AN ANALYSIS OF THE SOCIO-ECONOMIC FACTORS AFFECTING FARMERS' PARTICIPATION IN THE NIGERIAN AGRICULTURAL INSURANCE SCHEME IN KADUNA STATE.

BY

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DECLARATION

I hereby declare that this thesis has been written by me and it is a record of my own research work. It has not been presented before in any previous application for a higher degree or reputable presentation elsewhere.

All borrowed ideas have been duly acknowledged by means of references and quotation marks.

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CERTIFICATION

This dissertation entitled "AN ANALYSIS OF THE SOCIO-ECONOMIC FACTORS AFFECTING FARMERS' PARTICIPATION IN THE NIGERIAN AGRICULTURAL INSURANCE SCHEME IN KADUNA STATE, by Mrs Agada J.E. meets the regulations governing the award of Degree of Master of science of Ahmadu Bello University, Zaria, and is approved for its contribution to scientific knowledge and literary presentation.

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DEDICATION

This thesis is dedicated to my dear husband Dr. F.O. Agada and my daughter Miss Joan Agada for all their support and understanding.

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My sincere gratitude goes to God Almighty for enabling me complete this work through the help of my major supervisor, Dr. M.I. Kolawole. Despite his many commitments, he spared time to read and make corrections that are vital in this thesis. I am very grateful for his guidance. I am also grateful to my other supervisor, Prof. O.A. Ogungbile who also provided me with useful suggestions and help during the work.

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ABSTRACT

This study was designed to analyse the socio-economic factors affecting farmers' participation in the Nigerian Agricultural Insurance Company in Kaduna state. The objectives of the study included: to summarize the socio-economic characteristics of farmers in the study area; to determine the factors that affect a farmers' participation in the Nigerian agricultural insurance scheme (NAIs); to critically assess the loss assessment procedures adopted by tne scheme; and to assess the adequacy of indemnity paid. Data were collected from 150 maize and or poultry farmers in the study area during the 1995/96 cropping season. Descriptive statistics and logit regression analysis were used to analyse the data obtained.

The study identified loan as the singular most important factor that affect a farmers' participation in the NAIS because it is mandatory that all those who acquire any form of institutional loan for use in agricultural production, to participate in the insurance scheme. The logit regression analysis also revealed that in addition to Amount of loan, years of education, membership of farmers association contact with extension agents, size of loss suffered and years of experience in farming were other factors affecting farmers participation in the scheme. Loss assessment as undertaken by the scheme is not very satisfactory in ensuring that the scheme fulfills its main role of keeping farmers in production even after suffering a loss. This is because it is based on cost of production as opposed to the cost of replacement. It therefore, does not take into account the effect of inflation. This it was discovered also discourages farmers from participating in the scheme.

Indemnity computation and payment were also found to be plagued with a number of problems which include; NAIC keeps a back-log of unsettled claims which may take an average of 3-6 months to be settled; Under insurance by some farmers who insure only the volume of loan obtained from the bank and not the total sum invested on the farm led to material misdescription and misrepresentation. Indemnity paid in the event of a loss in this case, covers only the proportion of the farm insured. Others include the problem arising from the excess clause and minimum loss clause attached to the policy.

TABLE OF CONTENTS

		Page
CHAPTER	Declaration	i
	Certification	ii
	Dedication	iii
	Acknowledgements.	iv
	Abstract	vi
	Table of Contents	viii
	List of Tables	xii
	List of Figures	xiv
	List of Appendices	xv
1.	INTRODUCTION	1
1.1	Nature of Agriculture And Its Implications.	1
1.2	Agricultural Insurance Scheme.	1
1.3	Problems Statement	3
1.4	Objective of the Study	5
1.5	Justification of the Study	5
1.6	Hypothesis:	5
2.	LITERATURE REVIEW	6
2.1	Agricultural Production in Nigeria . .	6
2.1.1	The Effects of Risks and Uncertainties in Agriculture	7
2.1.2	Classification of Agricultural Risks .	8
2.1.3	Managing Agriculture Risks	10
2.2	The Essence of Insurance to Agriculture	14
2.3	Insurability of Agricultural Risks . .	16

		Page
2.4	THE NIGERIAN AGRICULTURAL INSURANCE SCHEME	17
2.4.1	Establishment and Administration of the Scheme	17
2.4.2	Objectives of the Scheme	19
2.4.3	The Cover	19
2.4.4	Beneficiaries of the Scheme	21
2.4.5	Perils Under Cover and Duration of Cover	22
2.4.6	Limit for Insurance Cover	22
2.4.7	Sum Insured and Premium Rate	23
2.4.8	Minimum Loss to Attract Claim	24
2.4.9	Basic Implementation Guidelines . . .	24
2.4.10	Settlement of Claims/Indemnification .	28
2.4.11	The Role of Intermediaries	30
2.4.12	Accreditation of Intermediaries . . .	31
2.4.13	Relevant Services of the Banks/lending Institutions	32
3.0	METHODOLOGY	33
3.1	Study Area	33
3.2	Data Source and Collection	34
3.2.1	The Primary Data	34
3.3	Sampling Procedure	35
3.4	Analytical Framework	36
3.4.1	Descriptive Statistics	36
3.4.2	Logit Regression Analysis For Qualitative or Discrete Dependent	

	Variables	37
3.5	Limitation of Study	45
4.0	PRESENTATION AND DISCUSSION OF RESULTS.	46
4.1	Socio-economic Characteristics of Sampled Farmers.	46
4.1.1	Age:	46
4.1.2	Years of education	46
4.1.3	Job Status	49
4.1.4	Farm Size	51
4.1.6	Amount of Loan	51
4.1.7	Number of Years of Membership of Farmers' Association/Cooperative . . .	53
4.1.8	Years of Experience in Farming	55
4.1.9	Contact with Extension Agents	57
4.1.10	Perception of Insurance In General. .	59
4.1.11	Size of loss Suffered If Any	60
4.2	Socio-Economic Characteristics of Insured Respondents	62
4.3	Results of the Logit Analysis for Sampled Farmers.	63
4.3.1	For Maize growers	63
4.3.2	For Poultry Farmers	66
4.4	Procedure and Effectiveness of Loss Assessment.	71
4.4.1	Procedure for Loss Assessment	71
4.4.2	Effectiveness Of The Loss Assessment Procedure.	74

4.5	Procedure and Effectiveness of Indemnity Payment	76
4.5.1	Procedure Of Indemnity Computation And Payment.	76
4.5.2	Effectiveness Of The Procedure Of Indemnification	79
5.0.	SUMMARY, CONCLUSION AND RECOMMENDATIONS.	84
5.1	Summary	84
5.2	Summary of Findings:	85
5.3	Conclusion	88
5.4	Recommendations	88
	References	91

LIST OF TABLES

TABLE		PAGE
4.1	Age distribution of respondents.....	47
4.2	Distribution of the respondents based on reported years of education.....	47
4.3	Job status of respondents.....	49
4.4	Farm size of sampled maize growers.....	49
4.5	Number of farm sites operated by maize growers...	51
4.6	Distribution of farmers according to number of birds kept.....	51
4.7	Distribution of respondents by amount of loan acquired for production.....	53
4.8	Distribution of respondents by years of membership of farmers' association or cooperatives	53
4.9	Distribution of respondents by years of experience in farming.....	54
4.10	Distribution of respondents by number of contact with extension agents in a month.....	54
4.11	Distribution of respondents by their perception of insurance generally	57
4.12	Distribution of maize growers by size of loss suffered in recent years.....	57
4.13	Distribution of poultry farmers by size of loss suffered in recent years.....	60
4.14	Summary statistics of the logit analysis for maize growers	63

4.15 Maximum likelihood estimates of logit model for maize growers..... 63
4.16 Correlation matrix for Poultry Farmers..... 66
4.17 Summary statistics of the logit analysis for poultry farmers..... 68
4.18 Maximum likelihood estimates of logit model for poultry farmers..... 68
4.19 Farmers' investments, losses and Recommended indemnity..... 82

LIST OF FIGURES

FIGURE		PAGE
1.	Organisational structure of the Nigerian Agricultural Insurance Company.....	20

LIST OF APPENDICES

APPENDIX		PAGE
1.	NAIC estimated Production cost for a small-scale hybrid maize farm	94
2.	Estimated production cost for a mechanized medium/large scale farm	95
3.	Estimated Production cost for a small-scale open pollinated maize production	96
4.	Cummulative weekly input cost per pullet, for layer	97
5.	NAIC cummulative weekly input cost per bird for broilers	99
6.	NAIC Katsina zone's Annual Calender of operations for production maize	100

CHAPTER 1

INTRODUCTION

1.1 Nature of Agriculture And Its Implications.

Agriculture in Nigeria is not just a business enterprise but also largely, a way of life. It involves production, distribution and exchange of certain basic products indispensable to man. It is also, a source of sustenance, for a very large body of persons generally known as agriculturist (Ray, 1967).

In all its aspects and relationships, agriculture is subject to a considerable element of uncertainty and a wide variety of risks ranging from input supply and prices to the vagaries of nature such as inclement weather conditions, pest and diseases. Other natural hazards such as floods and fire outbreaks and the time specific nature of agriculture are equally important with regards to their impact on the success or failure of an agricultural enterprise. In order to boost agricultural production considerably, it is imperative to reduce the impact of these risks and uncertainties to the barest minimum. The need therefore, for a mechanism that is designed primarily to keep the farmers in business cannot be overemphasized. An agricultural insurance scheme is one such mechanism.

Insurance have been severally suggested as a logical farm management option whenever knowledge imperfection can be reduced to no more than risk (E.O Heady, 1952).

1.2 Agricultural Insurance Scheme.

Agricultural insurance has been defined as the stabilization of

income, employment, prices and supplies of agricultural products by means of regular and deliberate savings and accumulation of funds in small installments by many, in favorable time periods to defend some or a few of the participants in bad time periods (Nigerian Agricultural Insurance Scheme Bulletin, 1989).

The Nigerian Agricultural Insurance Company (NAIC) was established by the Federal Government following the formal launching of the scheme on 15 December,1987. The insurance scheme offered by this company is designed to benefit the small, medium and large scale farmers, either in group or as individual producers. Its broad objective is to offer protection to the farmer from the effects of natural disasters and to ensure payment of compensation to keep the farmers in business after suffering a loss. Agricultural insurance is, therefore, a safeguard for the farmers.

More specifically, some of the benefits of Agricultural Insurance to farmers are as follows;

(a) It promotes agricultural production by enhancing greater confidence in adopting new and improved farming practices and in making greater investments in the agricultural sector of the economy, thereby increasing the total production;

(b) It provides financial support to farmers in the event of losses arising from natural disasters;

(c) It increases the flow of agricultural credit from lending institutions to the farmers;

(d) It minimizes or eliminates the need for emergency assistance provided by Government during periods of agricultural disasters.

Since the Nigerian Agricultural Insurance Scheme has been in operation for close to ten years (1987-1997) now, this study seeks to analyse the socio economic factors affecting farmers' participation in the Nigerian Agricultural Insurance Scheme in Kaduna state.

1.3 Problem Statement

Generally, Insurance companies in Nigeria as in many developing countries, have a very poor image as regards payment of claims and many people accuse them of capitalizing on the ignorance of the insured (Ogunrinde, 1982; Aigbe, 1982; Jafiya 1984). This has resulted in a high level of apathy towards insurance in Nigeria. Farmers are not confident that insurance companies would honour their claims. Long delays in settlement or the outright denial of claims have been identified as a major area of conflict between the insured and the insurer in this country. If this trend is the case for agricultural insurance, then the twin objectives of relieving the government of the burden of providing aid to the victims of agricultural disasters and of reducing the risk in agriculture, would be totally defeated (Okorie, 1987).

To ensure the success of the scheme, it is important that farmers' losses be assessed promptly and claims settled appropriately. For a farmer who suffers loss to be able to remain in business, the amount paid to him as indemnity must be adequate to cover the replacement cost (not just cost of production) and also, be timely to allow for the time specific nature of agricultural production. These are all necessary to

avoid eroding the farmers' confidence in the scheme and thus, ecourage their participation in it.

The replacement cost approach of indemnity computation is not shared by Lot (1988), who argued that because loss of output resulting from an insured peril, is calculated from costs, assessment of loss hinges on production cost which in turn determines the indemnity to be paid. Apart from the problem of the timely and adequate payment of indemnity, there is also, an "excess clause" in the policy and whether or not a farmer can bear this, has to be considered. "Excess clause" refers to the proportion of total loss suffered which the farmer is required to bear for each and every claim approved for settlement (the farmer therefore, is paid a net amount as indemnity excluding the amount of excess clause).

This study is intended to analyse the socio economic factors affecting farmers' participation in the Nigerian Agricultural Insurance Scheme in Kaduna state and in so doing, to answer the following questions:

(1) What are the socio economic factors that affect farmers' participation in the scheme?

(2) What are the problems, if any, experienced by farmers in obtaining an insurance cover?

(3) Is the Nigerian Agricultural Insurance Scheme (NAIS) actually fulfilling its mandate of keeping the farmer in production after suffering a loss?

(4) Are farmers losses promptly and properly assessed?

(5) Are settled claims adequate and timely?

1.4 Objectives of the Study

The objectives of this study are:

(i) To analyse the socio-economic characteristics of farmers in the study area,

(ii) To determine the relationship between the insured and selected socio-economic characteristics,

(iii) To evaluate the loss assessment procedures adopted by the scheme.

(iv) To assess the adequacy of indemnity paid.

1.5 Justification of the Study

Basically, this study is justified in that it seeks to contribute to the existing knowledge on agricultural insurance in Nigeria. Very little empirical work has been done in the area of agricultural insurance despite the fact that it has become a very important consideration as the Nation seeks to reduce the farmers' losses and ensure that he/she remains in production even after suffering a loss.

1.6 Hypothesis:

This study will test the hypothesis that:

There is no relationship between farmers' decision to insure and selected socio-economic characteristics.

CHAPTER 2

LITERATURE REVIEW

2.1 Agricultural Production in Nigeria

Despite the pre-eminent position of the petroleum sub-sector, especially in income generation, the agricultural sector still play significant roles in the overall economic growth and development of the country. These roles include employment generation, provision of raw materials to the growing industrial sector, provision of foreign exchange earnings and the provision of food for the growing population.

Mbaba and Ukeji, (1992), have however, pointed out that the rate of growth and development of the agricultural sector in the recent past, had not been encouraging. The poor performance of the agricultural sector has been traced by many scholars including Ighen (1987), to certain endemic and imposed problems, some of which are: the inadequacy of loanable funds (due to the risky and uncertain nature of agricultural production), poor production and storage facilities, poor management and structural disequilibrium etc.

Various governments in Nigeria have over the years, attempted to provide enduring solutions to these problems. Of recent, the problem of the risky and uncertain nature of agriculture was put under focus by the establishment of the NAIC in 1987.

2.1.1 The Effects of Risks and Uncertainties in Agriculture

Risk as defined by some authors is a situation where all possible outcomes are known for a given management decision and the probability associated with each possible outcome is also known. Kay, (1986), on the other hand defined uncertainty as an instance when one or both of two situations exist for a management decision - either all the possible outcome are known, the probability of the outcomes are unknown or neither the outcome nor the probabilities are known. For this study, both terms will be used interchangeably.

Hay (1979) indicated that farmers move out of a risky world into certainty with respect to the peril he insured against. If the farmer suffers a loss, he receives compensations according to the terms of the insurance policy. Otherwise, he keeps his earnings, less the amount paid as premium.

The incidence of risk and risk averse behavior is important to policy makers in developing countries as indicated by the following:

(i) Default on bank loans is increased when farmers are exposed to severe risks.

(ii) Return to farmers' resources reduces in their bid to manage risks.

(iii) Resources have to be well allocated before yield and product prices can be known.

(iv) Variation in yield results in unstable supply of agricultural commodities.

The Government is, thus, justified in introducing policies

aimed at assisting farmers to cope with risk. Such interventions include risk sharing institutions and risk management intervention like farm income stabilization programmes, emergency food ration, storage system, crop and animal insurance, price support and a well functioning credit market.

2.1.2 Classification of Agricultural Risks

Ray (1967), classified Agricultural risks into two broad groups; personal risks and property risks. This classification is based on the object of incidence of uncertainty. The risks to agricultural property may again be divided into three major groups; (a) natural, (b) social and (c) economic, depending on whether the uncertainty involved is due to natural, social or economic factors.

Personal risks: In agriculture, these are similar to those of a non farmer. It may mean the possibility of capital or income loss to the farmer arising from the uncertainty of the human factor. Such uncertainty may affect the farmer and the farm worker as well as a third party. It could be in form of personal hazard (of ill health, death or accident etc.) to the farmer himself or of his employees arising out of and in the course of their employment or finally in form of liability incurred for personal injuries to a third party.

Property risks: Agricultural capital inputs are also prone to risks which as earlier mentioned may be:

Natural risks: Also referred to as natural hazards and further sub-divided into three namely - Natural element; plant and animal diseases and insect and other pests. Those due to natural elements include the uncertainties of weather such as deficiency of moisture or drought, excess moisture (flood and inundation, wind-storm, natural fire or lightening (meteorological risks). They affect agricultural properties by having an adverse impact on crop yield and or by causing losses to existing farm stock, animate and inanimate. The former is called production risks and the latter, maintenance risks.

Farm losses may also arise from diseases and insect pest sometimes in epidemic proportions. In Africa, swarms of locust are known to cause widespread destruction of crops. Livestock are also exposed to this form of risk. Rinderpest and Dermatophiliases (locally known as "kirchi") are common livestock diseases in Nigeria. A loss of well over N200 million per annum was estimated in the livestock industry as far back as 1976 as a result of diseases (Bankole, 1995).

Economic Risks: Variability of output prices is a major source of economic risk in agriculture. The farmers may be able to affect yields through their decisions but have little or no influence on produce prices except occasionally through some form of co-operation effort of government action. This is further made difficult due to the long production process involved which create a time lag between the time production decisions were made and when the output was sold. Financial risk is also incurred when money is borrowed to finance the farm operation. The farmer

faces an increasing risk of losing equity due to a decline in income as borrowing and debt/equity ratio increase (Ray, 1967).

Social risks: Social factors which may affect a farm property include fire, burglary or theft, embezzlement, strikes, civil unrest etc, change in social structures and changes in technology which is a source of production risk. A change from an old and proven production technology to some new technology involves some risk due to the uncertainties involved. Kay (1986), pointed out that the risk associated with adopting new technology is captured in an old saying - "Be not the first upon whom the new is tried nor the last to lay the old."

2.1.3 Managing Agricultural Risks

Human ingenuity has not failed to device ways and means to reduce risks or to mitigate their results. Ray (1967) identified three principal ways of meeting agricultural risks: (a) Avoidance, (b) Prevention and (c) Assumption. Sada (1993), classified the methods of managing agricultural risk into five: Risk avoidance, Risk assumption or retention, Risk prevention, Risk distribution and Risk transfer.

Risk Avoidance: Both Ray (1967) and Sada (1993) agreed on avoidance as an important method of managing risk in agriculture. Ray, stated that risk avoidance is the first device that strikes the mind immediately especially for those risk which are avoidable, but he also conceded that it is not a practicable way of meeting agricultural risks as the extent to which risk can be

avoided is in most cases limited. Sada (1993), pointed out that for risk which is known, action can be taken to avoid it and where total prevention is not possible, efforts can be made to reduce the impact of any loss that might occur.

Risk assumption or retention: Sada (1993), described risk assumption or retention as a situation in which either knowingly or unknowingly, risk is retained without being passed off to another person or agency. Unplanned risk assumption usually occurs when no consideration whatsoever is given to the risk probably because it is insignificant or because the farmer is not aware of it. Planned risk on the other hand, assumes the risk in question would have been identified but the individual or corporate body may decide the risk or chances of loss occurring are insignificant or can be easily absorbed within the financial resources available. This method is only recommended for any one event during any particular period which would be relatively small and therefore, easily absorbable. Ray (1967) pointed out the importance of this method particularly for unavoidable losses. He further describes three ways by which this method may work:

Self Insurance: Since certain agricultural risks must be assumed, Ray stated that assumption can be done in several ways: A risk may be borne by the subject of uncertainty himself, either alone or in combination with a group of persons or it may be transferred to others. If it is a one-man enterprise, he may undertake to protect himself by accumulating funds in good years

to support him in lean years or when risk occurs. The farmer may also opt to operate on a large scale thus reducing or carrying his losses up to a point especially when the units of ownership or operation is spread over space. This is referred to as self insurance or latent insurance.

Mutual Insurance: Ray (1967) described this as a situation in which a small owner or operator, either of a few animals or of a few acres of land, can however, protect himself against risk of concentrated loss by spreading it over space and time through combination with a number of small owners like himself. This combination may be in form of pooling of resources to set up a cooperative farm where losses would be shared by all in proportion to assets posted or by subscribing small sums in order to meet any eventual loss to one or more of them, the aggregate subscription being just sufficient to indemnity that loss plus incidental expenses.

Speculation and Insurance: Here, the subject of uncertainty may, without bearing the risk either individually or in a group, transfer it to others who specialize in uncertainty bearing such transfer may be affected through two different processes, which are similar in that both are aimed at reducing uncertainty to a measured risk by grouping similar uncertainties. These two processes are:

Insurance which offers protection in case of physical loss to person or property in consideration of a small stipulated sum,

and speculation which is chiefly a cover against probable loss of value. The speculator by a system of transfer of risks, take up themselves the chance of gain or loss through fluctuations in the value of certain commodities in the hand of the producers, dealers and manufacturers. Although their immediate object is to make money through fluctuations of prices, they serve indirectly to reduce the cost of uncertainty. A specific instance is the hedging contract under which two contracts of opposite character are made at about the same time to offset the gain or loss from one by loss or gain from the other.

Risk prevention: This include any reasonable step taken to prevent a loss or any action that has the effect of reducing the possibility of loss. They are aimed at reducing or minimizing risk (Sada, 1993). Ray (1967), accepted this as the second and more important way of meeting a risk. He says the prevention of risk in agriculture means the reduction of uncertainties through improved facilities and techniques as well as organization.

Risk distribution: This term is used generally in connection with speculative risks. It involves the incorporation of a firm as a limited liability company with ownership and risk distribution amongst the shareholders with each shareholder's liability being limited to the proportion which the loss bears to share capital subscribed.

Risk transfer: Sada(1993) described risk transfer as one of the common techniques of risk management in agriculture. It involves

the transfer of the risk or a potential loss to a third party. An example of risk transfer is under a contract of insurance where the risk generator pays a premium to an insurer who is a professional risk bearer and thereby transfer the risk to the insurer.

Kay (1986) identified two ways by which a farm manager can provide insurance for a business: Formal insurance which can be obtained through an insurance company to cover many types of risks which if they occur, could have serious impact on business equity and survival or on the alternative, a business can provide its own insurance (i.e., be self-insured). In this case, some type of readily available or liquid financial reserve must be available in case loss does occur as without such a reserve, a crop failure, a major windstorm or a fire outbreak may be such a financial set back that the business may fail.

2.2 The Essence of Insurance to Agriculture

The essence of insurance lies in minimization of uncertainty or risks of loss to individuals, through the combination of a large number of similarly exposed individuals who each contribute, to a common fund, premium payments sufficient to make good the loss caused to any one individual (Alfred Mannes, 1931).

Ray (1981) considered insurance as a social device which aims at reducing the uncertainty of loss through the combination of a large number of similar uncertainties and through the use

of accumulated fund, distributing the burden of loss, should there be any, over time and space.

In the developed countries of the world, agricultural insurance is regarded as a useful device for reducing risk on the operations of the farm (Ray, 1981). Quite rightly, much attention has been paid to the organizational structure and the problems associated with the implementation of development efforts (Alli, 1980), Ashan, 1981) but Peinberton (1984), pointed out that less attention is being paid to the farmer himself within the context of agricultural insurance. Ray (1981) further stated that farmers are left to realize the benefits of insurance and adopt its use in compulsory national schemes where he would be forced to appreciate its "real significance."

Ogunbiyi and Orafidiya (1988), specified that at present, Nigeria records comparatively high livestock mortality as a result of unhealthy and unsanitary living conditions and inadequate veterinary facilities due to prohibitive costs of drugs. In essence, the cost of instituting an insurance scheme is likely to be high to an average farmer. Adegeye and Akinwumi (1978), therefore recommended that the kind of agricultural insurance envisaged for Nigeria must be a national all-purpose type covering a range of risks. They envisaged that such an arrangement will allow for wide coverage and minimum risk sharing among farmers such that individual premium payable becomes relatively small.

Peinberton (1984) advised that farmers must not be made to perceive insurance scheme as a tax measure of the central government if they are to fully participate in it. Rather, he

advised that they must be convinced that the scheme is beneficial in minimizing their farming risks. Premiums charged must therefore be related to the risk being covered, while indemnity payments reflects the extent of damage incurred.

Credit allocation to the agricultural sector is important for agricultural growth and development. However, this has been a major constraint facing agriculture in Nigeria. Commercial banks and other financial institutions are unwilling to meet this need adequately because of the following reasons: high exposure to risks associated with agricultural production, low productivity and poor farm management, high administrative cost and loan default. However, with insurance, part of the banks problems is solved i.e. that of recovering their investment in the event that following a natural hazard farmers lose their harvest and are unable to pay back their loan. Also, according to Ogunbiyi (1989), complementary technical assistance is, on the other hand offered the farmers by the insurance company.

2.3 Insurability of Agricultural Risks

For an agricultural risk to be insurable, it must and should satisfy at least the following conditions:

(i) It should be a real risk, that is, the loss must be of fortuitous character.

(ii) It should be measurable in large numbers.

(iii) The cost of insurance or premiums should be within the means of the average farmer.

Ray (1967) pointed out that so far as fortuity is concerned, perhaps no other firm is subject to as much fortuity as the farm firm. Uncertainties created by natural elements, diseases and

pest make the outcome of the farm enterprise extremely uncertain. He also indicated that the fortuitous character of farm losses caused by natural agencies may be affected either positively or negatively by human activities.

Apart from being fortuitous, a farm risk which is insurable, must also have statistical measurement to determine the probability of occurrence of the risk. That is, the risk should belong to a class large enough to conform to the theory of probability.

Finally, an insurable agricultural risk must have a low cost. That is, the premium should be within reach of the average farmer. This requires that ;

(a) premium must be reasonably low in proportion to the protection available and

(b) there must be an effective demand for insurance among a sizeable section of the farming community so that the administrative and operational expenses might be low per unit value of insurance. Where an insurance is beyond the reach of an average farmer, it can still be available if the government subsidizes part of its costs as well as expenses (Ray, 1967).

2.4 The Nigerian Agricultural Insurance Scheme

2.4.1 Establishment and Administration of the Scheme

Information given in this section were drawn largely from the prospectus published by the Nigerian Agricultural Insurance Company.

The Nigerian Agricultural Insurance Company was set up in 1988 and its operations commenced in 1989. The Federal Government Decree No. 37 of 1993 changed its name to The Nigerian Agricultural Insurance Corporation (NAIC), provided it with legal backing, and set up a Board of Directors to manage its affairs.

NAIC is funded largely by the Federal Government of Nigeria, with the participation of State Governments and the organized Private sector. The infrastructural and administrative facilities required for the implementation of the scheme are provided by the Federal and State governments and the Financial Institutions. In view of the social nature, problems, cost and high risks involved in setting up an agricultural insurance scheme, the insurance industry/companies in Nigeria, did not initiate the scheme.

The Board of Directors of the Company, were appointed by the Federal Government under the supervision of the Federal Ministry of Agriculture, Water Resources and Rural Development, for the smooth administration of the scheme. Five(5) zonal offices were created each headed by a zonal officer. There were also state offices in each of the thirty one states including Abuja. These, are apart from the Headquarters in Lagos. At the grassroots level, the company's activities are enhanced by two special types of technical committees established in each State and Local Government Area of the Federation. These are:

(a) The Nigerian Agricultural Insurance Company States Coordinating Committee; and

(b) The Local Government Agricultural Insurance Committee (LGAIC) appointed to assess loss and settle claims at the

grassroots (Operational Guidelines for the Nigerian Agricultural Insurance Scheme, 1989).

2.4.2 Objectives of the Scheme

Broadly, the objective of the Nigerian Agricultural Insurance Scheme (NAIS) is to offer protection to the farmer from the effect of natural disasters and to ensure payment of appropriate compensation sufficient to keep the farmer in business after suffering a loss.

Also, the scheme is designed specifically to:

(a) Promote agricultural production.

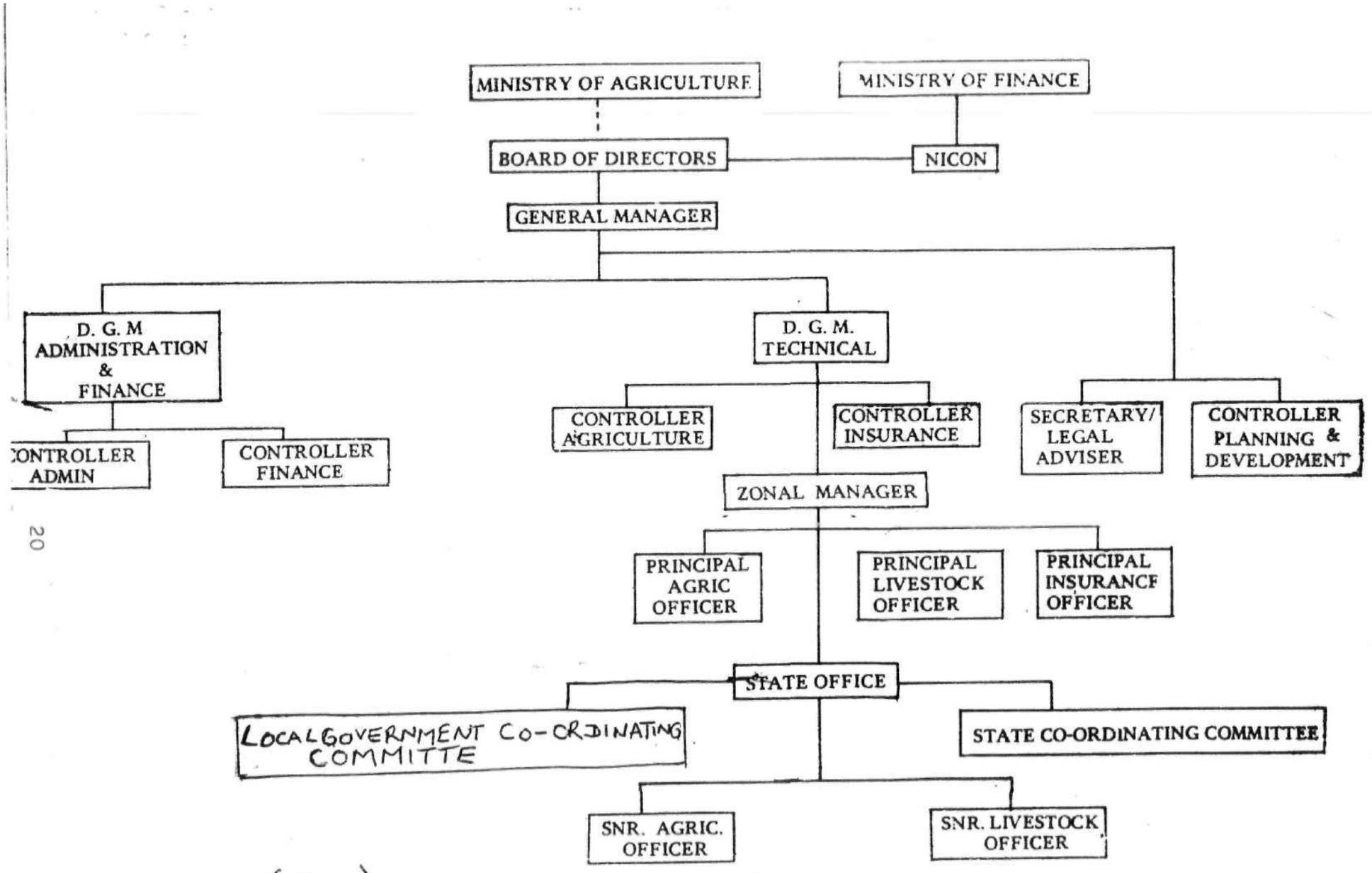
(b) Provide financial support to farmers in the event of crop and livestock losses arising from natural disasters.

(c) Increase the flow of agricultural credit from lending institutions to the farmers.

(d) Minimize or eliminate the need for emergency assistance provided by Government during period of agricultural disasters.

2.4.3 The Cover

At inception, the scheme only covered very limited items in the crop and livestock sub-sectors. In the crop sub-sector only maize and rice were covered initially but at present, the scheme covers most of the food crops produced in the country. Piggery, sheep, goats, fishery are now covered in addition to the initial cattle and poultry production in the livestock sub-sector. This extension to cover other crops and livestock was in response to



20

Source: NAIC (1997).

FIG. 1 : NIGERIAN AGRICULTURAL INSURANCE COMPANY'S ORGANISATIONAL STRUCTURE.

farmers' demand and in recognition of the Nigerian Agricultural System.

Tangible farm assets like farm building, machinery and equipment are also covered and so are the farmers, farm labour/employees and their dependents. However, these covers are not subsidized like those for crop and livestock. Hence, there are two types of cover; subsidized agricultural insurance, and commercial agricultural insurance. Subsidized insurance* is for food crops only. Also, all food crops are insurable. Livestock are also covered under the subsidized cover. The commercial agricultural insurance deals mostly with cash crops. Full premium is payable for this cover as there is no subsidy. Fixed farm assets and human assets also fall under this category.

2.4.4 Beneficiaries of the Scheme

The scheme was established to provide security for all categories of farmers, namely; small, medium and large scale holders, either in groups or as individual farmers. The cover is compulsory for farmers who benefit from any form of agricultural credit scheme operated by approved lending institutions or agencies.

* Premium payable on the subsidised insurance is reduced by 50%.

The scheme also provides cover for self financed farmers, Government sponsored or assisted projects etc. in which institutional credit facilities may not be involved. In this case, payment of premium and request for any compensation are to be made direct to the company by the individual farmer or group.

2.4.5 Perils Covered and Duration of Cover

The NAIC, covers perils under the crop sub-sector which include fire, windstorm, drought, lightening, flood, diseases and pest. Perils in the form of death and injury due to accidents, diseases, storm, fire, flood and Lightening are also covered for the livestock sub-sector. The NAIC does not accept responsibility for losses arising from negligence, or wilful damage. Political risks, and social risk such as riots, revolution, mutiny etc. are not covered.

NAIC provides guidelines/policies required to meet the conditions (see page 27) for good crop and livestock husbandry and the insured is required to meet these conditions.

Effective cover for crops ranges from germination to physiological maturity but land preparation or clearing costs are covered retrospectively for accepted proposals. For poultry production, the scheme covers the period from one day old to seventy two weeks for layers, and breeding birds and one day old to ten weeks for broilers. Turkeys and cockerels, are covered from one day old to eighteen weeks. Cattle are covered for a duration of one year only at a time and can be renewed annually.

2.4.6 Limit for Insurance Cover

The cover for poultry is available for minimum stock levels as follows:

(a)	Breeding (parent birds):	500 birds
(b)	Layers:	500 birds
(c)	Broilers:	250 birds

(d) Cockerels: 250 birds

(e) Turkeys: 100 birds

For crop production, the minimum farm size that can be covered is 0.4 hectares (about 1 acre) and for cattle production, the minimum stock levels that can be covered are:

(a) Dairy cattle (milking cows): herd of 5

(b) Bull calves, heifers and fatteners (Beef cattle):herd of 10

(c) Cross breeds for each class/type: herd of 5

(d) Work bulls and breeding bulls: herd of 2

(e) Exotic breeds for each class/type: herd of 2

2.4.7 Sum Insured and Premium Rate

The sum insured for crops is the approved input basic cost while for livestock it is equal to the value of the animal at the commencement of the insurance plus the sum of the approved input cost (see appendix 1). The approved input cost is taken to be the Estimated production cost (EPC) of any crop or for a livestock project and the company has produced a comprehensive EPC Booklet for use in computing the sum insured, the premium payable and the subsequent indemnity.

The approved premium rate for the scheme ranges from 5% to 7.5% of the EPC for livestock depending on the agro-ecological zones of the country. The EPC booklet contains the appropriate premium rate for each ecological zone with relevant explanatory notes. For crop and livestock, the premium is subsidized by Government up to 50% and this subsidized premium must be paid by

the insured or his agent before the contract is deemed effective between NAIC and the insured farmer. In the case of the unsubsidized (capital) items and personal accident/workmen compensation to farm workers, competitive commercial rates are applicable. However, it must be noted that the estimates of input costs, the premium rates and the consequent premium are provisional and therefore, subject to review as occasions demand.

2.4.8 Minimum Loss to Attract Claim

To qualify for indemnity under the poultry insurance policy a minimum loss must be recorded as follows:

(a) For broilers above 5% of total stock

(b) For cockerels/Turkeys above 5% of total stock

(c) For layers: 1 day old to 8 weeks, above 5% of total stock.

9 weeks to 72 weeks, above 3% of total stock.

(d) Breeding birds above 5% of total stock.

2.4.9 Basic Implementation Guidelines

For any particular farm to qualify for an insurance cover, it must fulfil the following conditions:

(a) The farmer must be engaged in the production of any of the insurable items of crop or livestock,

(b) Protect the crop or livestock from imminent or inevitable risk before or at the time of cover, (for example, use of bird scarers and fire tracers).

(c) Avoid all negligence or poor production methods.

(d) Separate all already damaged crops or injured livestock from those to be insured.

(e) The farm must be accessible.

(f) The farmer must accept that political risk or social risk, are not covered by the scheme and that theft of growing crops and or livestock is not covered except where covered by terms of theft policy or relevant policy endorsement.

Processing of request for cover entails the farmer collecting, completing and promptly returning the appropriate proposal form to NAIC zonal or State office or other designated points. This form would be carefully scrutinised and the estimated production cost (EPC) immediately computed thus, working out the tentative premium and advising the farmer accordingly. Next, farm inspection/survey is conducted to ascertain contents of form, identify hazards, estimate severity of hazards, determine insurability, provide technical advice, enumerate crop or livestock population, reject politely and explain to farmer, if proposal is not acceptable. If on the other hand, the proposal is acceptable, finalize and collect premium, or deduct from source and follow-up farm visits to ensure compliance to the use of improved technology or adherence to approved farm management practices.

Premium may be paid directly to NAIC or other approved intermediaries by self- financed farmers, cover is not effective until full payment is made. Also, premium can be deducted from approved loans through the lending bank and prompt remittance made to NAIC. Direct payment by cash or cheque is possible in

which case a bank format has to be completed. On receipt of premium, official receipt(s) and certificate of insurance are issued where applicable via appropriate channel. The policy is later prepared and sent to the insured.

Farm inspection is made separately and/or jointly by NAIC, Bank, ACGS or other intermediaries. NAIC farm inspection is to enable them advise intermediary on the issue of delegation (extent, how and when) of farm inspection to other links - banks, ACGS and other approved intermediary. Policy is only issued after proper inspection of all project by NAIC while also taking note of advice from ACGS and/or lending bank. Depending on the nature of the project(s) involved, random or total inspection may be carried out. All units of the linkage complete a jointly agreed proforma for obtaining/exchanging information and data and this is made available to other members of the institutional linkage for use. Each member of the linkage as a general rule bears the cost of such inspection visit(s).

The mandatory insurance cover is effected by the help of the linkages. Bank/other financial institutions educate farmers intending to acquire loan to produce any one or more of the insurable crops and livestock items, on the need to take NAIC insurance policy for the items and subsequently assist the farmer fill the relevant forms. The ACGS will only provide provisional guarantee for a loan after it must have received evidence of processing or issuance of cover. However, if no effective cover is eventually issued, this guarantee is revoked. Premium is calculated and collected for NAIC by the bank or non-bank lending institution. The amount so charged is tentative pending NAIC

confirmation. Once the provisional premium has been worked out and built into the loan as part of the projects costs, the processing of the application and approval would continue or alternatively premium could be paid in cash and therefore treated separately from the loan. Non-bank institutions operating outside the ACGSF which lend to the agricultural sector and particularly for items covered by the insurance scheme are requested to ensure mandatory cover is effected similarly as under the ACGS. This is important in compliance with the objectives of the NAIC and as approved for implementation by the Government of Nigeria. The Insurance cover though enforced is not to be regarded as an alternative to collateral security for the approved loans but a protection or guarantee of loan recovery, should the insured default.

All premium collected by Banks or other lending institutions on behalf of NAIC are to be remitted promptly, not later than one month after collection. They are forwarded on Bank Remittance form designed specifically to show the required details of the insured farms or items. Both the premium and Remittance forms are received and receipted at the nearest NAIC office. Other non banks including individuals and intermediaries are to pay to the nearest NAIC office as soon as premiums are collected, otherwise no cover will be affected. 10% of premium payable on subsidised insurance are paid to Brokers/Agents as commission. For commercial agricultural insurance, 10-15% of premium payable as in conventional insurance business, is considered reasonable. If payment is made through the bank, i.e. deducted from source of credit, the bank pays directly to the NAIC and NAIC will

accordingly reinburse the brokers and agents. If payment is made through the broker/agent, they remit the premium in full to NAIC immediately and the commission shall be paid promptly. Remuneration for consultants would vary according to the farm size and the frequency of operations throughout the period of cover.

2.4.10 Settlement of Claims/Indemnification

Report and Assessment of Loss

Peril(s) covered by the scheme once they occur, must be reported to any of the accredited points immediately (within 24 - 48 hours) and by the quickest means available. The accredited points include Local government office, nearest State Ministry of Agriculture and Natural Resources, financing bank, Cooperative Society, NAIC office etc.

Once the report of an incident reaches the State office of the company, any of the following options would be taken:

(i) The State Officer and his teams would make an immediate inspection visit to assess the loss or confirm the report of the Agricultural Insurance Committee (AIC) or other intermediary.

(ii) If report is not originating from the NAIC, the State Officer may quickly advise the AIC in that Local Government Area or any other competent and approved intermediary to visit the farm for survey.

Each reporting station must keep and complete appropriate Report/Inspection forms containing relevant information such as;

Name of farm; farm location; Policy Number; Date of Report; Farm Size; Assessment of damage or loss; Estimate of loss; Decision taken/Recommendation. For livestock, a death certificate for animals and post mortem report from a registered/approved Veterinarian must be obtained though this may be waived for small scale cattle rearers. Prompt report of loss so that dead animals could be inspected before they are disposed off is required and the company's veterinarians may sometimes be used to confirm loss reports.

Conditions for Claims Settlement

In order to qualify for indemnity, a farmer must meet the following conditions:

(a) Timely acquisition of insurance cover;

(b) Cover must be effective at the time the loss is sustained or reported;

(c) Farmer must have followed approved production practices;

(d) Damage must have been caused by one of the perils covered by the policy;

(e) Notification of loss must have been made within the stipulated time;

(f) The farmer must have incurred the minimum loss to attract claim as specified in the relevant insurance policy.

Procedure for Settlement of Claims

In settling any claim against the company, the insured will after reporting the loss appropriately be given a claim form which is to be fully completed and returned to NAIC together with

any relevant supporting document(s). This may be referred to the appropriate AIC for on-the-spot inspection and assessment or alternatively, the NAIC office would act promptly to facilitate indemnification. After the damage has been assessed by the LGAC and/or the State office of the NAIC, a report with appropriate recommendation would be submitted to the Zonal Office. If approval is given at the State or Zonal level, payment is made to the farmer through his banker by NAIC's State office or directly to the beneficiary in the case of voluntary insured. The lending institution is to ensure that the compensation is immediately credited or made available to the farmer to enable him go back to production. Intermediaries should not compel insured to assign his right by holding on to the policy when the farmer is to be indemnified or to withhold the indemnity as the part payment of the existing loan unless the insured ceased to be a farmer or the moratorium (grace) period expires.

2.4.11 The Role of Intermediaries

The Nigerian Agricultural Insurance Company (NAIC), like other registered insurers, has identified and utilized the services of competent and registered Insurance agents, brokers and consultants to ease their job and make them more effective. These agents, brokers and consultants are entitled to payment of some (usually fixed) brokerage/agency or consultancy fees commensurate with the professional services rendered. Though the role of these intermediaries in agricultural insurance as in other fields of insurance, have not changed, the scope of

services and terms of participation of these intermediaries have of a necessity been spelt out.

2.4.12 Accreditation of Intermediaries

Agents and Brokers are distinguished by defining an Agent as an ordinary person knowledgeable in insurance practice but who can not be held liable for professional negligence and a Broker as a professionally qualified person who can be held liable for professional negligence. Both brokers and Agents are appointed to operate the scheme in accordance with the provisions of the Insurance decree which makes their registration with the Director of Insurance Mandatory.

Another group of intermediaries in the operation of the NAIS are the consultants consisting mainly of agriculturist, veterinary surgeons, animal scientists, loss adjusters, agricultural engineers, surveyors, management firms, professional bodies, and other relevant experts whose technical/professional services would facilitate the operations of the company. These offer services which include; Veterinary/health care of livestock, pet and zoo animals, Project appraisal/feasibility studies, Crop protection/soil analysis and conservation, Animal breeding, Biochemistry and Nutrition, Loss adjustment. Risk management consultancy, crop reduction, management, Data collection and processing, staff development and training, Epizoological investigation and quality control services, and procurement/supply of agricultural inputs.

2.4.13 Relevant Services of the Banks/lending Institutions

Banks and lending institutions which work in conjunction with NAIC offer important services which range from introducing the insurance outfit to prospective clients, helping to complete insurance forms to premium collection and prompt remittance to NAIC. For this reason, the interest of the bank is noted when claims are being settled.

CHAPTER 3

METHODOLOGY

3.1 Study Area

This study was conducted in Kaduna State which occupies a major position in the agricultural economy of Northern Nigeria. The State is located between latitudes 9°N and 12°N and longitudes 6°E and 9°E of the Prime Meridian (Iloeje, 1989). It has an area of about 70,210 square kilometers (27.108 sq. miles or y,021,000ha), of this area, 3268,600ha (32,688 km²) is classified as forest and the cropped area is estimated at 2,878,600ha (28,786 km²) leaving an estimated 1,700,000 ha (17,000 km²) of potentially cultivatable land, uncropped. The climate of the State varies most markedly from north to south. In the extreme north there is sahelian type of climate with highly variable and unpredictable rainfall. In the extreme south there is abundant rainfall for about seven (7) months of the year. In general, the climate can be described as being characterized by alternating dry and wet seasons. Relative humidity is relatively low between 20 and 40 percent in January, rising to between 60 and 80 percent in July. The mean annual temperature varies between 24°C and 27°C (Iloeje, 1989). The soils are described as Sandy loan in texture.

The bulk of agricultural production in the Kaduna State is undertaken by small scale farmers, most of whose labour force management and capital originate from the household. The cropping patterns is mixed, with few farmers still practicing sole cropping. The major mixtures are maize with sorghum or millet or maize with groundnut or cowpea. The main crops grown

however, are: Maize, millet, cotton, sorghum, groundnut, yams, acha, cowpea and vegetables. Livestock such as cattle, goats, donkey, pigs, sheep and poultry are also produced.

The population of the State which is multi-ethnic is put at about 3,969,252 (1991 census, FOS). Agriculture offers employment to the majority of the people and is essentially on subsistence basis. Agricultural production in the State as in other peasant agriculture is characterized by low levels of production, which can be accounted for largely by the use of manual tools, inadequacy of credit to facilitate production, high levels of risk (drought, flood, pests etc.) and farmers illiteracy. Between 80 - 90 percent of the State's agricultural population falls within this traditional low income group (Aku, 1981, cited in Ajibaiye, 1992).

3.2 Data Source and Collection

For this study, Three(3) local government areas were covered from the total of eighteen (18) in Kaduna State. These are: Zaria, Giwa and Sabon Gari.

Two major types of data were used for this study. These are the Primary and Secondary types of data.

3.2.1 The Primary Data

Primary data were collected using structured questionnaires, informal interview with the farmers participating in the scheme, and some officials of the NAIC.

3.2.2 Secondary Data

Secondary data were sourced through a survey of existing literature relevant to the study and from records and documents of NAIC.

3.3 Sampling Procedure

The sample population for this study was selected using purposive and random sampling technique as follows:

In each of three Local Government areas covered in the study, a pre-survey study was conducted in which all maize and or poultry farmers were identified purposively with the assistance of some staff of the Agricultural Development Project (ADP) in these local government areas. Maize farmers were interviewed separately and so were the poultry farmers so as to avoid the problem of measurement of variables.

Simple random sampling technique (by ballots) was finally used to select twenty-five participant farmers and another twenty-five non-participant farmers (irrespective of whether maize or poultry farmers) in each of the three Local Government areas. This gave a total of fifty farmers in each of the Local Government areas making a total of one hundred and fifty farmers.

Structure of respondents

	Insured	Not insured	Total
Maize farmers	49	51	100
Poultry farmers	26	24	50
Total	75	75	150

The basis of selection of the three (3) local government areas include;

(i) In the selected local government areas, agriculture is largely an important occupation of the majority of the population.

(ii) That the areas are accessible to the researcher (in terms of their proximity) making the administration of questionnaire easier.

3.4 Analytical Framework

The following tools of analysis were employed in the study:-

(i) Descriptive statistics.

(ii) Logistic regression analysis.

3.4.1 Descriptive Statistics

Descriptive statistics are normally used to summarize and describe a body of data in a format that best reveals the major characteristic features of the data. In this study descriptive statistical measures such as the Mean and Percentages were used to achieve objectives (i), (iii) and (iv).

3.4.2 Logit Regression Analysis For Qualitative or Discrete Dependent Variables

Many economic and sociological studies have shown that some relationships are based on dependent variables that are dichotomous. For such, ordinary least square estimates of some standard statistics such as t-ratios will be incorrect because the assumptions of the classical regression model are violated.

Six major problems were identified by Tobin (1958), Goldberger (1964), Judge et al (1980), Rubinfeld (1981), to be encountered in using ordinary least square regression with binary dependent variables. They are;

i) The predicted values of the dependent variables are not essentially zero or one and even if values between zero and one are viewed as probabilities, negative values or values greater than one cannot be interpreted.

2) Heteroskedasticity is exhibited by the disturbances ($e^i.$) since the variances of these disturbances depend on the unknown expected values of the dependent variable. Hence, there is no simple way to "correct" for the heteroscedastic residuals.

   The ordinary least square method therefore gives inefficient estimates and imprecise predictions. Also, the assumption that the variances of E is constant and equal to d^2 i.e. $E(E_i) = d^2$ is no longer satisfied.

3) The assumption too, that E(ei.) ≈ 0 from a regression model using a dummy variable, $Y_i + a + B\ x_i + e$ means that the random variable ei can take only two values given X_i,

namely:- $(a + Bx_i)$ and $1-(a - Bx_i$ with probabilities $1-(a + Bx_i)$ and

$1-(a - Bx_i)$ respectively. Since the right hand side of the model, $a + Bx_i$, can take on values greater than one or less than zero, it also makes the above probabilities greater than one or less than zero. The result therefore, presents an apparent problem when regression procedure is used.

4) The fitted relationship, $\hat{Y}_i = \hat{a} + \hat{B}x_i$ is sensitive to values taken by the explanatory variables particularly when data are bunched.

5) The estimated standard errors are not consistent.

6) The usual tests of significance for the parameter estimated are not valid.

The above are all limitations of the standard ordinary least square (OLS) approach, and as a consequences, alternative specifications have been devised to cater for qualitative choice models. These include:

i) the linear probability model.

ii) the logit model and,

iii) the probit model.

Qualitative models are important in analyzing relationships involving a discrete dependent variable. In such relationships, the probability of an event occurring is a function of a set of non-stochastic explanatory variables and a vector of unknown parameters. Amemiya (1981) states that the general form of the univariate binary choice model can be expressed as:

$P_i = P_i\ (Y_i = 1) = G\ (X_i, Q)$, $i = 1, 2$ ------n ---(1). This

means that the probability that the ith farmer will buy an insurance policy, P_i $(Y_i = 1)$ is a function of the vector of explanatory variables, X_i and the unknown parameter vector.

Since the functional form of G, is unknown, practical applications of the model are not feasible (Amemiya, 1981, P. 1486). Therefore, an explicit functional specification of G is necessary, which involves the use of either the probability probit or logit models.

The linear probability model is thus:

$Y_i = X_i B + ei$----------n----(2)

where: Y_i is one (1) if the ith decision maker selects the first alternative and zero (0) if he selects the second alternative;

X_i, is the ith row of the n x p matrix of regressors, i = 1, 2---n, (n refers to the sample size and p refers to the number of coefficients);

B, the P x I vector of parameter coefficients; and

E_i the ith independently and identically distributed random variable with zero expectation.

Though, the linear probability model is computationally and conceptually easier than the probit and logit models, it however, suffers from a lot of deficiencies. First, the variance of the disturbance term of the model is heteroscendastic. The presence of heteroscedasity results in loss of efficiency of the parameter estimates and, because of this problem, the standard errors of the OLS parameter estimates are biased. Second, the distribution of the disturbance term is not normal (Pindyck and Rubinfeld, 1981. The classical statistical tests of significance as such are not applicable because the tests depend on normality of the

disturbance terms. Third, this formulation allows Y_i to fall outside the interval between 0 and 1, inconsistent with the interpretation of the conditional expectation as a probability.

The probit and logit specifications, circumvent the difficulties of the linear probability model via the use of monotonic transformations to guarantee that predictions lie in the unit interval (Capps and Kramer, 1985). Both models have been variously employed to explain different socio-economic phenomena. The probit analysis was used by Gerhert (1975) to examine the factors influencing hybrid maize adoption in three regions in Kenya. (Capps and Randall 1985) used both probit and logit models to analyze food stamp participation in the United States. Falusi (1974) used probit analysis to analyze factors influencing fertilizer adoption among farmers in Western Nigerian.

The Probit Model: The theoretical basis of the probit analysis is rather complicated, and the justification of the normality assumption in this particular context is not very strong in econometric applications (Pindyck and Rubinfeld, 1981).

The logit analysis is a possible alternative as its probability is associated with the logistic cumulative distribution function. Hanushek and Jackson (1977) however, showed that the logistic function closely resembles the t-distribution with seven degrees of freedom. The logit and probit formulation are quite similar and the only difference is that the logistic density has slightly heavier tails than the standard normal density (Probit model).

The model as specified by Pindyck and Rubinfeld (1981) was used as follows:

$$Pt = F(Z_t) \text{ ------ } {}^{1}/_{2\Pi} \int_{Zt}^{-} e^{-{}^{1}/_{2} U^2} dU \text{ ----. (3)}$$

where,

Pt = Probability of an event occurring (e.g., insuring crop/poultry).

Z_t = underlying index value.

U = is normally distributed random variable with zero mean and unit variance;

e = base of natural logarithm (e = 2. 7182); and II = 3.1415.

The underlying index value (Zt) is a linear combination of dependent variable.

Thus,

$$Z_t = b_o + b_1X + b_2X_{zt} + \text{---- } tbX_{nt} \text{ ----- (4)}$$

where,

t = 1, 2, ------n, are observations

Z_t = the unobserved index level for the tth observation;

X_{nt} = the nth explanatory variable for the tth observation;

b_n = the parameter to be estimated.

n = O, 1, ----------, n.

The index level (Zt) which is not observable, may take on any value between negative and positive infinity but the probit model transforms the probability values to lie between zero and one. The property that increase in explanatory variables are associated with increase (or decreases) in the dependent variable

for all values of independent variables is maintained in the probit model. The probability Pt resulting from probit analysis is the conditional probability that a farmer will buy an insurance policy given certain conditions that must hold.

When using the probit analysis, the maximum likelihood technique of estimation is employed to find the estimators B that maximizes the likelihood of observing the pattern of choices in the sample (Capps and Kramer, 1985). The maximum likelihood approach is highly reliant on individual, rather than grouped observations. Although, the maximum likelihood estimation procedure requires the use of iterative algorithm, this procedure assures the large - sample properties of consistency, efficiency and asymptotic normality of the parameter vector B so that the conventional test of significance like regression t - test, are applicable (Capps and Kramer, 1985); Pindyck and Rubinfeld,(1981). Also, the maximum likelihood technique is used when likelihood ratio test is employed as the natural method of inference to test the significance of all or a subset of the coefficients included in the model (Pindyck and Rubinfeld, 1981). For example, to test the hypothesis that $H_o : b_1 = b_2 =$ -------, $= b_n = 0$, against the alternative that these parameters are not equal to zero, the test statistic is

$$- 2\log \lambda = - 2(\log Lo - \log Lmax) \text{ --------- } (5)$$

where,

log Lo = value of log likelihood function when all parameters except the constant (or certain parameters) is set equal to zero.

log Lmax= value of log likelihood function with all

variables and a constant in the model;

ɔ = log/max.

The log likelihood ratio test statistics - 2(log Lo - log max =) follows the chi-square distribution with K degrees of freedom where K is the number of parameters in the equation other than the constant term (Pindyck and Rubinfeld, 1981).

The Logit Model: Very few studies have actually used appropriate qualitative response models, such as the probit or logit (Feder et al., 1985), to study farmers willingness to buy the agricultural insurance policy. Since probit and Logit models usually yield similar results, a Logit specification was arbitrarily chosen to achieve objective (ii) which seeks to determine the relationship between the farmers willingness to insure and some socio-economic characteristics. This was based on the following:

For the case of a single independent variable, the logistic regression model can be written as:

$$\text{Prob (event)} = \frac{e^{Bo} + B_1X}{1+e^{Bo}+B}$$

or equivalently,

$$\text{Prob (event)} = \frac{1}{1 + e^{-(Bo + B1X)}}$$

where; Bo and B_1 are coefficients estimated from the data, X is the independent variable and e is the base of the natural logarithms. Similarly, for more than one independent variables, the model can be written as:

$$\text{Prob (event)} = \frac{e^{z}}{1 + e^{-z}}$$

or equivalently, Prob (event) = $\frac{1}{1 + e^{-Z}}$

where Z is the linear combination.

$$Z = B_0 + B_1 X_1 + B_2 X_2 + \text{-----} + B_n X_n \text{.-------} \quad (1)$$

In the present study, the model is specified as follows:

$$Y = b_o + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7 X_7 + b^8X_8 + b_9X_9 + b_{10}X_{10} \text{ ----------} \quad (2).$$

where

Y = Willingness to insure maize/poultry (1 if respondent is willing to insure and 0 if otherwise).

X_1 = Age of farmer in years.

X_2 = Years of Education

X_3 = Job status; 1 if respondent is a fulltime farmer and 0 if otherwise.

X_4 = Farm size in Hectares (ha) cultivated for maize producer and number of birds for poultry farmers.

X_5 = Amount of loan in naira (₦).

X_6 = Years of Membership of farmers' association or cooperative;

X_7 = Years of experience in farming.

X_8 = Number of Contact with extension agents; per month.

X_9 = Farmers' perception of insurance generally (1 if beneficial 0, if otherwise).

X_{10} = Size of loss suffered between1995 and 1997 in percentage of total production (%).

The parameter estimates from the logit model do not represent the change in the probability of the farmers being

willing to insure maize/poultry, given a one-unit change in the explanatory variables. However, for continuous explanatory variables, the logit coefficients can be transformed into the vector of first derivatives by:

$$\frac{P_i}{X_j} = \frac{P(Y_i = 1 \setminus_i = 1) - P(Y_i = 1 \setminus_i = 0)}{1 - 0} \quad \text{------(3)}$$

Because qualitative explanatory variables are discrete, the first derivative of the logit model does not exist (Godwin and Koudele, 1990). Here, the change in probability is obtained by evaluating P_i at alternative values of X_j:

$$\frac{P_i}{X_j} = \frac{b_j \exp(- X_j b}{(1t \exp(-X_j b)^2} \quad \text{------(4)}$$

Probabilities and probability changes were calculated for each variable while holding the other variables constant at their sample mean values.

3.5 Limitation of Study

Very little work has been done in the area of agricultural insurance in Nigeria, hence, there is a great scarcity of essential literature to review on the subject of study and also, the dependence on some of the records of NAIC posed another difficulty as some of these were considered as sensitive or confidential data.

Three Local government areas were selected out of the eighteen in Kaduna State. The sample size used was also one hundred and fifty. This may not be representative enough to give a very good coverage of the population. However, such a sample allowed for indepth interview.

CHAPTER 4

PRESENTATION AND DISCUSSION OF RESULTS.

4.1 Socio-economic Characteristics of Sampled Farmers.

One of the specific objectives of this study was to analyse the socio-economic characteristics of farmers in the study area.

This section is thus, devoted to reporting the responses of farmers on each of these factors.

4.1.1 Age:

Table 4.1, showed that 77% of the maize growers studied were within the active ages of 20 - 49 years, 19% and 4% were also within the range of 50 - 59 years and 60 - 69 years respectively. The cumulative percentage showed that 77% were within the active age of below fifty years. The distribution mean age (41 years) revealed that the average age of all the respondents was below fifty years and the standard deviation was 9.811.

The study also showed that about 78 percent of the poultry farmers interviewed were within the ages of 20 - 39 years. Precisely, 14(28%) were aged, 20 - 29, 25(50%) and 9(18%) fell within ages 30 - 39 and 40 - 49 years respectively. Another 2 (4%) were of ages 50 - 59 years. Details are outlined in Table 4.1.

4.1.2 Years of education

This refers to the number of years respondent has spent in formal education.

Table 4.2 showed that about 9% of the maize growers had no

formal education at all. Another 53% had spent 9 years (Primary school equivalent) in school. About 29% had spent between 10 - 14 years in school meaning they had full secondary education with some even attaining higher levels of education (OND, HND) 9% had spent 15-20 years in school. Therefore, it can be said that most of the farmers (67%) possessed the educational qualification needed to adequately influence the adoption of an innovation.

Table 4.1 AGE DISTRIBUTION OF THE RESPONDENTS

	Maize growers			Poultry farmers		
Age (years)	Frequency	Percentage	Cummulative percentage	Frequency	Percen tage	Cummu. percentage
20 -29	12	12	12	14	28	28
30-39	30	30	42	25	50	78
40-49	35	35	77	9	18	96
50-59	19	19	96	2	4	100
60-69	4	4	100	-	-	-
Total	100			50		

Source; field survey, 1996.

Table 4.2 DISTRIBUTION OF THE RESPONDENTS BASED ON REPORTED YEARS ON EDUCATION

	Maize growers			Poultry farmers		
Reported years of Education	Frequency	Percentage	Cummulative percentage	Frequency	Percen- tage	Cummu. percentage
0	9	9	9	4	8	8
1- 4	24	24	33	15	30	38
5 - 9	29	29	62	9	18	56
10-14	29	29	91	18	36	92
15-20	9	9	100	4	8	100
Total	100			50		

Source; field survey, 1996.

Table 4.2 also showed that only four (8%) poultry farmers were completely illiterates. 15(30%) out of the 50 farmers covered had 1 - 4 years education, 4(8%) had more than 15 years education (equivalent of tertiary education).

4.1.3 Job Status

Here, whether a respondent was a full time or part time maize grower and or poultry farmer was considered. Table 5.3 showed that 68% of the respondents interviewed were Full time farmers and the remaining 32% were growing maize on a part time basis. It is expected that the full time farmers who had no other source of livelihood and who also had a lot at stake in the case of any eventuality (losses), should be more interested in adopting any innovation (like agricultural insurance) that will reduce their losses and improve their chances of continuing with farming as a business even after suffering a loss.

34 (68%) of the poultry farmers studied were part time farmers with only 16(32%) taking poultry production, as a full time business. Table 4.3 showed the details. It was noticed that majority of the poultry farmers studied were engaged in some other business . Some were also petty traders and some also grew some crops.

Table 4.3: JOB STATUS OF RESPONDENTS.

	Maize growers			Poultry farmers		
Job Status	Frequency	Percentage	Cummulative percentage	Frequency	Percen-tage	Cummu. percentage
Full-time (1)	68	68	68	16	32	32
Part-time (0)	32	32	100	34	68	100
Total	100			50		

Source: field survey, 1996.

Table 4.4: FARM SIZE OF SAMPLED MAIZE GROWERS

Farm Size (Ha)	Frequency	Percentage	Cummulative Percentage
1 - 3	74	74	74
4 - 6	19	19	93
7 - 9	5	5	98
10-12	2	2	100
Total	100		

Source: field survey, 1996.

4.1.4 Farm Size

Table 4.4 showed that majority of maize growers (74%) among the respondents were mainly small scale farmers with farm size within the range of 1 - 3 ha. It was also observed that most farmers had farm land in small plots scattered in different locations. The average farm size in the area was 0.6 hectares thus, an average holding of 5 plots per farmer gives a total farm size of 3 hectares. Table 4.5 showed distribution of farm sites operated by respondents.

4.1.5 Number Of Birds:

Also majority of the poultry producers studied (74%) had between 1 - 100 birds and on the average, it was found that each farmer had 50 birds. This means they were all small scale producers.

4.1.6 Amount of Loan

Table 4.7 showed that 51% of the maize growers were not loan beneficiaries while the remaining 49% benefited from institutional loans. The study revealed that the 51% who did not take any loan were not willing to insure their maize farm(s) while the 49% who benefited from loans were insured and most of them disclosed that they were insured because it was mandatory if they were to benefit from any loan. Table 4.7 also revealed that about 39% of those who benefited from loans got amounts in the range of ₦5000 - ₦20,000 showing that they were mainly small scale to medium scale farmers. They had little capital of their own and therefore were not financially independent. This accounts for their accepting the mandatory insurance cover which was a prerequisite for their obtaining any institutional credit.

Table 4.5: NUMBER OF FARM SITES OPERATED BY MAIZE GROWER

Number of Farm sites	Frequecy	Percentage	Cumulative Percentage
1 - 3	73	73	73
4 - 6	27	27	100
>6	-	-	-
Total	100		

Source: field survey, 1996

Table 4.6: **DISTRIBUTION OF FARMERS ACCORDING TO NUMBER OF BIRDS KEPT:**

Number of birds	Frequency	Percentage	Cumulative percentage
1 - 100	37	74	74
101 - 200	11	22	96
201 - 300	-	-	96
301 - 400	1	2	98
401 - 500	1	2	100
Total	50		

Source: field survey, 1996

The survey also showed that 26 (52%) of the poultry farmers' interviewed did not benefit from any institutional loan but depended on other sources (personal savings money lenders, friends and relations) while 16(32%) got between ₦4100 - ₦10,000 and another 6(12%) got ₦10,100 - ₦20,000 as loan from banks. This implies that about 44% were small scale farmers who depended on the small loans they could get from banks. There were only two (4%) who got ₦20,100 and above as loan. Details are also indicated in Table 4.7:

4.1.7 Number of Years of Membership of Farmers' Association/Cooperative

This was to find out whether a respondent was a member of any farmers' association/cooperative or not. It was expected that farmers' who belong to a farmers' association/cooperative, should have more access to information on new innovations; its benefits and how to acquire it. It was also believed that such farmers will be influenced by the decision of other members of such association/cooperative (peer action) either positively or negatively. Hence, it was expected that the number of years a farmers has been a member of a farmers' association/cooperative was an important socio-economic characteristic of farmers in the study area especially as regards their willingness or not to insure their crop.

Table 4.8 showed that 50% of the maize growers studied were not members of a farmer's association at all. While 42% of them had been members of a farmers' association/cooperative for between 1 - 6 years. Another 8% had been members for between 7 - 9 years.

Table 4.7: DISTRIBUTION OF RESPONDENTS BY AMOUNT OF LOAN ACQUIRED FOR PRODUCTION

	Maize growers			Poultry farmers		
Amount of Loan (₦)	Freq.	%	Cummulative %	Freq.	%	Cummu. %
0	51	51	51	26	52	52
5100 - 10,000	38	38	89	16	32	84
10,100 - 20,000	8	8	97	6	12	96
20,100 - 30,000	2	2	99	1	2	98
30,100 - 40,000	1	1	100	1	2	100
Total	100			50		

Source: field survey, 1996.

Table 4.8: DISTRIBUTION OF RESPONDENTS BY YEARS OF MEMBERSHIP OF FARMERS' ASSOCIATION/COOPERATIVES.

	Maize growers			Poultry farmers		
Years of Member-ship	Frequency	Percentage	Cummulative percentage	Frequency	Percen-tage	Cummu. percentage
0	50	50	50	36	72	72
1 - 3	20	20	70	7	14	86
4 - 6	22	22	92	1	2	88
7 - 9	8	8	100	6	12	100
Total	100			50		

Source: field survey, 1996.

The survey showed that 36(72%) of the poultry farmers had never been members of any farmers' association/cooperative while 7(14%) had been members for between 1 - 3 years. 1(2%) had 4 - 6 years membership and a total of 6(12%) had been members of a farmers association for 7 - 9 years. This means that only 14(28%) were members of a farmers' association/cooperative and therefore had access to information about innovations. This group of farmers could also consequently be influenced by the decision of other members of their association. This information is also summarized in Table 4.8.

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4.1.8 Years of Experience in Farming

It was found that there was a link between the farmers age and his years of experience in farming. Specifically as the farmers age increases his years of experience also increases. It could be argued that the more experienced a farmer is, the more aware he is expected to be on the risky nature of agricultural production and thus, the more willing he would be to insure his crops but on the other hand, it can also be concluded that a more experienced farmer would have studied his environment properly over the years, and would have been able to determine the various risks prevalent in his environment and even how to overcome/avoid or reduce them by other means different from insurance and thus, may be unwilling to insure his crops.

On the average, the poultry farmers surveyed had at least 2 years experience.

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Table 4.9: DISTRIBUTION OF RESPONDENTS BY YEARS OF EXPERIENCE IN FARMING.

	Maize growers			Poultry farmers		
Years of Exp. in Farming	Frequency	Percentage	Cummulative percentage	Frequency	Percen-tage	Cummu. percentage
1- 5	44	44	44	49	98	98
6- 10	30	30	30	1	2	100
11- 15	7	7	7	-	-	-
16- 20	6	6	6	-	-	-
21- 25	13	13	13	-	-	-
Total	100			50		

Source: field survey, 1996.

Table 4.10: DISTRIBUTION OF RESPONDENTS BY NUMBER OF CONTACT WITH EXTENSION AGENTS IN A MONTH.

	Maize growers			Poultry farmers		
Number of Contacts in a month	Freq.	%	Cummulative %	Freq.	%	Cummu. %
0	55	55	55	27	54	54
1	34	34	89	19	98	92
2	11	11	100	4	8	100
Total	100			50		

Source: field survey, 1996.

For instance, in the study area, it was discovered that farmers used various methods to prevent or reduces losses such as mixed cropping, diversification, use of improved and treated seed varieties, use of bird scarers, avoidance of bush burning etc.

Table 4.9 shows that the majority of the maize growers (44%) had 1 - 5 years experience in farming while another 30% had, at least 6 years experience in farming. This shows that the farmers had accumulated years of experience such that it is then not surprising if they do not respond positively to agricultural insurance since they must have on their own devised ways of remaining in business by minimizing losses.

It was also observed in Table 4.9, that 41 (94%) of the poultry farmers had 1 - 3 years experience only implying that most of them were not too long in poultry production.

4.1.9 Contact with Extension Agents

Table 4.10 showed that about 45% of the maize growers studied had some contact with extension agents while 55 had no contact with extension agents. It has been found from many studies that extension agents are important in innovation adoption process (Voh, 1979; Atala, 1980). However, a shortfall here may be as a result of inadequate number of extension agents in the study area. It was found that though in ideal situations, extension agents should have contact with farmers fortnightly, this was not possible in most cases, only 11 farmers enjoyed this privilege. Also, extension agents were not reported to be charged with the responsibility of educating farmers about the importance of insuring their crops/ poultry.

Table 4.11: DISTRIBUTION OF RESPONDENTS BY THEIR PERCEPTION OF INSURANCE GENERALLY.

Perception of insurance generally	Maize growers			Poultry farmers		
	Frequency	Percentage	Cummulative percentage	Frequency	Percentage	Cummu. percentage
1	26	26	26	12	24	24
0	74	74	100	38	76	100
Total	100			50		

1 = Beneficial

0 = Not beneficial

Source: field survey, 1996.

Table 4.12: DISTRIBUTION OF MAIZE GROWERS BY SIZE OF LOSS SUFFERED IN RECENT YEARS.

Amount of loss suffered (% of total ha. cultivated)	frequency	Percentage	Cumulative Percentage
0	76	76	76
1 - 10	1	1	77
11 - 20	5	5	82
21 - 30	7	7	89
31 - 40	6	6	95
41 - 50	5	5	100
Total	100		

Source: field survey, 1996.

It was also observed that 27 (54%) of the poultry farmers studied had never had any contact with extension agents at all while 19(38%) had contact once in a month and only four (8%) benefited from the normal forth nightly contact (twice a Month) with extension agents. Again, this does not necessarily mean that agricultural insurance is discussed or encouraged during such meetings.

4.1.10 Perception of Insurance In General.

It is common knowledge that most Nigerians consider insurance as a waste of resources. This can be traced to the less than satisfactory image of the insurance industry regarding loss compensation. Table 4.11 showed that 74% of the maize growers considered insurance to be non-beneficial. This means that only 26% of them thought insurance to be of any benefit. This is in conformity with a study of 70 broiler farmers in Kaduna State which revealed that as many as 56(80%) expressed concern that the then prospective agricultural insurance firm in Nigeria will either grant delayed and partial compensation of losses, or even fail to compensate losses incurred by the insured (Philip, 1988). The same study also showed that 66% of the respondents had taken one form of insurance policy or another in the past, and were therefore, responding largely from pervious personal experience. Okorie (1987) showed in his study 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.

Table: 4.13: DISTRIBUTION OF POULTRY FARMERS BY SIZE OF LOSS SUFFERED IN RECENT YEARS:

Size of loss (in birds)	Frequency	Percentage (%)	Cumulative Percentage
0	15	30	30
1-20	11	22	52
21-40	10	20	72
41-60	10	20	92
61-80	4	8	100
Total	50		

Souce: field survey, 1996

4.2 Socio-Economic Characteristics of Insured Respondents

The study revealed that there were 49 maize growers and 26 poultry producers who were insured under the NAIS among the 150 respondents. It was also noticed that on the average, the maize growers were of the age range 30-39 (49%), had 10-14 years (41%) of education and were mainly full time farmers (74%). Also, majority of them had 4-6ha of farm land (60%), all of them took loans and majority got loans of the range ₦5,000 - 20,000. 60% of the maize growers studied had been members of a farmers association for 1-6 years, 40% had 1-5 years experience in farming and 50% had contact with extension agents at least once in amonth. 70% of them perceived insurance generally, not to be beneficial and only 5% of them reported having suffered any loss in recent years.

Among the 50 poultry producers studied 26 were insured under the agricultural insurance scheme. On the average, 26% were of the age 20-29 and another 13% were 30-39 years. 28 (57%) of them had 10-20 years of education, 16 (32%) were full time farmers and 54% kept 1-100 birds. All of them had taken loans within the range of ₦5,000- ₦20,000, 55% had been members of a farmers' association or cooperative for between 1-6 years and 60% had 1-5 years experience in farming. 60% of the poultry farmers studied it was also noted had contact with extension agents at least once in a month, 70% of them had suffered some loss in recent year (60% had suffered loss ranging between 20-60% of total size of production) and 56% perceived insurance generally, to be beneficial.

4.3. Results of the Logit Analysis for Sampled Farmers

This model was used to determine the relationship that exist between willingness of farmers to insure maize/poultry and some selected socio-economic characteristics of the farmers.

4.3.1 For Maize Growers

The summary statistics for the logit model are given in Table 4.14. For the maize growers, a maximum of five iterations were required. The likelihood ratio test was high pointing to the overall significance of the model. 94% of the maize growers studied were correctly classified by the model. The model chi-square was 57.086.

Emperical results of the logit model are given in Table 4.15. Parameter estimates for the model were evaluated at the 1%, 5% and 10% levels of significance. Five of the Ten independant variables included in the model were found to be signifacant. These include amount of loan (x_5), years of education (x_2), and number of contact with extension agents in a month (x_{10}) all of which were significant at 1% level. Job status (x_3) was significant at 5% and Size of loss was significant at 10% level. The signs of all the significant parameter estimates, except size of loss suffered and number of contact with extension agents in a month, were consistent with a priori expectations.

Table 4.14: **SUMMARY STATISTICS OF THE LOGIT ANALYSIS FOR MAIZE GROWERS**

	Indicators	Results
1.	likelihood ratio	72.99
2.	Number of farmers correctly classified	94%
3.	Model Chi-square	57.086
4.	Total Number of iterations	5

Source: field survey, 1996.

Table 4.15: **MAXIMUM LIKELIHOOD ESTIMATES OF LOGIT MODEL FOR MAIZE GROWERS:**

Variable	Coefficient (standard error)	T-Values
Age of farmer (X_1)	-	-
Year of Education (X_2)	0.224 (0.0726)	0.0854*
Job Status (X_3)	1.555 (0.7687)	2.0230**
Farm Size (X_4)	0.1498 (0.1827)	0.81992^{ns}
Amount of Loan (X_5)	0.0003 (0.0001)	4.1449*
Years of Membership of farmers association/cooperative (X_6)	0.0077 (0.0167)	0.0427^{ns}
Years of experience in farming (X_7)	0.0398 (0.0275)	1.4472^{ns}
Farmers persception of insurance generally (X_8)	0.07294 (0.6985)	-1.0442^{ns}
Size of loss suffered (X_9)	0.0367 (0.0211)	-1.7393***
Number of contact with extension agents in a month (X_{10})	-0.3264 (0.0211)	-7.1049*
Intercept estimate	-4.7634 (1.2252)	-3.8879^{ns}

ns = Not significant
* = Significant at 1% level
** = Significant at 5% level
*** = Significant at 10% level
Source: field survey, 1996.

The analysis showed that acquisition of loan (which field survey showed to be institutional loans only) increased the likelihood of the farmer to buy an isurance cover for his maize farm. This was discovered to be so because it was mandatory for anyone who acquired an institutional loan for investment in agriculture to also obtain the agricultural insurance cover. This finding is consistent with the findings of a similar study carried out in Niger state by Chikwuendu et al, 1993. the relationship was a positive one meaning that the probabilities of acquiring the agricultural insurance cover increases as a farmer acquires an agricultural loan.

Job status (whether the respondent is a full time or part time farmer) was also found to significantly increase the farmers willingness to insure his crops. The study revealed that 68% of the maize growers studied were full time farmers and that 80% of these had acquired institutional loans to improve their financial base. This may then explain why this parameter was significant in determining farmers' willingness to insure as it then becomes mandatory for them to insure.

Number of contact with extension agents in a month is an important but controversial factor in determining farmers' willingness to insure. Though found to be significant, it was negatively signed inplying that the probabilities of insuring falls as number of contact with extension agents increased. Extension agents are important in innovation adoption processes as studies by Voh (1979) and Atala (1980) have revealed. The study by Chikwendu et al (1993), also revealed that contact with

extension agents was significant in determing farmers' response to agricultural insurance in Niger state.

Size of loss suffered was also significant but negatively signed. This phenomenon therefore requires further investigation as expectations are that this variable should be very significant and positively signed. However, this could be a result of the use of cross-sectional data. Farmers are expected to insure their farms so as to minimise losses hence, the more a farmer suffers losses the more willing he should be to insure.

Years of education of the farmer was significant in determining farmers' willingness to acquire the agricultural insurance cover. formal schooling enhances the farmers' enterpreneural ability, defined as the ability to perceive, interpret, and respond to new events in the context of risk (Schultz, 1981). Several emperical studies have verified the link between high level of educational attainment and early adoption of new technologies (Foster and Stem, 1979; Ervin and Ervin, 1982).

4.3.2 For Poultry Farmers

The correlation matrix for the poultry farmers shown in Table 4.16 was obtained and based on the relationship between the variables considered, three variables X_1 (Age of farmer), X_8 (perception of insurance generally) and X_{10} (size of loss suffered) were dropped from the model because they were found not to be significant. Logistic regression was then ran for Y (the dependent variable) using X_2, X_3, X_4, X_5, X_6, X_7 and X_9 as the independent variables.

Table 4.16: CORRELATION MATRIX FOR POULTRY FARMERS.

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}
X_1										
X_2	-0.1450									
X_3	0.0399	0.4200								
X_4	0.0716	0.2812	0.4305							
X_5	-0.1188	0.2808	0.3849	0.2107						
X_6	-0.0847	0.4537	0.0850	0.3040	0.1052					
X_7	0.0660	0.3851	0.4725	0.5588	0.2407	0.0258				
X_8	0.0836	0.2599	0.0156	0.1480	-0.0562	0.0156	-0.0080			
X_9	0.0193	0.3490	0.4274	0.2543	0.3550	0.1254	0.2932	0.0511		
X_{10}	0.1746	-0.0971	0.1185	0.0579	0.2690	-0.2181	-0.0761	0.0930	0.2002	
Y	0.0419	0.6347	0.5147	0.4047	0.4235	0.3595	0.4772	0.1176	0.4952	0.1034

Source: field survey, 1996

Table 4.17: **SUMMARY STATISTICS OF THE LOGIT ANALYSIS FOR POULTRY FARMERS.**

	Indicators	Results
1.	likelihood ratio	17.898
2.	Number of farmers correctly classified	98%
3.	Model Chi-square	50.695
4.	Total Number of iterations	7

Source: field survey, 1996

Table 4.18: **MAXIMUM LIKELIHOOD ESTIMATES OF LOGIT MODEL FOR POULTRY FARMERS.**

Variables	Coefficient (Standard error)	T-Values
Age of farmers(X_1)	0.1811 (0.0980)	1.847***
Years ofeducation(X_2)	0.2632 (0.1454)	1.8102***
Amount ofloan(X_5)	0.0008 (0.0003)	2.6666*
Years of experience in farming (X_7)	1.5491 (0.7954)	1.9476**
Intercept	-14.2276 (5.5346)	-2.5707*

* = Significant at 1% level

** = Signigicant at 5% level

*** = Significant at 10% level

Source: field survey, 1996

Eight iterations were required and only X_5 (Amount of loan) was found to be significant at 10% level. further analysis was done using the Backward Stepwised selected approach.

The results obtained when the backward stepwise selection approach was used, showed that X_1, X_2, X_5 and X_7 were significant using the model hence Y was again ran with these variables using the logistic method approach. Summary statistics for the logit model are given in Table 4.17. Seven iterations were required for the estimation. The -2 log likelihood test was high indicating the goodness of fit of the model. The model Chi-square was 50.695 and 98% of the poultry farmers were correctly classified by the model. Table 4.18 shows the logit regression coefficients and their levels of significance. X_1 (Age of farmers) and X_2 (years of education) were significant at 10% level. X_5 (Amount of loan) and X_7 (years of experience in farming) were significant at 1% and 5% levels respectively. The signs of all the significant parameter estimates were consistent with a priori expectations that each of the variables will be positively signed.

As was the case for the maize growers, amount of loan was again found to be a very significant factor affecting farmers' participation in the NAIS. This also was found to be so because it was mandatory for anyone who acquires an institutional loan for investment in agriculture to also purchase an agricultural insurance cover. This is consistent with a similar study conducted in NIger state in 1993 by Chikwendu et. al.

The probabilities of acquiring the agricultural insurance cover, increases as a farmer's resource base increases (Akinola, 1987).

The logit regression coefficient for age was significant and consistent with the result of the study by Chikwendu et. al, 1993. The positive relationship between willingness to insure and age of farmer implies that the older the farmer, the more willing he is to insure. Voh, (1982) and Akinola (1987), both agreed that younger farmers have greater flexibility in accepting new ideas and in dealing with risks. However, it is not clear what upward bounds can be set on this age level. Voh (1982), for example, while recognising that older farmers are less inclined to try newer farm practices, could not specify a threshold age level.

Years of education was also found to be significant implying that the more educated a farmer is, the more willing he will be to acquire an insurance cover. This again is consistent with several emperical studies which have verified the postive link between high level of educational attainment and early adoption of new technologies (Forster and Stem, 1979; Ervin and Ervin, 1982 and Chikwendu et al., 1993).

Years of experience in farming was again found to be significant as a factor affecting farmers' participation in the NAIS. This could be explained by the fact that farmers who have more years of experience, are more conversant with the reality that poultry production is a very risky business hence, they are expectedly more willing to insure against such risk than a new entrants into the business.

4.4 Procedure and Effectiveness of Loss Assessment.

4.4.1 Procedure for Loss Assessment

Loss assessment is the process of determining the loss sustained by an insured farmer. This is normally done by the Insurer (NAIC) to assist her in determining the appropriate amount that should be paid to such a farmer as compensation/indemnity. Loss sustained is always quantified in monetary terms. The procedure differs for crop and livestock.

Loss Assessment For Livestock: In the case of death of the livestock, loss assessment is done on the basis of the value of the livestock at the time of the occurrence of the incident and this can be done in either of two ways:

a, Valuation at cost: which is the value of the livestock at time of death. Here, the farmer receives as indemnity, an amount which only covers the cost of production thus, enabling him to return to business.

b, Valuation at market Price: This covers loss sustained by the farmer at the current market price of the livestock.

Valuation at cost is used when loss occurs before livestock reaches maturity age or age at which they can be sold off while valuation at market price is used when loss occurs at maturity of the livestock.

In the case of injury, which occurs due to accident, disease

or any other such reason, and which does not result in the death of the livestock, the farmer is entitled to compensation covering all medical and other costs incurred in treating the livestock.

Loss Assessment For Crops: Just as for livestock, loss assessment for crops, is also done based on the stage of production at which loss occurs. Loss assessment is done based on the cost of production. For this reason, NAIC keeps track of the costs of each cultural operation in each zone. Loss assessment is divided into three stages:

First Stage Damage: This falls within the sowing period implying that sowing can still be done hence, a farmer who suffers loss at this stage and makes claims will be indemnified in good time to enable him replant. Loss assessment for first stage damage covers cost of land preparation, cost of seeds, cost of sowing and cost of pre-emergence herbicide and fertilizers.

Second Stage Damage: This refers to damage(s) which occur before or during flowering. The farmer at this stage may lose all or most of his crops and it is not possible to replant any more. Indemnity is therefore, paid to cover total cost of production up to the point the damage occurred.

Third Stage Damage: Damage at this stage occurs when the crop has matured but is yet to be harvested. This could be from Birds, fire

or flood etc. The whole farm or part of it may be destroyed. Whatever is left on the field is harvested and the output is used when calculating the amount of claim that will be paid. Indemnity therefore depends on salvaged output and is calculated thus:

$$\frac{SY - AY}{SY} \times SC \text{ (per ha.)}$$

where:

SY = standard yield expected.

AY = Actual yield after loss.

SC = Standard Cost.

NAIC annually keeps a record of standard yield and cost in its "Annual Calendar of Operations, crops ratings and estimated production Cost".

As already established in chapter four of this study, a farmer is expected to report peril(s) covered by the scheme once they occur, within 24 - 48 hours to any of the accredited offices and by the quickest means available. This accredited offices are local government office, financing bank, Cooperative Society nearest State Ministry of Agriculture and Natural Resources, NAIC office etc.

Once an incident is reported, an immediate inspection visit is made by either NAIC officers or any other competent and approved intermediary to visit the farm for survey. Appropriate Report/Inspection Forms containing relevant information on the loss sustained and decision taken or recommendation(s) made, are filled. For livestock, a death certificate for animals and post mortem report from a registered/approved veterinarian must be obtained though this may be waived for small scale cattle rearers. It is

required that losses be reported promptly so that dead animals can be inspected before being disposed off. The company's veterinarian may sometimes be used to confirm loss reports.

4.4.2 Effectiveness Of The Loss Assessment Procedure.

A critical examination of this loss assessment procedure reveals the following as pertaining to the effectiveness of the procedure;

For livestock, loss assessment as stated earlier can be done either on the basis of the valuation at cost or valuation at market price. Valuation at cost is used when loss occurs before livestock reaches maturity age or age at which they can be sold off while valuation at market price is used when loss occurs at maturity of the livestock. Compensation paid on both instances may not on all occasions be sufficient to set up the farmer in business again. The present poor economic situation of the country as evidenced by the high inflationary rate, makes the compensation paid to the farmer insufficient to return him into business. This same problem is applicable to loss assessment for crops which in most cases only covers the cost of production up to the stage where loss occurred and nothing more.

In the course of this study, it was observed that loss assessment as undertaken by NAIC was not always satisfactory to the farmers concerned so much so that some of them even abandon the claims offered them. The farmers dissatisfaction often times arise from the fact that they have to go all the way to the NAIC office in Kaduna to report their losses and most times, and 80% of the

respondents who suffered losses indicated that no proper inspection of their farm was done made by NAIC staff as is required by laid down rules before the amount to be paid to them as indemnity was computed.

It was also discovered that the requirement for a post mortem report and death certificate from a registered veterinarian was viewed by 75% of farmers as unnecessary bureaucracy which only waste time and resources. However, it is clear and only logical for NAIC to require these of farmers in order to check fraudulent claims.

45% of the farmers who suffered losses complained that they have to make several visits to NAIC office before they can be attended to properly. On the average they claim they have to make two to three visits to follow up their report before a proper record of it is made. This, they consider also, to be a waste of time and resources.

This study revealed a need to do away with some practices which the farmers considered as a hinderance to the effective running of the scheme so as to encourage farmers to participate in it. Uppermost among these is for NAIC to make deliberate efforts to improve on the length of time it takes to perform a proper loss assessment whenever a farmers reports a loss. This is very important considering that farmers already exhibit apathy against insurance in whatever form it came because of the bad or poor record of other classes of insurance being practiced in the country.

NAIC should also be more liberal in her loss assessment

procedure as it was discovered that the amount being offered as compensation to farmer who suffered losses is usually too little compared to the actual loss suffered (Table 5.17). This defeats the aim of keeping the farmer in production.

NAIC will improve on the effectiveness of its loss assessment procedure if it ensures that it carries out proper farm inspection whenever a farmer reports a loss. This is important ,in order to confirm farmers claims.Such inspections should be carried out on time before the damage is cleared away or disposed off. In addition , such an inspection visit should be carried out by:

(a) the Agricultural Insurance committee (AIC) in that Local government area or any other competent and approved intermediary to visit the farm for survey if the report is not originating from the AIC. Or

(b) the state officer and his team can make an inspection visit immediately, to assess the loss or confirm the report of the AIC or other intermediary.

4.5 Procedure and Effectiveness of Indemnity Payment

4.5.1 Procedure Of Indemnity Computation And Payment.

Indemnity is the compensation paid to a farmer who experiences an insured loss. It is aimed at putting him/her in the same financial position he/she was before the occurrence of the loss. It tries to repay the insured for the loss of his crops/livestock up to the extent of the cost of production and is directly related to the amount insured.

For crops, indemnity is calculated on the basis of the

approved input cost (see appendix 1-5) and not the value of the crops harvested. Indemnity for livestock on the other hand, is determined based on the value of the animal or bird at the time of death or the medical expenses incurred in treating the animal or bird in the case of injury.

On obtaining an insurance cover, an insurance policy is issued to the insured by the insurer stating clearly the conditions of the insurance cover. Among such conditions are excess clauses such as the minimum loss clause which states that the insurer is not liable to pay indemnity unless the losses suffered exceed a specified percentage of the value insured:

Crops	0.4ha
Broilers	5% of Total stock
Cockrels/Turkeys	5% of total stock
Layers; Day old	5%
9 weeks to 72 weeks	8%
Breeding birds	5%

The loss deductible clause is another of such clauses and here the insured is required to bear a certain percentage of total loss suffered for each and every claim approved for settlement. Other conditions necessary for settling claims are;

(a) Timely acquisition of insurance cover;

(b) following strictly, approved production practices;

(c) damage must be caused by a peril covered by the policy; (d) notification of loss within stipulated time (24 - 48 hours)

(e) cover which is effective at the time loss is sustained or reported.

In settling any claim against the company, the insured is required to fill a claims form to be returned to NAIC with the relevant supporting document(s). The appropriate Local Government Agricultural Insurance Company (AIC) office is then required to do an on-the-spot inspection and assessment or alternatively, the NAIC office would act promptly to facilitate indemnification. After loss has been assessed recommendations are submitted to the zonal office. Approval is given either at the state or zonal level and payment is then made to the farmer through his bankers by NAIC or directly to the beneficiary in the case of voluntary insured. The lending institution is to ensure that compensation is credited immediately to the farmer to enable him go back to business.

Indemnity is calculated thus:

For Crops:

Indemnity = Total loss X sum insured/Ha - 10% Policy excess.

For Livestock (Poultry inclusive):

Indemnity = Total loss X sum insured/Bird or animal - 10% Policy excess.

Example; A sample farmer kept 500 broilers till market weight and paid ₦0.75 per bird as premium based on the estimated cost of production (Appendix 1-5). If this farmer experiences 40% (200 birds) loss due to a poultry disease, he will be entitled to an indemnity computed using the above formular as follows:

Total loss = 200 birds

Sum insured for 500 birds	=	₦10,045
Sum insured/bird (or extent of liability)	=	₦10,045 / 500 = ₦20.09
(10% policy excess	=	10% of claim approved for settlement).
Indemnity	=	200 x 2.08 = ₦4018.00
10% policy excess	=	10% of 4018.00 = 401.8
Therefore, Indemnity	=	4018.00 - 401.8
	=	**₦3616.20**

4.5.2 Effectiveness Of The Procedure Of Indemnification

This study revealed that the procedure for indemnity determination and payment is well laid out and impressive and if followed strictly, will ensure that the farmer is able to a large

extent, to return to business after suffering a loss. However, some lapses were noticed which negatively affect the efficiency of the procedure.

Farmers, it was noticed from the study, are in most cases not advised on approved production practices by NAIC staff even though the policy requires that the farmer knows and strictly follows such practices to minimize the occurrence of losses. Ideally, each insured farmer is expected to have access to the NAIC booklet "Annual Calendar Of Operations, and crop rating" (appendix 6) in which such approved practices for each zone are clearly stated but this is not the case in most instances. Even where the booklet is available, some illiterate farmers cannot read them.

Another crucial situation in indemnification is the fact that the farmer must incur some stipulated minimum loss to attract claim (minimum loss clause). This is a discouraging aspect of the procedure as most farmers have already devised ways of preventing very large losses. In addition to this, a memo attached to the policy requires that farmers comply with risk improvement recommendation such as; the use of bird scarers early enough from the flowering stage to harvest period, and the use of fire tracers around the farm. When all these are put in place losses on the farm are minimal and as such farmers are discouraged from seeking an insurance cover pre-supposing that their losses if any, may not be large enough to warrant indemnification thus making them lose even their premium

The long bureaucratic procedure for settling claims is

considered time wasting and stressful by most farmers such that some of them prefer to bear their losses themselves especially if it is not too much rather than be frustrated by the many trips they may have to make to NAIC office before their claims are settled. This study revealed that NAIC kept a backlog of unsettled claims and that on the average claim settlement could take up to 3 - 6 months. This makes it impossible for farmers who experience first stage damage to replant. Approval for settlement of claims may sometimes have to come from the zonal office or worse still from the Head Office. This causes unnecessary delays which hinders timely indemnification and may discourage farmers.

Some farmers apply to insure the volume of loan obtained from the bank as credit only and not the total sum invested on the farm (under insurance). The insurance policy states that for such cases, of material misdescription or misrepresentation, the insurers shall be liable as it relates to that farm only to the extent of the cover. This is a major cause of insufficient indemnification of some farmers and NAIC would perform better if she insist such farmers take insurance to cover their whole farm investment.

Essentially, this study showed that indemnification as obtainable from NAIC presently, does very little in helping the farmer to remain in production after suffering a loss. This is mainly because of the inadequacy of amount paid as indemnity, when compared to the total loss suffered and the delay in approval and payment of indemnity.

Table 4.19 shows the amount invested by some insured farmers between 1995 - 1996 for which they took an insurance cover, the extent of loss they suffered and made claims for, and the amount recommended and paid to them as compensation. A careful look at the table shows that the amount paid as compensation only covers about 45 - 54% of total loss suffered by the farmers. This implies that apart from the 10% excess clause which the farmer is required to bear himself, another 36 - 45% is unaccounted for. This goes a long way to substantiate farmers claim that the amount paid as compensation or indemnity is in most cases inadequate to put them back in business as it does not cover the total cost of production. However, the fact that it is better than nothing cannot be denied and farmers are more or less better off than if they did not insure at all.

Table 4.19: **FARMERS' INVESTMENTS, LOSSES AND RECOMMENDED INDEMNITY TABLE FOR THE CLAIMANTS.**

Insured Farmer	LOCATION OF FARM (Local Government Area)	CLASS	AMOUNT INVESTED (N)*	PERIL	EXTENT OF LOSS %	AMOUNT RECOMMENDED FOR COMPENSATION (N)
1.	Gellesu (Zaria)	Maize	7,180.00	Drought	50	1,800.00
2.	Gaskiya (Zaria)	Maize	7,180.00	"	45	1,000.00
3.	Kongo (Zaria)	Maize	7,180.00	"	70	2,500.00
4.	Chikaji (Sabon Gari)	Maize	7,180.00	"	30	800.00
5.	Basawa (Sabon Gari)	Maize	7,180.00	"	70	2,500.00
6.	Samaru (Sabon Gari)	Maize	7,180.00	"	50	1,800.00
7.	Bomo (Sabon Gari)	Maize	7,180.00	"	80	2,600.00
8.	Gellesu (Zaria)	Maize	7,180.00	"	60	1,900.00
9.	Kafan Fada (Zaria)	Maize	7,180.00	"	70	2,500.00
10.	Zangon Shamu (Sabon Gari)	Maize	7,180.00	"	80	2,600.00
11.	Tudun Wada (Zaria)	Maize	7,180.00	"	50	1,800.00
12.	Shika (Giwa)	Maize	5,128.00	"	80	2,400.00
13.	Bomo (Sabon Gari)	Maize	7,180.00	Pests	90	3,500.00
14.	Basawa (Sabon Gari)	Maize	7,180.00	Drought	50	1,800.00
15.	Gidan Iya (Sabon Gari)	Maize	7,180.00	"	40	1,000.00
16.	Shika (Giwa)	Maize	7.180.00	"	80	2,600.00
17.	Layin Radio (Zaria).	Poultry	17,000.00	Disease	70	1,814.40
18.	Tudun Wada (Zaria)	Poultry	6,000.00	"	80	1,555.20
19.	Basawa (Sabon Gari)	Poultry	10,000.00	"	75	2,592.00
20.	Layin Radio (Zaria).	Poultry	8,000.00	"	30	578.40
21.	Chikaji (Sabon Gari)	Cotton	22,462,000.00	Fire	80	424,104.00
22.	Gellesu (Sabon Gari)	Maize	5,500.00	Flood	90	2,990.00
23.	Fadan Sarki (Zaria)	Poultry	4,000.00	Disease	90	1,066.00
24.	Kongo (Sabon Gari)	Maize	6,000.00	Drought	75	1,505.58

Source: NAIC

*This refers to the amount of loan acquired by the farmer for investment and not the total amount actually invested on the farm. It is this loan amount that is covered by the insurence and thus, indemnity is computed based on this.

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS.

5.1 Summary

This study was designed to analyse the socio-economic factors that affect farmers' participation in the Nigerian Agricultural Insurance Scheme (NAIC) in Kaduna State. The emphasis was on identifying the various Socio-economic factors that determine a farmers willingness to insure; examine the procedure of loss assessment as adopted by the scheme and assess its effectiveness; and examining the effectiveness of indemnity computation and payment. To achieve these objectives, data were collected from 150 farmers in the 3 Local Government Areas studied: Zaria, Giwa and Sabon-Gari. Farmers growing maize and or keeping poultry were identified and further stratified into two categories (participant and non-participants in the Agricultural Insurance Scheme). Descriptive statistics were used to analyse the data.

Chapter one of the study is the introduction. This reviewed the nature of agriculture and its implication. The research problems and objectives were also stated in this chapter.

The Literature Review found in chapter two, looked at existing research work related to this study. Areas covered include; The effects of risks and uncertainties in agriculture, classification of agricultural risk, Managing agricultural risk, the setting up and running of the Nigerian insurance scheme. Chapter three on the other hand, is the methodology which covered the study area, selection of the local Government areas studied, sampling procedure

and size, and analytical tools used for the study.

Chapter four covers the presentation and discussion of results. The results of the analysis of data collected were presented and discussed in this chapter. This includes the socio-economic characteristics of the respondents generally and the insured respondents in particular, their production activities and willingness to insure their maize/poultry. These were mainly presented in tabular form. Also included here, were results of the logistic regression analysis which revealed the relationship between a farmers willingness to insure and his socio-economic characteristics. Finally, the chapter examined the method of loss assessment and indemnity computation and its adequacy. This was done using percentages and tables.

5.2 Summary of Findings:

The major findings of the study were as follows;

The logit regression analysis for the 100 maize growers showed that a farmers' willingness to insure his maize crops was significantly influenced by his/her years of education, Job status, Loan amount, years of experience in farming, number of contact with extension agents in a month and size of loss suffered.

Again, logit regression for poultry farmers revealed that the socio-economic factors relevant in determining a farmers willingness to insure his/her poultry were Age of farmer, Years of education, loan amount, and years of experience in farming.

An examination of the procedure for loss assessment which is

based on production cost as opposed to replacement cost, showed that in most instances, farmers' losses were under estimated by NAIC. The effect of the high rate of inflation in the country was not considered and this makes cost of replacement higher than cost of production. Also bureaucratic bottlenecks encountered by farmers who suffer losses when they approached NAIC to conduct loss assessment is sometimes discouraging to farmers. The procedure takes a lot of time and in some instances farmers cannot even get NAIC to send inspection staff to inspect the damages in good time resulting in them making a number of "frustrating" visits to NAIC Office. This study also revealed that the procedure for indemnity computation and payment though well laid out, was plagued by some lapses which hamper the effectiveness of the procedure. Some of these lapses as revealed by the study are that;

1. Farmers are not properly advised on approved production practices as required by the insurance policy. This is rather left completely under the assumption that the farmer will be advised by extension agents or other sources of information but the study revealed that most of the farmers especially, the poultry farmers had no contact at all with extension agents. 55% of the maize growers and 54% in the case of poultry farmers reported no contact at all with extension agents in any given month.
2. Farmers are discouraged by the minimum loss clause attached to the agricultural insurance policy. They argue that they have on their own devised ways of minimizing losses on the farm and

that the occurrence of such large losses as required to attract claims from NAIC only occur very rarely.

3. The procedure for indemnification was time wasting and stressful for most farmers who complained that they cannot afford the time and money (transportation) involved in "following up" their claims.

4. The NAIC keeps a back log of unsettled claims. On the average, a claim takes up to 3 - 6 months normally to be settled. This, it was revealed was because approval for claim settlement came solely from the Head office.

5. Some farmers who obtained loans from commercial banks and who are, being compelled by the terms of the loan to insure, insure only the volume of loan obtained from the bank and not the total sum invested on the farm. For such cases of "under insurance" the farmer in the event of a loss on the farm, gets an indemnity which expectedly covers only the proportion of the farm insured. This may be less than the total loss suffered. Such farmers may be unable to continue in business.

6. The loss deductible clause also attached to the policy which requires the insured to take responsibility for 10% of all losses suffered and for which compensation is to be paid, is another important consideration which tends to lower the effectiveness or adequacy of indemnity. The study revealed that most farmers were not very happy about this issue.

7. The insured still has to bear on his own up to 36 - 46% of losses suffered (Table 5.17) because in most cases, the amount

paid as indemnity by the insurer, falls short even of the cost of production/investment (and more so, the replacement cost) by these percentages. Farmers in most cases, can therefore not continue in business after suffering a loss and especially not on the same scale or level they used to before the loss.

5.3 Conclusion

This study revealed that the Agricultural Insurance Scheme as operated by NAIC has recorded very poor acceptance by farmers. This was discovered to be mainly as a result of the apathy that already exist against insurance of all classes in Nigeria and the fact that the running of the scheme is also presently plagued by some shortfalls which discourage most farmers from willingly taking the cover. Majority of the farmers who acquired the agricultural insurance cover, do so because it is a mandatory requirement for any one who takes a commercial bank loan. Loan therefore, was seen from the study to be a very important variable in determining a farmer's willingness to insure either his or her crop (Maize) or poultry. Other socio-economic factors which affect farmers' participation in the NAIS, were; years of education, job status, years of experience in farming, size of loss suffered, age of farmers and number of contact with extension agent.

5.4 Recommendations

To substantially improve on the participation of farmers in the NAIS the various constraints and bureaucratic bottlenecks

identified earlier must be minimized if not eliminated and the scheme must take advantage of the socio economic factors identified in this study. This can be done by adopting the following suggestions;

1. Deliberate efforts must be made by NAIC to improve on the procedure of loss assessment and its implementation. If loss assessment is based on replacement cost(taking into consideration other externalities like inflation rate) rather than just the cost of production, the farmer may be better encouraged to engage in the scheme as this is hoped to improve on the amount paid as indemnity.
2. Improve on the timeliness of performing loss assessment for every case of loss reported by farmers. This will increase efficiency of service rendered by NAIC and thus, improve on their popularity with the farmers. It was also observed during the course of the study that NAIC need more staff who will go out for loss assessment to improve on the timeliness of their services.
3. Indemnity computation and payment is another important aspect that has to be considered seriously. NAIC should give special attention to the computation of indemnity. This study revealed that the amount paid to farmers as indemnity is most of the time inadequate to meet the prime objective of keeping the farmer in business.
4. NAIC can remove completely or reduce the apathy in the minds of Nigerians about insurance generally by taking advantage of

the factors which the study has revealed to be important in determining the farmers' willingness to insure. Particularly, the government should increase efforts aimed at educating the rural populace who constitute majority of farmers in the country so that they can become literate and thus, more enlightened about important innovations such as the Agricultural Insurance Scheme. NAIC too can assist here by ensuring that their personnel make deliberate effort to enlighten farmers about the scheme and how it is different from other forms of insurance already existing in the country. This will help to ensure that farmers willingly take insurance cover and are not coerced into doing so as a pre condition to obtaining bank loans.

5. Extension agents and farmers association or cooperatives should also be enlightened about the operation and benefits of the scheme and they should be encouraged to pass these knowledge to farmers who are the target.
6. NAIC needs to improve its services to their existing clients by ensuring they pay adequate and timely compensation in the event of losses and by organizing enlightenment campaigns, best farmer awards and the likes so as to attract other farmers to join the scheme.

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Appendix I

NAIC ESTIMATED PRODUCTION COST FOR A SMALL-SCALE HYBRID MAIZE FARM

INPUT/OPERATION	Rate	Naira(₦) per Ha
Stage 1		
A. Land Clearing & Stumping		1,200.00
B. Land Preparation (Tillage)	25md @ ₦15.00/day	375.00
C. Seeding/Planting		
i) Seeds 20kg/ha @₦5.00	₦100.00	100.00
ii) Seed dressing	50k/kg for 20kg/ha	10.00
iii) Planting	8 man-days/ha @ ₦15.00	180.00
D. Fertilizer application		
i) Basal application	8 bags NPK/ha @ ₦35/bag	280.00
ii) Side dressing (4-5weeks after planting)	7 bags CAN/ha @ ₦35.bag	245.00
Labour	2 man-days/ha @ ₦15/md	30.00
i) Basal application	2 man-days/ha @ ₦15/md	30.00
ii) Side dressing		
	.....	.....
E. Irrigation (if applicable)		
Stage 2		
A. Weed Control	12 man-days/ha @ ₦15/md	180.00
i) 1st Hand weeding	8 man-days/ha @ ₦15/md	120.00
ii) 2nd Hand weeding		
B. Pest Control	e.g. 5 lit. of Gammalin 20	
i) Pesticide	@₦50/litre	250.00
ii) Labour	2 man-days/ha @ ₦15.00/day	30.00
C. Transportation (Inputs)	@₦50.00/ha	50.00
D. Interest on loan (if applicable)	.....%p.a	.....
Stage 3		.....
Harvesting (Maturity)		
Miscellaneous (10% of Total Cost)	.....	308.00
	10% of ₦3,080.00	
	Total Production Cost/ha	3,388.00

Appendix 2

ESTIMATED PRODUCTION COST FOR MAIZE PRODUCTION (HYBRID) FOR A MECHANIZED MEDIUM/LARGE SCALE FARM

INPUT/OPERATION	RATE	NAIRA(₦) PER HA
Stage 1		
A. Land Clearing & Stumping		1,200.00
B. Land Preparation		
i) Ploughing	@ ₦120/ha	120.00
ii) Harrowing	@ ₦100/ha	100.00
iii) Ridging	@ ₦100/ha	100.00
C. Seeding/Planting		100.00
i) Seeds	20kg/ha @ ₦5.00/kg	10.00
ii) Seed dressing	50k/kg for 20kg/ha	40.00
iii) Planting	@ ₦40/ha	
D. Fertilizer application		280.00
i) Basal application	8 bags NPK/ha @ ₦35/bag	245.00
ii) Side dressing (4-5weeks after planting)	7 bags CAN/ha @ ₦35.bag	45.00
Labour	@ ₦45/ha	45.00
i) Basal application	@ ₦45/ha	
ii) Side dressing	.....	.....
E. Irrigation (if applicable)		
Stage 2		200.00
A. Weed Control	e.g. 5 lit/ha of Primagram	
i) Pre-emergence herbicide	@ ₦40/litre	200.00
ii) Post-emergence herbicide	e.g. 1it/ha of Primextra	
Labour (Mechnnized)	@ ₦40/litre	
i) Pre-emergence herbicide	@ ₦45/ha	45.00
ii) Post-emergence herbicide	@ ₦45/ha	45.00
B. Pest Control		
i) Pesticide	e.g. 5 lit/ha Gammalin 20	250.00
	@ ₦50/litre	45.00
ii) Labour (Mechanized)	@ ₦45/ha	200.00
C. Permanent Staff (if any)	₦50/month for 4 months	50.00
D. Transportation (Inputs)	@ ₦50/ha	.....
E. Interest on loan	.....%p.a	.....
Stage 3		.....
Harvesting (Maturity)	.....	332.00
Miscellaneous (10% of Total Cost)	10% of ₦3,320.00	3,652.00
Total Production Cost/ha		

Appendix 3

ESTIMATED PRODUCTION COST FOR A SMALL-SCALE OPEN POLLINATED MAIZE PRODUCTION

INPUT/OPERATION	RATE	NAIRA (M) PER HA
Stage 1		
A. Land Clearing & Stumping		1,200.00
B. Land Preparation (Tillage)	25md @ ₦15.00/day	375.00
C. Seeding/Planting		
i) Seeds	25kg/ha @ ₦5.00/kg	125.00
ii) Seed dressing	50k/kg for 25kg/ha	12.50
iii) Planting	8 man-days/ha @ ₦15.00	120.00
D. Fertilizer application		
i) Basal application	5 bags NPK/ha @ ₦35/bag	175.00
ii) Side dressing (4-5weeks after planting)	5 bags CAN/ha @ ₦35.bag	175.00
Labour		
i) Basal application	2 man-days/ha @ ₦15/md	30.00
ii) Side dressing	2 man-days/ha @ ₦15/md	30.00
	.....	.....
E. Irrigation (if applicable)	Sub Total	2,242.50
Stage 2		
A. Weed Control	12 man-days/ha @ ₦15/md	180.00
i) 1st Hand weeding	8 man-days/ha @ ₦15/md	120.00
ii) 2nd Hand weeding		
B. Pest Control	e.g. 5 lit. of Gammalin 20	250.00
i) Pesticide	@₦50/litre	30.00
	2 man-days/ha @ ₦15.00/day	
ii) Labour		50.00
C. Transportation (Inputs)	.....%p.a	550.00
	Sub Total	
Stage 3		.....
Harvesting (Maturity)	.....	287.25
Miscellaneous (10% of Total Cost)	10% of ₦2,872.50	3,159.75
	Total Production Cost/ha	

Appendix 4

CUMULATIVE WEEKLY INPUT COST PER PULLET, FOR LAYERS

	AGE OF BIRDS (WEEKS)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	ITEMS COST OF DAY OLD CHICK *	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.000	6.00	6.00	6.00
2	Feeds (i) Chick Mash 10-8wks)	0.63	1.25	1.88	2.50	3.13	3.75	4.38	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.000	5.00	5.00	5.000
	(ii) Growers Mash (9 - 20wks)									1.36	2.73	4.09	5.45	6.81	8.18	9.54	10.90	12.27	13.63	14.99	16.35	16.35	16.35	16.35	16.35
	(iii) Layers Mash (21-24wks)																					1.52	3.04	4.51	6.09
3	VACCINATIONS (i) NDV (I/o)*	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	(ii) IBDV*		0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	(iii) NDV (L)*			0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	(iv) FTV *						0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	(v) IBDV *												0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	(vi) FPV *			0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30

Appendix 4 Continues.

	(vii) NDV (K) *						0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
4	MEDICATION/CONTINGENCIES	0.80	0.16	0.24	0.33	0.41	0.49	0.57	0.85	0.73	0.81	0.89	0.98	1.06	1.14	1.22	1.30	1.38	1.46	1.54	1.63	1.17	1.79	1.87	1.95
5	COST OF LABOUR	0.08	0.15	0.23	0.30	0.38	0.45	0.53	0.60	0.68	0.75	0.83	0.90	0.98	1.05	1.13	1.20	1.28	1.35	1.43	1.50	1.58	1.65	1.73	1.80
6	COST OF UTILITIES	0.02	0.04	0.08	0.10	0.13	0.15	0.18	0.20	0.23	0.25	0.20	0.30	0.33	0.35	0.38	0.40	0.43	0.45	0.48	0.50	0.53	0.55	0.58	0.60
7.	DAY OLD-24 WEEKS	7.11	8.20	9.63	10.43	11.25	12.59	13.51	14.30	15.85	17.39	18.94	20.78	22.33	23.87	25.42	26.95	28.51	30.04	31.59	33.13	34.84	36.53	38.25	39.94

- These inputs costs are not cumulative since the operations are carried out only once in the life span of the birds.
- There is the need to substitute some of the figures on this table with current input costs.
- It is assumed (in this table) that the feed intake during the chick phase (1-8 weeks of age) is uniform, similarly the feed intake for the grower phase (9-20weeks of age) as well as that of the laying phase are assumed uniform.

Appendix 5

NAIC CUMULATIVE WEEKLY INPUT COST PER BIRD FOR BROILERS

	AGE OF BIRDS (WEEKS)	1	2	3	4	5	6	7	8	9	10	
	ITEMS											
1.	COSTS OF DAY OLD CHICK*	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
2.	Feeds											
	(i) Broiler starter	0.75	1.50	2.25	3.00	3.00	3.00	3.00	3.00	3.00	3.00	
	(ii) Broiler Finisher						1.09	2.19	3.28	4.38	5.47	6.57
3.	VACCINATIONS											
	(i) NDV (i/o)*	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	
	(ii) IBDV*		0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	
	(iii) NDV (L)*			0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	
	(iv) IBDV*					0.30	0.30	0.30	0.30	0.30	0.30	
4.	MEDICATION/CONTINGENCIES	0.15	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.45	
5.	COST OF LABOUR	0.09	0.18	0.27	0.36	0.45	0.45	0.63	0.72	0.81	0.90	
6.	COST OF UTILITIES	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	
	CUMULATIVE TOTAL											
7.	(DAY OLD -WEEKLY 10)	6.34	7.88	9.02	1006	1174	1313	1451	1590	1728	18.62	

*These input costs are not cumulative since the operations are carried out only once in the life span of the birds.
-There is the need to substitute some of the figures on this table with the current input costs.
-It is assumed (in this table) that the feed intake during the starter phase (1-4 weeks of age) is uniform, similarly the feed intake for the finisher phase (5-10 weeks of age is also assumed to be uniform.

Appendix 6

NAIC KATSINA ZONE'S ANNUAL CALENDAR OF OPERATIONS FOR PRODUCTION OF MAIZE

Operations	Early Main Crop of Maize	Late/light crop of Maize
1. Procurement of inputs	March 15-May 16	September 25-October 10
2. Land preparation ploughing, harrowing & ridging.	April 21 - June 10	August 25-September 30
3. Planting		
a) seed treatment.	May 12-May 31	September 25-October 10
b) sowing	June 15-July 21	October 15-November 15
4. Fertilizer Application		
a) Basal application	June 15-July 15	October 15-November 15
b) Side dressing.	July 16-July 15	November 16-December 20
5. Weed control		
a) Pre-emergence/1st. Hand weeding	June 15-July 15	October 15-November 15
b) Post-emergence/2nd. Hand weeding.	July 16-August 15	November 20-December 26
6. Pest control	June 15-July 15	October 15-November 15
7. a) Harvesting.	September -October	February - March
b) Shelling and Drying.	September -October	February - March

i. Sowing seeds for early main crop depends upon onset of early rains.
ii. Late maize production in Bauchi, Katsina and Minna zones is recommended under irrigation.
iii. Katsina zone comprises of Kaduna, Sokoto, Kebbi, Katsina, Jigawa and Kano States.

Notes:
1. The schedule should not be rigidly applied where need for flexibility is justified.
2. When necessary, adjustments made to the calendar will be promptly communicated for application.
3. Early maturing and pest resistant varieties are recommended.