

## *Original Paper*

# Smallholder Farmers' Formal Risk Management Services: Evidence from Southeast Nigeria

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### **Abstract**

*Smallholder farmers' livelihood activities are mainly centred on agricultural investments which are inherently risky. The risky nature of agricultural activities is further complicated by the fact that resource-poor smallholder farmers operate in an environment with weak markets and less than satisfactory financial services. Formal risk management services hold out the expected external intervention for aiding the resource-poor farmers break out of the vicious circle of poverty. Not all formal risk management services are actually tailored to the scope the smallholder farmers. This study therefore set out to examine the formal risk management services employed by the smallholder farmers in southeast Nigeria. A multi-stage sampling technique was adopted in selecting respondents. Out of 504 smallholder farmers selected, data were successfully collected from 494. Functional analysis, descriptive and inferential statistics were used in data analysis. Results showed that 37% of the smallholder farmers employed formal risk management services; 17.68% subscribed to and utilized direct formal risk management services provided by the Nigerian Agricultural Insurance Corporation. There was a sufficiently deficient use of formal risk management services by smallholder farmers in Southeast Nigeria. It is recommended that the Nigerian Agricultural Insurance Corporation should tailor its services to the needs of the smallholder farmers.*

### **Keywords**

*formal risk management services, index insurance, micro-insurance, smallholder farmers, southeast Nigeria*

## 1. Introduction

A characteristic feature of the agricultural production system in Nigeria is that a disproportionately large fraction of the agricultural output is produced by smallholder farmers (Mgbenka et al., 2015). More than 80% of farmers in Nigeria are considered smallholders because they own less than 5 hectares of land; they produce 99% of Nigeria's agricultural outputs (Anderson et al., 2017). While agriculture accounts for 21% of GDP, the sector employs 70 percent of the labour force (CIA, n.d).

Smallholder farmers in southeast Nigeria contribute over 85% of total domestic agricultural output (Echebiri & Mbanasor, 2003). Their livelihood activities are centred on agricultural investments, and they produce over 75% of the domestic demand for agricultural products. It is established that agriculture, unlike other investment activities, is exposed to a wide variety of risks and uncertainties ranging from input supply and prices, agricultural yield, post-harvest losses, and product prices to the vagaries of weather, pests, and diseases (Anderson et al., 2017). Other natural hazards such as floods and fire outbreaks are equally important regarding their perilous impact on agricultural enterprises. The wide variety of risks encountered by smallholder farmers in Nigeria has resulted in variability in farm income which has been further complicated by the fact that the farmers operate in an environment with weak markets and poor financial services.

Risk refers to uncertain events that can damage wellbeing; the uncertainty can pertain to the timing or the magnitude of the event (World Bank, 2000). In this context, risk is construed as negative consequences. However, taking a risk can also bring about a positive outcome. In the views of Hopkin (2010), a third possibility is that risk is related to uncertainty of outcome.

There are three typical things that can be done with any risk. They are: a. mitigate, that is taking necessary actions to eliminate the risk or prevent its potential for occurrence; b. accept the risk (this involves an evaluation of the potential loss together with the probability of threat occurring may lead to accepting a particular risk); and, c. transfer the risk; which involves purchasing an insurance against the risk (Anon, 2017). Mitigation, acceptance and transfer of risk are decisions that come under the purview of risk management.

Informal or traditional risk management practices adopted by smallholder farmers cannot protect them against low frequency/high severity covariate risk like floods, droughts or tsunamis (Sinha & Tripathi, 2014). Without government support and formal risk management, less risky and less profitable farming practices are adopted, resulting in lower productivity (Demeke et al., 2016). Formal risk management hold out the expected external intervention for aiding the resource-poor farmers break out of the vicious circle of poverty of which low productivity is a characteristic. However, not all the formal risk management services are tailored to the capacity of the smallholder farmers.

This study was therefore designed to examine the Formal Risk Management Services (FRMS) employed by the smallholder farmers in southeast Nigeria.

The study not only adds to existing literature but also expected to inform and influence relevant policies. The broad objective of the study focused on the use of FRMS by smallholder farmers in Southeast Nigeria.

The specific objectives were:

- i. examine the socio-economic characteristics of these smallholder farmers in Southeast Nigeria;
- ii. identify the type of risks faced by smallholder farmers and the perceived impact of the risks on the livelihood activities of the farmers in Southeast Nigeria;
- iii. identify the formal risk management services available to smallholder farmers and the institutions offering the formal risk management services in Southeast Nigeria;
- iv. estimate proportion of smallholder farmers who use the formal risk management services in Southeast Nigeria;
- v. determine the formal risk management services providers patronized by the smallholder farmers in Southeast Nigeria;
- vi. analyse the factors affecting smallholder farmers taking up formal risk management services in the study area; and
- vii. describe the barriers encountered by smallholder farmers in taking up formal risk management services in Southeast Nigeria.

## **2. Materials and Methods**

### *2.1 Study Area*

The study was conducted in Southeast, Nigeria, located within latitudes 5°N to 6°N of the Equator and Longitudes 6°E and 8°E of the Greenwich (Prime) Meridian (Microsoft Corporation, 2010). The zone occupies a total landmass of 10,952,400 hectares with a population of 16, 381,729 people (NPC, 2006). The zone is made up of 5 States namely, Abia, Anambra, Imo, Enugu and Ebonyi, which are notable for agricultural production. Major agricultural activities in the zone include fishing, crop, and livestock production.

### *2.2 Sampling Procedure and Data Collection*

Primary and secondary data were employed for the study. Primary data were collected from both formal financial institutions and smallholder farmers. Secondary data were collected from relevant formal institutions, published and unpublished materials. Three out of the five States in Southeast Nigeria were randomly selected for the study. The States are Anambra, Imo, and Ebonyi. In each of the three States, two agricultural zones were randomly selected to give a total of six agricultural zones. In each of the six agricultural zones, three Local Government Areas (LGAs) were randomly selected giving a total of 18 LGAs. In each of the 18 LGAs, two communities were randomly selected giving a total of 36 communities. In each of the 36 communities, six crop farmers, five livestock farmers, and three fishery farmers were randomly selected. This gave a total of 504 respondents for the study. Out of the 504 smallholder farmers selected for the study, data were successfully collected from 494 farmers.

### 2.3 Conceptual Framework

According to the theory of vicious circle of poverty, in developing countries, income levels remain low; this leads to low level of saving and investment. Low investment leads to low productivity which again leads to low income. According to Nurkse (1953), the vicious circle of poverty implies circular constellation of forces tending to act and react with one another in such a way to keep a developing country in a state of poverty. Broadly, two methods are employed to solve the problem of vicious circle of poverty namely solution to the supply side and solution to the demand side. In the supply side, efforts are made to increase savings so that investment in productive channels may be encouraged. In effect, government interference is essentially required through its fiscal and monetary policies that encourage savings and investments. On the demand side, it is argued that the market be widened so the people may be motivated to invest. Another solution to the vicious circle of poverty is investment in increasing skills and competencies of the human person (<https://www.economicdiscussion.net/poverty/vicious-circle-of-poverty/4584>). The popular argument in development circles is that the vicious circle of poverty is likely to continue if there is no external intervention.

Mosley and Verschoor (2005), argued that due to the precarious conditions in which resource-poor small-scale farmers operate in poor countries, and in the absence of insurance markets, adequate risk management requires diverse livelihoods with low covariate risk. Ineffective risk management strategies are bound to lead to a depletion of capital buffer and thereby increase the likelihood of income poverty in any given period, and in turn increase the likelihood of chronic poverty. Chronic poverty, reduces one's willingness to undertake the risky investment that may offer an escape from poverty, which completes the circle.

While Mosley and Verschoor (2005), addressed the idea of a vicious circle of poverty driven by risk attitude (risk aversion), this study focused on evidence-based smallholder farmers' formal risk management practices in southeast Nigeria. The risk attitude of the smallholder farmers is beyond the scope of this enquiry and can therefore be taken up for further study.

### 2.4 Theoretical Framework

On daily basis, farmers take decisions that affect farm activities. The factors that affect the decisions cannot be predicted with complete accuracy; this is risk (Kahan, 2013). For every decision the farmer makes, there are many possible consequences and only one expected outcome. At the time the decision is taken, the outcome is uncertain. When the likelihood or probability of an outcome is known in advance this is called risk; when the likelihood of an outcome is unknown in advance this is called uncertainty (Kahan, 2013). Risk can also be construed as the intentional interaction with uncertainty, uncertainty being construed as a potential, unpredictable, and uncontrollable outcome (Teweldemedhin & Kapimbi, 2012). Risk is a consequence of action taken without regard to uncertainty. Disasters resulting from risky ventures can often not be prevented from happening but they can, to some extent, be

predicted and arrangements can be made to reduce their impact to enable the farmers cope with the situation.

However, in some cases, disasters cannot be predicted and farmers will have to cope with major losses after the event occurs (<http://www.fao.org/ag/ags/agricultural-finance-and-investment/agricultural-insurance/en/>). When such risks occur, smallholder farmers are likely to lose their investments due to weak arrangements and the absence of any formal arrangement. As a consequence, the farmers are sorely left to bear their loss. Smallholder farmers can benefit from formal risk management services by way of external intervention. Hopkin (2010) set out some definitions of the concept of risk management thus: Coordinated activities to direct and control an organization with regard to risk; process which aims to help organizations understand, evaluate and take action on all their risks with a view to increasing the probability of success and reducing the likelihood of failure; and, all the processes involved in identifying, assessing and judging risks, assigning ownership, taking actions to mitigate or anticipate them, and monitoring and reviewing progress. According to Kahan (2013), effective risk management requires protection against idiosyncratic shocks.

Risk management can be construed as the use of specific strategies to reduce the likelihood of the occurrence of known or unknown unintended outcomes in an enterprise. As a decision-making tool, it involves choosing among alternatives that attenuate the downside effects resulting from risks. Farmers including smallholder farmers can adopt strategies to manage risk before the occurrence of the potentially harmful event (ex-ante) or after the likely adverse event has occurred (ex-post) (Harwood et al., 1999; Ahaneku et al., 2019; Mbugua et al., 2019). Risk management can be either informal or formal. According to Cervantes-Godoy et al. (2013) informal risk management practices are characterized by diversification of income sources and choice of agricultural production strategy; formal risk management mechanisms can be classified as publicly provided or market-based strategies.

Formal risk management programmes have been recommended to help smallholder farmers manage risks. These formal risk management programmes can be in form of insurance, credit risk guarantee and micro-finance services provided by banks and other specialized agencies. However, there is a debate that smallholder farmers are not effectively accommodated in this formal arrangement. For instance, Dercon et al. (2014), argues that formal insurance is more likely to be taken up by large-holder farmers. International Finance Corporation (IFC, 2020a) further states that formal insurance programs are unavailable in SSA, and where they are available, they are prohibitively expensive. Smith (2016) also reports that smallholder farmers will not purchase commercially priced index products where payments are tied to the farm's crop losses. One of the reasons propounded for such a decline in the purchase of formal risk management services is that farmers often do not receive an index insurance indemnity when they experience a substantial loss on their farms. The myriad of challenges facing the smallholder farmers in the purchase of formal risk management services necessitates the need to study the formal risk management services available to smallholder farmers. An important innovative formal risk management

option to the bottleneck faced by traditional insurance institutions is the Global Index Insurance Facility (GIIF) which facilitates access to finance for smallholder farmers, micro-entrepreneurs, and microfinance institutions through the provisions of catastrophic risk transfer solutions and index-based insurance in developing countries (IFC, 2020a). Index insurance is an innovative approach to insurance provision that pays out benefits based on a pre-determined index or loss of assets and investments resulting from weather and catastrophic events, without requiring the traditional services of insurance claims assessors. It also allows for the claims settlement process to be quicker and more objective (IFC, 2020b). The index usually is based on a measure of the intensity and severity of rainfall or direct yield measures for a named geographic zone covered by the insurance contract (Carter et al., 2017). Against the backdrop of the need for external intervention tailored to the needs of the smallholder farmers, this study provides the empirical evidence of formal risk management services employed by the smallholder farmers in southeast Nigeria.

### 2.5 Data Analysis

Descriptive statistics, functional analysis and inferential statistics were used to analyse data. Descriptive statistics such as frequency and percentage were used to analyse data for objectives (i), (ii), (iv), (v), and (vii). Descriptive and qualitative risk impact analysis was used to analyse data for objective (ii). The risk faced by the smallholder farmers were categorised under production risk, price/market risk, financial risk, institutional risk, human or personal risk. A 4- point Likert-type scale rating was used to elicit responses on the farmers' perceived impact of various risks. The mean scores for the 4-point Likert scale rating was obtained by adding up the weighted values and dividing by the number of scales; high impact (4), moderate impact (3), mild impact (2), low impact (1), then divided by the number of scales to obtain the discriminating index (e.g.,  $4+3+2+1/4 = 2.5$ ).

Functional analysis was used to achieve objective (iii). The functional analysis shows:

- a. the principal functions of the institutions offering formal risk management services; and
- b. the institutions carrying out these functions.

For objective (vi), a binary logistic regression technique was used to estimate the relationship.

Considering the discrete nature of taking up insurance policies, a dichotomous dependent variable was constructed to indicate whether or not the farmers took up insurance policies.

The binary logistic model is represented as follows;

$$\Pr(Y_i=1/X_i = x_i) = \frac{\exp(x\beta)}{1 + \exp(x\beta)} \dots$$

$$\text{Log } \frac{P_i}{1 - P_i} = Z_i = a + \beta X_i + \epsilon_i \dots \quad (1)$$

$$\text{Log } \frac{P_i}{1 - P_i} = Z_i = a + \beta X_i + \epsilon_i \dots \quad (2)$$

$1 - P_i$

Where:

$P_i$  = is the probability that the event occurs to an individual with a given set of characteristics,  $X_i$

$a$  = is the intercept or constant

$\beta_i$  = is the vector of coefficients of the vector of covariates or coefficients,  $X_i$

$P_i / [1 - P_i]$  = is the odds ratio of farmers with a given set of characteristics taking up an insurance policy or not taking up a policy.

Y is a binary response variable

$Y_i = 1$  if the farmer took up an insurance policy

$Y_i = 0$  if the farmer did not take up an insurance policy

The dependent variables were:

X1 = age (years), X2 = education (years), X3 = marital status (single = 0, married = 1), X4 = household size (no of persons), X5 = farming Experience (years), X6 = Annual Farm Income (naira), and X7 = Farming Activity category (1 = crop, 2 = livestock, 3 = poultry, 4 = fishery).

### 3. Result and Discussion

#### 3.1 Socio-Economic Characteristics of the Smallholder Farmers

Table 1 shows that the smallholder farmers had a mean age of 46.6 years, spent a mean of 11.3 years in formal education, and had a mean household size of 6 persons. The farmers had average farming experience of 15.6 years. The mean annual income from farming was ₦453, 066.80 (equivalent to \$1,258.52). The farming activities engaged in included, crop production, livestock production, poultry, fishery, and multiple enterprises. The mean of farming activities was 2 implying the involvement of the smallholder farmers in combined enterprises. On the basis of the mean household size of 6 and mean daily farm income of ₦1,241.28 (equivalent to \$3.45), the smallholder farmers can be empirically classified as living below the poverty line and should therefore be assisted in bearing the risks associated with farming which is their main means of livelihood.

**Table 1. Socio-Economic Characteristics of the Smallholder Farmers**

Socio-economic characteristics	Minimum	Maximum	Mean	Std. Dev
Age (years)	20.00	70.00	46.6	10.5
Education (years of formal education)	2.00	16.00	11.3	3.8
Marital Status	.00	1.00		
<b>0 = Single; 1 = Married</b>				
Household Size (no of persons)	2.00	12.00	6	2
Experience (years)	1.00	50.00	15.6	9.3
Income (Naira)	10,000.00	2,080,000.00	453,066.80	359,569.62
*Farming Activity	1.00	5.00	2	

\* (1 = Crop; 2 = Livestock; 3 = Poultry; 4 = Fishery; 5 = Multiple)

Source: Field Survey, 2019.

### 3.2 Risks Encountered by the Smallholder Farmers and the Perceived Impact

Table 2 shows that the various risks faced by smallholder farmers were categorised under production risk, price/market risk, financial risk, and institutional risk, human or personal risk. For production risk, flooding and drought occurrences were above the mean score and respectively had moderate and high impacts on the smallholder farmers' enterprises. The price/market risk had high impact on the activities of the smallholder farmers. The areas of market risk identified included, input price (mean = 2.57); output price fluctuation (mean = 2.72), customer preferences and preference for imported goods.

The risks of high interest rate and poor access to production credit were perceived as having high and medium impact with (Mean = 2.58) and (Mean = 2.91) respectively. Institutional risk identified by the farmers also included unfavourable government policy (Mean = 2.80) and poor infrastructure (Mean = 2.63).

The smallholder farmers were confronted with various risks which included production, market, institutional, personal (also called human), and financial risks. These categories of risks are in line with those of Komarek, Pinto, and Smith (2020), who further classified the first four as business risks and are independent of financial risks.

For production risk, the smallholder farmers stated that flooding and drought had moderate and high impact on their farm enterprises respectively. The dependence of smallholder farmers on the vagaries of weather makes the smallholder farmers more vulnerable to production risk.

Market risks identified included, fluctuations in input and output prices, customer preferences and preference for imported goods. Fluctuations in input and output prices tend to put the farm income of the smallholder farmers in a risky tailspin.

High interest rate and poor access to production credit impacted negatively on the production and returns accruing to smallholder farmers and discouraged farmers from borrowing. In the event of default in loan repayment, the smallholder farmers were exposed to the risk of losing their investment. Poor access to credit raises the risk exposure of the farmers.

**Table 2. Risks and Impact of Risks Faced by Smallholder Farmers in the Study Area**

S/N	Risk	High impact (4)	Moderate impact (3)	Mild impact (2)	Low impact (1)	Total score	Std. dev.	Mean
<b>Production risk</b>								
1	Pests and diseases	107	78	196	113	1167	1.0602	2.36
2	Flood	122	173	137	62	1343	0.9742	2.72*
3	Drought	183	151	139	21	1484	0.9074	3.00*
<b>Price/Market risk</b>								



4	Input price	140	148	138	68	1348	1.0207	2.72*
5	Output price	130	103	180	81	1270	1.0495	2.57*
6	Customers Preference	162	90	140	102	1300	1.1420	2.63*
7	Imported goods	193	122	134	45	1450	1.0170	2.94*
	<b>Financial risk</b>							
8	High interest rate	168	96	88	142	1278	1.2249	2.58*
9	Poor access to production credit	171	107	215	1	1436	0.8845	2.91*
	<b>Institutional risk</b>							
10	Government policy	141	117	232	4	1383	0.8653	2.80*
11	Poor infrastructure	83	147	262	2	1299	0.7606	2.63*
	<b>Human or Personal risk</b>							
12	Farm theft	88	160	244	2	1322	0.7645	2.68*
13	Ageing	84	145	264	1	1300	0.7602	2.63*
14	Illness/death	88	-	404	2	1162	0.7705	2.35
15	Attack or injury from farm animals/ wild animals	84	-	409	1	1155	0.7543	2.34

Source: Field Survey, 2019. Cut-off point = 2.5

### 3.3 Formal Risk Management Services and the Institutions Offering Them in Southeast Nigeria

Table 3 shows that the FRMS available to smallholder farmers in Southeast Nigeria included the provision of financial support to farmers in the event of loss of crop or livestock from a natural disaster; linking farmers with agricultural risk-bearing institutions such as the Nigerian Agricultural Insurance Cooperation, Nigeria Incentive-based Risk Sharing System for Agricultural Lending and the Central Bank of Nigeria, to provide relevant risk cover; and provision of credit risk guarantee for farmers. These services were provided by specialized agencies of government armed with the responsibility of supporting farmers in bearing the risks associated with farming enterprise.

The institutions offering FRMS in Southeast Nigeria as presented in Table 3 were broadly categorized into two: those offering direct FRMS, and those offering indirect services. The Nigerian Agricultural Insurance Corporation (NAIC), and the Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) were the only two institutions directly engaged in offering FRMS to farmers. Institutions indirectly offering FRMS to farmers included; Bank of Agriculture, BoA, Agricultural Development Program (ADP), Federal Ministry of Agriculture, State Ministries of Agriculture, and the

Agriculture Department of Local Governments. These government agencies in addition to their core mandate, linked up farmers to specialised agencies that offered direct FRMS, and advisory services to the farmers.

The institutions directly offering FRMS were the Nigerian Agricultural Insurance Corporation (NAIC), and Nigeria Incentive-based Risk Sharing System for Agricultural Lending (NIRSAL). NAIC, is an institution directly engaged in offering FRMS to farmers. As a direct FRMS offering institution, the NAIC provides financial support to registered farmers in the event of loss of crop or livestock from such natural disasters as fire outbreak in farm, lightning, windstorm, flood, drought, pest and disease infestation of farmlands and animals, death of farm animals, injury due to accident, burglary, loss of goods on transit, etc.

NIRSAL is a dynamic, holistic approach that tackles both the agricultural value chain and the agricultural financing value chain with the aim of de-risking the agricultural business finance value chain. The mandate is hinged on five pillars: risk sharing; insurance; technical assistance; holistic bank rating mechanism; and bank incentives mechanism (Central Bank of Nigeria, n.d). NIRSAL guarantees loans offered to farmers through commercial banks. Out of the five pillars of NIRSAL operation, the two components that typically address risk management services as they relate to agricultural financing (as opposed to risk management services on account of the loss of farm produce) are risk-sharing facility and insurance facility. The risk-sharing facility component addresses banks' perception of high-risks in the agricultural sector by sharing banks' losses on agricultural loans. The insurance facility window has the primary goal of expanding insurance products for agricultural lending from current coverage to new products, such as weather index insurance, new variants of pest and disease insurance, etc. It should be noted that the weather index insurance is a new insurance product yet to be expanded and be extended to the smallholder farmers.

All other institutions offered indirect FRMS management services by linking farmers with an agricultural risk-bearing agency, in this case, NAIC. Bank of Agriculture, BoA, is an agency for agricultural lending that provides credit support to farmers from production to marketing of their produce. In carrying out its functions, the BoA encourages loan applicants to obtain the relevant risk cover from NAIC. The Agricultural Development Programme, the Federal Ministry of Agriculture, State Ministries of Agriculture and the Agriculture Department of Local Governments in carrying out their agricultural extension related activities also advise farmers to obtain relevant insurance cover from the NAIC.

The different institutions offering indirect risk management services tended to occasionally, offered some aid to some farmers in the event of a loss on account of a natural disaster. Such aids came via ex-post responses such as financial bailouts, debt forgiveness, and emergency response. However, none of these responses were optimal; they tended to be sufficiently deficient in providing a safety net for the poor; they tended to be inequitable and untimely, and they also tended to create a dependency that cannot be sustained (World Bank, 2005). Additionally, there had been some isolated instances of off the cuff transfer payments made by Federal, State, or Local governments to some farmers who were victims of

fire or flood. However, such transfer payments, when they ever occurred, had no bearing to the size and magnitude of the relevant risky event.

One of the available FRMS was the provision of financial support to farmers in the event of loss, and it was typically associated with the traditional services offered by insurance companies that were made available to clients registered with such companies. Smallholder farmers did not conveniently access and use such traditional insurance protection services, because they were not tailored to their needs in terms of types of risks covered, types of delivery channels, premium level, and types of claims documentation requirements. The challenge of accessing insurance cover against risk by smallholder farmers may be attributed to the low income of smallholder farmers in developing countries. Micro-insurance is advocated by various scholars to accommodate the needs and peculiarities of smallholders and rural farmers. This view is compatible with making a case for micro-insurance as opposed to just insurance (IFC, 2020b; AFRACA/FAO/LBoSA/WB, 2009). Micro-insurance tailored specifically for smallholder farmers have the potential to boost the confidence of smallholder farmers taking up an insurance cover. Another FRMS option available to smallholder farmers was linking the farmers with agricultural risk-bearing institutions. This is particularly advisory and does not in any way guarantee actual use by the farmers. The risk-bearing institutions mainly provided cover for smallholder farmers who applied to the formal financial institutions for loans. A credit risk guarantee is a formal risk management service instrument aimed at encouraging financial institutions to provide loans to farmers who borrow. The instrument guarantees a certain percentage of loans offered by the financial institution and hence bears the burden of the risk with the farmer. The provision of a credit risk guarantee is clearly for those farmers with the capacity to borrow. Ehiogu and Nwite (2018) observed that the objectives of risk management included an efficient pre-loss arrangement for the post-loss balance between resources needed and resources available to preserve the effective operation of the business. It is therefore evident that risk management is an integral part of farm management. To this extent, for the smallholder farm enterprise to be a going concern, the farmers expect to be provided with and therefore subscribe to FRMS tailored to the scale of their farm operations.

**Table 3. Formal Risk Management Services and Institutions Offering in Southeast Nigeria**

S/n	Institution	Function
<i>Direct FRMS</i>		
1	Nigerian Agricultural Insurance Cooperation (NAIC)	Provision of financial support to farmers in the event of loss to crop or livestock from natural disaster
2	Nigeria Incentive-Based System for Agricultural Lending (NIRSAL)	Credit risk guarantee for farmers
<i>Indirect FRMS</i>		
3	Bank of Agriculture (BOA)	Linking farmers with agricultural risk bearing institutions (NAIC, NIRSAL and CBN) to provide relevant risk cover
4	Agricultural Development Programme (ADP)	Advisory services
5	Federal Ministry of Agriculture	Advisory services; linking farmers to relevant agencies like NEMA to provide financial support to farmers affected by natural disasters (e.g. flooding)
6	State Ministry of Agriculture	Advisory services
7	Agric. Dept. of Local Govt.	Advisory services

Source: Field Survey, 2019

### 3.4 Proportion of Smallholder Farmers Using Formal Risk Management Services in Southeast Nigeria

Table 4 shows that approximately 37% of the smallholder farmers employed FRMS. The majority of the smallholder farmers represented by approximately 63% did not employ any FRMS. The majority of the smallholder farmers in Southeast Nigeria who used FRMS utilized the indirect formal risk management services as provided by the Bank of Agriculture, the Agricultural Development Programme, the Federal and State Ministries of Agriculture and the Agriculture Department of the Local Government Areas. All the formal risk management services-providing institutions were owned by the government. There was

no private participation in the public provision of formal risk management services. This evidence tends to buttress the argument of Poole (2017) that formal insurance is an important factor in rural development as a way of reducing poor people's vulnerability to external risks and enabling them to escape poverty traps. However, there is a need for the government at different levels to explore the benefits of public-private-participation in this service delivery.

Moreover, the proportion of the smallholder farmers who used FRMS is a pointer to the sufficiently deficient use of FRMS by smallholder farmers in Southeast Nigeria. This is worrisome considering that farming in southeast Nigeria is a high-risk venture due to the predominant dependence on the vagaries of weather. According to UN Monitor (2019), insurance and other market-based mechanisms fail to meet human rights criteria for responding to loss and damage associated with climate change.

**Table 4. Proportion of Smallholder Farmers Using Formal Risk Management Services**

Use/non-use of formal risk	Frequency	Percentage
Use	181	36.64
Non-use	313	63.36
<b>Total</b>	494	100

Source: Field Survey, 2019

### *3.5 Smallholder Farmers' Patronage of Risk Management Services Providers in Southeast Nigeria*

Table 5 shows the proportion of smallholder farmers who patronized formal risk management service providers. Majority, represented by 71.27%, utilized the services as provided by the Agriculture Department of the Local Government Areas. This was followed by 67.40% who utilized formal risk management services, FRMS, provided by State Ministries of Agriculture, while 50.01% of the smallholder farmers used FRMS provided by the Federal Ministry of Agriculture. Table 5 also shows that 18.78% and 17.68% of the smallholder farmers used FRMS provided by Agricultural Development Program and the Nigerian Agricultural Insurance Corporation respectively. The least number of smallholder farmers (approximately 1%) used FRMS provided by the Bank of Agriculture.

The poor patronage of FRMS elicited an in-depth analysis of factors affecting smallholder farmers taking up formal risk management services in the study area. The binary logistic analyses were used to measure the probability of change in the dependent variable as a result of a unit change in the independent variable. The derivation techniques indicated that neither the sign nor the magnitude of the marginal effects bore any relationship to the sign of the coefficients used in obtaining them (Greene, 1993). According to Rahji and Fakayode (2009) the positive sign implies that the probability of a farmers' choice relative to a reference (which in this case is taking up formal FRMS) increases with a unit increase in the value of the relevant explanatory variables. In other words, the probability of smallholder farmers taking up FRMS increased with a unit increase in the positive parameter. A negative parameter indicated that the

probability of choosing a formal risk management services decreased with a unit increase in the parameter.

**Table 5. Smallholder Farmers' Patronage of Formal Risk Management Services Providing Institutions**

Formal risk management service provider	*Frequency	Percentage
Nigerian Agricultural Insurance Corporation	32	17.68
Bank of Agriculture	1	0.55
Agriculture Development Programme	34	18.78
Federal Ministry of Agriculture	105	50.01
State Ministry of Agriculture	122	67.40
Agric. Dept. of Local Govt.	129	71.27
<b>N=181</b>		

Source: Field Survey, 2019 \*Multiple responses recorded

### *3.6 Factors Affecting Smallholder Farmers Taking up Formal Risk Management Services in Southeast Nigeria*

Table 6 shows that the coefficients for age, marital status, household size, and category of farming were significant at 1% and 5% levels of significance and statistically affected the smallholder farmers taking up FRMS. The log-likelihood result was -183.83187, and the likelihood ratio chi-square was 35.48. The result is statistically significant ( $P < 0.01$ ). The coefficient of age is positively signed; those of marital status, household size, and farming activity category are negatively signed. The coefficients for age, marital status, household size, and farming activity significantly affected the smallholder farmer taking up FRMS. The result of the marginal effect for age indicated that a unit increase in the age of the farmers would increase the probability of the farmers taking up formal risk management services by 0.39%. It can be argued that age significantly influenced smallholder farmers taking up FRMS in Southeast Nigeria. This may imply that older farmers were risk-averse and would seek FRMS from these institutions to mitigate risk. This finding is consistent with that of Chikezie et al. (2019) who found that age significantly influenced risk management strategies utilized by rice farmers in Ebonyi State Nigeria.

The result of the marginal effect for marital status indicated that married smallholder farmers in Southeast Nigeria had a 25.36% probability of not taking up formal risk management services compared to their counterparts who were single. This finding tends to imply that single smallholder farmers were

more likely to take up formal risk management services than the married farmers. This may be on account of the burden of payment of premiums that married smallholder farmers were less likely to bear, given that they shoulder a huge responsibility of catering for their families from their meagre farm earnings.

The result further shows that farmers with a large household had a 2.27% probability of not taking up formal risk management services and this is significant at 5% probability. It can be argued that the probability of taking up FRMS decreased with every additional member of the household. This may imply that the farmers were burdened with many family responsibilities and hence not be able to afford the premium for formal risk management services.

A unit increase in the number of farming activities engaged in by the smallholder farmers decreased the probability of the smallholder farmers taking up FRMS by 3.07%. It can be argued that the smallholder farmers increased the number of farming activities engaged in as a diversification portfolio aimed at risk management and may not see the need to further take up FRMS.

**Table 6. Coefficients of Factors Affecting Smallholder Farmers Taking up Formal Risk Management Services in Southeast Nigeria**

<b>Use of formal risk Management services</b>	<b>Coefficient</b>	<b>Std. Err.</b>	<b>Z</b>	<b>P&gt; z</b>
<b>Age</b>	.0198622	.0088143	2.25	0.024
<b>Education</b>	-.0154981	.0202087	-0.77	0.443
<b>Marital Status</b>	-.8833228	.2554812	-3.46	0.001
<b>Household size</b>	-.1131032	.0358882	-3.15	0.002
<b>Experience</b>	.00446	.0096142	0.46	0.643
<b>Income</b>	-4.06e <sup>-07</sup>	2.50	-1.62	0.105
<b>Farming activity</b>	-.1532436	.0650756	-2.35	0.019
<b>Constant</b>	.0575627	.4759143	0.12	0.904

**Log likelihood = -183.83187; No of Obs. = 494; LR Chi<sup>2</sup> (7) = 35.48;**

**Prob > chi<sup>2</sup> = 0.0000; Pseudo R<sup>2</sup> = 0.0880**

Source: Field Survey, 2019 Stata Output

### 3.7 Marginal Effects of Change in Dependent Variable as a Result of Unit Change in Independent Variables

The coefficients of the parameter estimate only provided the direction of the effect of the independent variables on the probability of the smallholder farmer taking up an insurance policy. They did not represent the actual magnitude of change or probabilities. The marginal effects were calculated to measure the change in the dependent variable as a result of a unit change in the independent variables. Table 7 shows that the marginal effect of age was .003988 ( $p < 0.05$ ), and that for marital status was -.25355868 and was statistically significant at 1% level of probability. The results further show that the coefficients of the marginal effect for household size and farming activity were -.022709 ( $p = 0.001$ ) and -.0307685 ( $p < 0.05$ ) respectively.

**Table 7. Marginal Effect of the Factors Affecting Smallholder Farmers Taking up Formal Risk Management Services in Southeast Nigeria**

Use of formal risk management services	dy/dx	Std. Error	Z	P> Z
Age	.003988**	.00175	2.27	0.023
Education	-.0031117	.00405	-0.77	0.442
Marital status	-.25355868*	.09112	-2.78	0.005
Household size	-.022709*	.00708	-3.21	0.001
Experience	.0008955	.00193	0.46	0.643
Income	-8.15e-08	.000000	-1.64	0.101
Farming activity	-.0307685**	.0129	-2.39	0.017

Source: Field Survey, 2019 Stata Output; \* and \*\* significant at 1% and 5% respectively

### 3.8 Barriers Encountered by Farmers in Taking up Formal Risk Management Services in Southeast

Table 8 shows that majority of the smallholder farmers represented by 78.95% stated that low income was a barrier to taking up FRMS. High input cost as a barrier to taking up FRMS was stated by 71% of the smallholder farmers. Poor access to insurance cover, and lack of awareness of the existence of formal risk management services as barriers to taking up FRMS were each stated by 56.27% of the smallholder farmers. Also, 50.81% of the smallholder farmers stated that the limited availability of land for farming constituted a barrier to taking up FRMS. While 45.55% of smallholder farmers stated that poor extension services were a barrier, the least number of respondents represented by 28.74% stated that lack of commitment to contract enforcement was a barrier to taking up FRMS. Low income was a barrier to taking up FRMS, as reported by a majority (78.95%) of the smallholder farmers. Low income is related



to what Torero (2011) referred to as the high risks of production and cycles of oversupply and price depression which create financial risks throughout the distribution chain and so inhibit investment and access to capital. Inhibited investments invariably include the inability to pay the premium associated with formal insurance services. High input cost as a barrier to taking up formal risk management services was stated by 71.26% of the smallholder farmers. This finding is consistent with that of Louw and Jordaan (2016) who in a similar study found that farmers complained about the costs of inputs, citing that they were too expensive and as a result, the farmers were forced to cut back on their input purchases and reduced their levels of production. As a consequence, the yield and income realized also declined. It should be stated that the barrier of high input cost tends to be associated with that of the inability to pay for formal insurance premiums. In the views of IFC (2020a) agricultural insurance and disaster insurance are either unavailable or prohibitively expensive in many developing countries. Poole (2017) asserts premiums may be too expensive for poor farmers, greater than the worst possible insurable outcome, and therefore may not be considered a prudent strategy by the smallholder farmers.

Poor access to insurance cover and lack of awareness of the existence of formal risk management services as barriers to taking up formal risk management services were each stated by 56.27% of the smallholder farmers. This finding is consistent with Poole (2017) who stated that the ability to manage income risk depends on access to credit, insurance, and contract terms. Lack of awareness of the existence of FRMS raises a question on the sincerity of the FRMS providers in reaching out to smallholder farmers who are predominantly rural dwellers. The high level of risk in agriculture and incidences of default in paying back loans tend to put the smallholder farmer at a disadvantage from accessing such services from FRMS. Also, a lack of awareness may indicate ignorance of insurance packages and stimulus tailored to the specific needs and abilities of the smallholder farmer.

Furthermore, 50.81% of the smallholder farmers stated that the limited availability of land for farming constituted a barrier to taking up FRMS. Smallholder farmers characteristically cultivate small landholdings. However, this barrier can be explained by the fact that population pressure has progressively reduced the available land for agricultural purposes. Farmers receive assistance from government when they, the farmers, are in groups. However, not all smallholder farmers are members of farmer organizations or unions. The smallholder farmers (45.55%) stated that poor extension services constituted a barrier to taking up risk management services. According to Louw and Jordaan (2016) the commonest support offered by the government is through extension services where farmers obtain information on good agricultural practices. It should be emphasized that the formal risk management services through government extension services are essentially advisory and do not indemnify against loss.

The least number of smallholder farmers (28.74%) stated that lack of commitment to contract enforcement was one of the barriers to taking up formal risk management services. Constrained commitment to a contract can come from any party to the contract. Contract breaches by a contractual counterpart constitute a clog in accessing FRMS. The FRMS providing insurance cover may be limited

by the mechanism used in determining and profiling the risk and the volume of loss incurred by the farmers. Poole (2017) observed that public policy is needed to strengthen market-supporting institutions to improve access to financial services and mechanisms for contract enforcement.

**Table 8. Frequency Distribution of Respondents according to Barriers to Taking up Formal Risk Management Services**

<b>Barriers</b>	<b>Frequency*</b>	<b>Percentage</b>
<b>Low income</b>	390	78.95
<b>Poor extension services</b>	225	45.55
<b>Limited availability of land for farming</b>	251	50.81
<b>High input cost</b>	352	71.26
<b>Poor access to insurance cover</b>	278	56.27
<b>Lack of awareness of the existence of formal risk management services</b>	278	56.27
<b>Lack of commitment to contract enforcement</b>	142	28.74

Source: Field survey data, 2019; \* (1= Crop; 2 = Livestock; 3= Poultry; 4= Fishery; 5= Multiple

#### **4. Conclusions and Policy Recommendation**

##### *4.1 Summary of Results and Conclusion*

Smallholder farmers face considerable losses of investment and income due to the risk and uncertainties inherent in farming; formal insurance programs have been recommended to help smallholder farmers adapt or mitigate risk. However, formal insurance is less likely to be taken up by smallholder farmers. This study, therefore, set out to examine the actual use of formal risk management services by the smallholder farmers in Southeast Nigeria. Secondary and primary data were used for the study. A simple random sampling technique was adopted in the choice of the respondents. Out of the 504 respondents selected for the study, data were successfully collected from 494 respondents. Descriptive and inferential statistics were used to analyse data. To determine factors affecting smallholder farmers' use of formal risk management services, a binary logistic regression technique was used to estimate the relationship. Considering the discrete nature of taking up insurance policies, a dichotomous dependent variable was constructed to indicate whether or not the farmers took up insurance policies.

Approximately, 37% of the smallholder farmers employed formal risk management services; 63% did not employ any formal risk management services. This finding is a pointer to the sufficiently deficient use of formal risk management services by smallholder farmers in Southeast Nigeria even in the face of climate change. The majority of the smallholder farmers utilized the indirect formal risk management

services as provided by the Bank of Agriculture, the Agricultural Development Programmes, the Federal and State Ministries of Agriculture and the Agriculture Department of the Local Government Areas. Only 17.68% of the smallholder farmers subscribed to and utilized the direct risk management services provided by the Nigerian Agricultural Insurance Corporation. All the formal risk management services-providing institutions were owned by government. There was no private participation in the provision of formal risk management services in Southeast Nigeria. The low use of FRMS implied that the available insurance policies were not tailored to the needs and budget of the smallholder farmers. This reinforces the advocacy for micro-insurance. Micro-insurance has the potential to boost the confidence of smallholder farmers taking up an insurance cover. It is expected to remove such stumbling blocks as collateral and expensive insurance premiums that had hitherto limited smallholder farmers' livelihood activities.

The majority of the smallholder farmers represented by 78.95% stated that low income was a barrier to taking up formal risk management services. High input cost as a barrier to taking up formal risk management services was stated by 71.26% of the smallholder farmers. Poor access to insurance cover and lack of awareness of the existence of formal risk management services as barriers to taking up formal risk management services were each stated by 56.27% of the smallholder farmers. The least number of smallholder farmers (28.74%) stated that a lack of commitment to contract enforcement was one of the barriers to taking up formal risk management services. The barriers identified in this study reinforce the argument for such targeted risk management services as the Global Index Insurance Facility.

Irrespective of the inherent risk of agriculture on account of its being a biological activity, there is sufficiently deficient use of formal risk management services by smallholder farmers in Southeast Nigeria. Majority of the smallholder farmers in Southeast Nigeria, who used formal risk management services, utilized the indirect formal risk management services (as provided by the institution which links farmers with agricultural risk-bearing agencies and in some isolated instances offer off-the-cuff transfer payments to some farmers who are victims of risky events). The very few smallholder farmers who utilized formal risk management services did so through the direct risk management services (as provided by the Nigerian Agricultural Insurance Corporation which offers financial support as indemnity to registered farmers in line with a contractual agreement in the event of loss on account of the occurrence of a specified risky event). In Southeast Nigeria, there is no private participation in the provision of formal risk management services.

#### *4.2 Policy Recommendation*

Based on the findings, the following recommendations are made:

- Government participation remains crucial in assisting smallholder farmers in developing countries to manage their risk. Public interventions could be in areas of investment in infrastructure and strengthening of institutions to promote information sharing and contract enforcement. The problem of land availability can also be solved through government support.

- The Federal, State and Local Governments should urgently review and thereby upgrade the risk management services offered to smallholder farmers. The smallholder farmers will be unable to profitably cope with the inherent risk involved in agriculture if the governments do not put in place clear-cut risk indemnifying services and strategies tailored to the capacity of the farmers.
- Micro-insurance, as opposed to insurance, should be provided by the governments for protecting the low-income smallholder farmers against specific mishaps in exchange for regular premium payments. Governments should ensure that the micro-insurance indemnity in the event of loss should be in proportion to the loss and also the premium payments should be in line with the capacity and needs of the smallholder farmers.
- Related to micro-insurance, the government should adopt the innovative index insurance approach to insurance provision that pays out benefits based on a pre-determined index or loss of assets and investments resulting from weather and catastrophic events, without requiring the traditional services of insurance claims assessors.
- Public-private partnerships in the provision of risk management services to farmers should be explored. This strategy will enable more smallholder farmers to obtain the relevant services. It is recommended that the government should lead the way in providing the enabling environment for such a partnership.
- Given the role played by the Nigerian Agricultural Insurance Corporation, NAIC, in providing formal risk cover to smallholder farmers, it is recommended that NAIC tailors its services to the needs of the smallholder farmers.

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