2.915***	1.657
	(0.194)		
Farm size (X_4)	0.063	1.650*	1.065
	(0.032)		
Household size (X_5)	-0.460	1.210	0.631
	(0.038)		
Membership of cooperative(X_6)	1.957	1.553	7.078
	(1.260)		
Amount of loan obtained (X_7)	0.568	2.877***	1.765
	(0.197)		

Contacts with extension agents (X_8)	-0.783 (0.640)	1.212	0.457
Farming experience (X_9)	1.752 (1.147)	1.453	5.631

Source; Field survey 2015.

Nagelkere R-squared (R^2)	0.870
-2log likelihood	96.547
Chi square (χ^2)	65.245

Note: ***P<0.01, **p<0.05,*P<0.1

4.4 Impact of Participation in Nigerian Agricultural Insurance Scheme on Farmers' Income

The Z-test analysis on the impact of the scheme on the incomes of participating and non-participating farmers in agriculture as shown in Table 4.14 gave a calculated value of 8.63. At 5% level of significance, t-value at 76 degrees of freedom is 1.67. It is therefore inferred that at this insured level of significance, farmers participating in insurance have had increased farm income than farmers not participating in the scheme. This is based on the ground that the Z-calculated (8.63) is greater than the Z-tabulated (1.67). The null hypothesis that there is no significant difference in the income of the participating and non-participating farmers in agricultural insurance was rejected while the alternative hypothesis was accepted. This is in agreement with a study by Arene and Tee (1996) which posited that agricultural insurance enhances farm income. This is attributable to the fact that upon adoption of an agricultural insurance policy, the farmers become confident that in the event of any loss from risks and uncertainties in their operations, they will be indemnified by the insurer and perhaps facilitate their ability to differ disposal of their products immediately after harvest, hence fetch higher prices.

Table 4.12: T-test for Difference in farm income of Farmers participating and those not participating in Nigerian Agricultural Insurance Scheme.

Variables	Mean	Mean Difference	Std. Deviation	Z-Calculated
PIncome	2331314.19			
NIncome	418909.01			
PIncome NIncome		1912405.17	221568.71	8.63

Where:

PIncome – Participating farmers' income
NIncome – Non-participating farmers' income

4.5 Constraints Associated with Participation in Nigerian Agricultural Insurance Scheme

(a) The major problem encountered by the farmers under Nigerian Agricultural Insurance Scheme, as shown in the Table 4.15 is that of delay in indemnity payment and is ranked first. The payment of indemnity by the insurance company was indicated to be untimely and inadequate by most (75.68%) of the farmers and this affected their perception of Agricultural Insurance Scheme as they tend to believe that the insurance company is only interested in collecting premium and not paying indemnity when due. Administrative bottlenecks which stem from excessive bureaucracy is ranked second as one of the constraints faced by farmers in participating in agricultural insurance which has the tendency of making the farmers withdraw from the Agricultural Insurance Scheme. Untimely assessment of losses by the insurance company is ranked as the third problem faced by the farmers participating in the Agricultural Insurance Scheme. The other constraints encountered by the farmers are rigorous procedures in claim settlement, inaccessibility to insurance/extension personnel and inadequate information dissemination.

Table 4.13: Distribution of farmers according to constraints faced in participating in Nigerian Agricultural Insurance Scheme

Constraints	Frequency*	Percentage	Rank
Delay in indemnity payment	43	75.68	1st
Administrative bottlenecks	36	64.85	2nd
Delay in assessment of losses	32	55.41	3rd
Rigorous procedures in claim settlement	30	53.38	4th
Inaccessibility to insurance personnel	27	47.30	5th
Inadequate information dissemination	21	36.49	6th

*Multiple response

(b) The major problem encountered by the NAIC staffs as shown in table 4.16is that of inadequate infrastructure and administrative facilities and is ranked first. The necessary infrastructures and administrative facilities such as vehicles, conducive office environment, stationeries and so on was indicated to be inadequate by most (83.33%) of the NAIC staffs and this affected their ability to perform more efficiently and cover as much farming communities as they ordinarily would have covered given the large proportion of farmers that ought to have been covered.Adverse selection and paucity of data which occurs when the insurance company lacks enough information to establish the riskiness of the venture being insured is ranked second as one of the constraints faced by staffs of the National Agricultural Insurance Scheme.Farmer apathy against insuranceis ranked as the third problem faced by the administrators of the Agricultural Insurance Scheme. The other constraints encountered by the administrators are moral hazards and inadequate skilled staff with relevant training.

Table 4.14: Ranking ofConstraints faced in the administration of Nigerian Agricultural Insurance Scheme by NAIC Staff

Constraints	Frequency*	Percentage	Rank
Inadequate infrastructure and administrative facilities	10	83.33	1st

Adverse selection and paucity of data	7	58.33	2nd
Farmer apathy against insurance	7	58.33	3rd
Moral hazards	5	41.67	4th
Inadequate skilled staff with relevant training	4	33.33	5th

*Multiple response

CHAPTER FIVE

SUMMARY, CONCLUSIONS, RECOMMENDATIONS AND CONTRIBUTION OF STUDY TO KNOWLEDGE

5.1 Summary of findings

Socio-economic characteristics of farmers participating in Nigerian Agricultural Insurance Scheme were considered in this study to elicit relevant information on their participation in the study area. Four Local Government Areas (Kagarko, Igabi, Chikun, Kudan) were randomly selected from the four Agricultural Development Projects (ADP) zone in Kaduna State and 148 farmers were purposively selected for the study. Data were collected using a well-structured questionnaires administered to the respondents through interviewing method. The following tools were used to analyze the data collected; descriptive analysis, logit regression model and the Z-Statistic test.

Hypothesis testing was done to establish the impact or otherwise of participation in agricultural insurance.

The study revealed that majority of the farmers (85.8%) were between the age brackets of 31-60 years. Gender was found to be made up of 38.5% females and 61.5% males.Majority of the respondents (98.5%) had one form of formal education or the other. It was also revealed that 74.3% of the respondents had farm plots that ranged between 1-5 hectares. The household size comprised mostly (81.1%) of families of less than 8 persons. Majority (53.4%) of the farmers interviewed did not belong to cooperative organization. 35% of the respondents had no access to loans and about 67% have farming experiences of over 7 years. The study further showed that majority (73.7%) of the respondents were aware of the Nigerian Agricultural Insurance Scheme and only 38.5% participated in the scheme. The study also revealed that the constraints associated with participation from the farmers' perspective in the study area were; delay in indemnity payment in the event of any loss incurred, administrative bottlenecks, delay in assessment of losses, rigorous procedures in claim settlement, inaccessibility to insurance personnel and inadequate information dissemination. Among these, the major constraints faced by farmers were delay in indemnity payment and administrative bottlenecks. From the administrators' perspective however, the constraints to the administration of the Agricultural Insurance Scheme were; inadequate infrastructures and administrative facilities, adverse selection and paucity of data, farmer apathy against insurance, moral hazard and inadequate staff with relevant training. The major constraints among these being inadequate infrastructure and administrative facilities, and adverse selection and paucity of data.

Estimates of the logit regression model to determine the socio-economic characteristics that influence farmers' participation in Nigeria Agricultural Insurance Scheme revealed that two of the coefficients which were educational level and amount of loan obtained were positively significant at 10% level of significance and age was negatively significant at 5% level of significance. Gender, household size, membership of cooperative organization, contact with extension agents and farming experience were not significant even though farmers in the study area had various amounts of contacts with extension agents as well as several years of farming experience. The socio-economic characteristics responsible for farmers' participation in agricultural insurance were age, educational level, amount of loan obtained and farm size. Test of hypothesis revealed that there was a significant difference in the incomes of farmers that participated in agricultural insurance to those that did not participate. The Z-statistic test analysis gave a calculated Z-value of 8.63.

5.2 Conclusions

The findings of this study showed that farmers in the study area were predominantly men, in their active years and have one form of formal educational or the other. This is expected to enhance their participation in the Nigerian Agricultural Insurance Scheme because as men in their active age and their educational background, they tend to be more exposed to modern innovations of improving their agricultural production activities which includes agricultural insurance. However, it was discovered that only about 38.5% of the 73.7% of the respondents that were aware of the Nigerian Agricultural Insurance Scheme participated. Agricultural insurance is an important instrument in improving income generation, poverty reduction and economic development and households should be encouraged to participate.

The study also revealed that the farmers are yet to achieve the best in the efficiency of production. The result of the Z-test statistics that showed the difference in the incomes of farmers participating in the Nigerian Agricultural Insurance Scheme as against those not participating suggests that farmers not participating in the scheme could do even better. This implies that farmers participating in the scheme could afford to access loan facilities that enable them acquire improved inputs and practices in their production which reflects in their increased income. Important factors influencing participation were age, educational level, amount of loan obtained and farm size.

The major challenges faced by farmers in the course of their participation in the agricultural insurance scheme were delay in indemnity payment, administrative bottlenecks, delay in assessment of losses, rigorous procedures in claim settlement, accessibility to insurance personnel and inadequate information dissemination.In the same vain, inadequate infrastructure and administrative facilities, adverse selection and paucity of data, farmers' apathy against insurance were the most important constraints faced by the administrators of the scheme in the State.

5.3 Recommendations

Based on the findings of the study, some of the recommendations which might improve farmers' level of participation in the Nigerian Agricultural Insurance Scheme in Kaduna State are that:

i. Government and the Nigerian Agricultural Insurance Corporation (NAIC) should make deliberate efforts to educate the rural populace especially on the benefits of the scheme. The more educated a farmer is, the more willing he/she will be to

participate in the scheme or in any new technology that could improve their productivity as well as their welfare in general.

ii. Nigerian Agricultural Insurance Corporation should evolve strategies for dealing with the already existing apathy against insurance in Kaduna State. A possible way could be to make efforts aimed at improving their services to farmers, removing existing bureaucratic bottlenecks and thus, rendering more timely and efficient services to the farmers as well as publicizing the payments of compensations to benefitting farmers through the various available public media.

iii. The Nigerian Agricultural Insurance Corporation (NAIC) should organize trainings for its staff as well as extension agents through which information on the scheme can be transferred to farmers. NAIC zonal and state officers can take advantage of the Monthly Technology Review Meetings (MTRMs) to encourage the diffusion processes of the scheme.

iv. The Nigerian Agricultural Insurance Scheme needs to be reorganized in terms of staff strength and capacity which will enable them make regular visits to rural areas to educate farmers and opinion leaders about the benefits of taking an agricultural insurance. This type of contact would enable farmers to have confidence in the corporation.

v. Government, through the Local Government Councils, should set up agricultural insurance offices that will employ agricultural insurance liaison officers that can bridge the gap between the rural farmers and the Nigerian Agricultural Insurance Corporation to tackle the problem of inaccessibility to insurance personnel.

5.3 Contribution to Knowledge

i. The findings of this study indicated the importance of in-depth education of farmers with regards to the operations of agricultural insurance as of the 96% of the respondents that had one form of education or the other, 77% of those that participated in the scheme had tertiary education which played a major role in their perception and reception of the scheme.

ii. The Z-test analysis on the impact of the scheme on the incomes of the respondents clearly showed that farmers that participated in insurance have had an increased farm income than the non-participating farmers with a calculated Z-value of 8.63. This shows that the level of confidence of participating farmers increased and as such enabled them to adopt innovations that improved their production which translated into increased income.

iii. Contrary to the assumption that only farmers that operate large farm sizes participate in agricultural insurance, the study has shown that even small-scale farmers, through their membership of cooperatives, were able to aggregate their small farm plots together which enabled them participate appreciably in agricultural insurance scheme.

iv. Despite the fact that a large number of farmers interviewed were educated, that did not translate into their participation in the agricultural insurance scheme as it was revealed not to have had any significant influence on their participation.

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APPENDIX

ECONOMIC EVALUATION OF FARMERS' PARTICIPATION IN AGRICULTURAL INSURANCE SCHEME IN KADUNA STATE OF NIGERIA

Dear Respondent,

This questionnaire will be used by a postgraduate student of the Department of Agricultural Economics, A. B. U. Zaria. Please fill and tick where necessary. All information will be treated with utmost confidentiality and will be used for the purpose of research.

A. **BACKGROUND INFORMATION**.

1. Name.....Village.....
   L. G. A.....

2. Gender: Male ( ) Female ( )

3. Age (years).....

4. What is your highest level of education attained? (a) No formal education ( )

   (b) Primary education ( ) (c) Secondary education ( ) (d) Tertiary education

5. What is your family size (in numbers).....

6. How long have you been engaged in farming? (a) 1-3 yrs ( ) (b) 4-6 yrs ( )

   (c) 7-9 yrs ( ) (d) 10-12 yrs ( ) (e) 12 yrs and above ( )

7. What is the actual size of your farm? .....

8. What type of farming activity are you engaged in? (a) Crop production ( )

   (b) Livestock production ( ) (c) Mixed farming ( )

9. Do you belong to any cooperative society? Yes ( ) No ( )

If yes, for how long? .....

B. RISK AND INVESTMENT

11. Have you ever had any loss in your farming business in the past? Yes ( ) No ( )

If yes, what year was this? .....

12. What was the cause of the loss?

(a) Natural factor (pest, disease, fire, drought, flood) ( )

(b) Economic factor (price fluctuation) ( )

(c) Social factors (theft, vandalism) ( )

(d) Other factors (specify).....

13. What was the nature of loss(s)? (a) Crop loss ( ) (b) Livestock loss ( )

(c) Both ( ) (d) others (specify).....

14. What was the volume of loss suffered? .....

15. What precautionary measure(s) did you adopt, before hand, to safeguard you against any unexpected loss?

(a) None ( ) (b) Insurance coverage ( ) (c) Diversification ( )

(d) Loan (Borrowing) ( ) (c) Savings ( ) (d) others (specify).....

16. Does fear of uncertainty affect your investment in farming? Yes ( ) No ( )

17. What is the total amount of loan you obtained in the 2013 agricultural production season?

(a) No loan ( )(b) ₦1.00 - ₦50,000 ( ) (c) ₦50,001 - ₦100,000 ( )

(d) ₦100,001 - ₦150,000 ( ) (e) ₦150,000 - ₦200,000 ( )(f) ₦200,000and above.

C. PARTICIPATION

18. Are you aware of the Nigerian Agricultural Insurance Scheme? Yes ( ) No ( )

19. If yes, how did you hear about the NAIC? (a) Radio ( ) (b) Television ( )

(c) Newspapers ( ) (d) Friends/ relatives ( ) (e) Extension agents ( )

(f) Bank ( ) (g) Others (specify).....

20. Are you participating in the Nigerian Agricultural Insurance Scheme? Yes ( ) No ( )

21. If yes, did you willingly take up the agricultural insurance policy introduced to you?

Yes ( ) No ( ). Why? .....

22. What did you insure against? (a) Crop ( ) (b) Livestock ( ) (c) Both ( )

23. Have you had contact with an extension agent aside from staffs of NAIC?

Yes ( ) No ( )

24. If yes, how many times in a month? (a) 1 ( ) (b) 2 ( ) (c) 3 ( ) (d) 4 ( )

25. How has the taking of agricultural insurance policy affected your level of investment in farming business? (a) Increased ( ) (b) Decreased ( ) (c) Same ( )

26. Since you started insuring, have you experienced any loss? Yes ( ) No ( )

27. Was there any delay between the time the claim(s) was filed and payment of indemnity?

Yes ( ) No ( )

28. If yes, for how long? .....

29. Was the amount paid as indemnity adequate to cover for the claimed losses?

Yes ( ) No ( )

30. What other problems did you encounter in getting your claims? .....

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.....

31. Are you satisfied with the mode of operations of NAIC in solving problems of risk and uncertainties in agriculture? Yes ( ) No ( )

32. What was your output/income from the past farming season?
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33. What suggestions can you offer to better enhance the operations of NAIC so as to encourage farmers' participation in agricultural

insurance?.....
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Thank you for your cooperation.