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Agriculture Insurance and Farmers Performance in Rwanda, A Case of National Agriculture Insurance Project

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Abstract

The general objective of the study was to investigate the effect of agriculture insurance on farmers' performance in Rwanda, a case of National Agriculture Insurance Project (NAIP). Specifically, the study examined farm production of insured famers before and after joining NAIP, assess farm income of insured famers before and after joining NAIP and evaluate savings level of insured famers before and after joining NAIP. The researcher conducted both descriptive and correlational studies. The study population was 241 farmers as cooperatives representative in NAIP. A sample size of 150 respondents was determined by the help of Solvin formula. The study used simple random sampling in selecting the respondents in the study. The study applied the following tools of data collection; questionnaire and documentary technique. The researcher adopted the descriptive and correlation analysis computed by Statistical Package for Social Sciences version 21. The study utilized multiple linear regression analysis to make inferences for the survey. After collecting data, the following results were obtained. Farm production correlated with farmers performance at positive strong correlation of r=0.935. Further, on farm income of insured famers before and after joining NAIP, the results showed that 18% and 29.3% showed very great extent and great extent respectively that monthly income has been increased,34.7% revealed that moderate extent. On the other hand, the person coefficient correlation showed that there is strongly positive correlation of 89.6% between farm income and farmers performance. The study concluded that farm production, income and savings level increased extremely after farmers joined NAIP. The study recommended that Agriculture agencies should encourage youths to invest in agriculture industry as the way of increasing agriculture productivity.

Keywords: *Agriculture Insurance, Performance, Productivity*

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1.1 Background of the Study

Farm coverage may be traced back to farmers and animal growers in Europe who formed cooperative health insurers in the 17th and 18th centuries. They banded together to protect their high-value fruit and vine crops from hail damage and their livestock from accidents and illness. Ex post to ex ante risk management strategies are becoming more popular with authorities. Desire for insurance products and risk management services has risen as a result. Innovation in agricultural insurers and effective application of financially successful farm insurance plans and services have been facilitated by associated with early between states and retail reinsurers (IIturrioz & Arias, 2016).

Spörri, Baráth, Bokusheva and Fertö (2015) studied how yield coverage affects agricultural profitability and found that it had a negative effect. A landowner's involvement in contract farming is significantly impacted by significant increases in harvest insurance payments. Latruffe *et al*, (2017) from 1990 to 2007 they looked at how farm subsidies impacted the technological efficiency of European agricultural producers. Random effect assessment and technique of instant simulations were employed in this research to assess the effectiveness and found that incentives used to have a positive influence in Spain and Portugal, a negative impact in Belgium and the United Kingdom, and no impact in Germany, France, Ireland and Denmark.

Zhu, Demeter and Lansink (2019) analyzed the effects of Common Agricultural Policy (CAP) funding in Sweden, Netherlands and Germany from 1995 to 2004 were examined in this research project. The researchers used a translog random effect model and found that in all 3 European nations, incentives had a detrimental impact on operating performance.

Yiran and Zhenyu (2022) stated that Politicians have debated endlessly over whether or not strategy crop coverage increases the incomes of farmers. When it comes to policy-oriented agricultural insurance and its impact on growers' revenue, this article first explains how it works from the theoretical perspective. A board of 31 provinces (autonomous regions and municipalities directly under the central government) in China from 2007 to 2019 is used to empirically examine strategy crop insurance's influence on farmers' incomes, notably the impact on growers of various income categories. Legislation crop insurance has a positive effect on farmers' incomes on the overall, but its impact on landowners of various income levels varies significantly and gets more pronounced as producers' revenue increases.

Armand, Rola and Corazon (2018) discovered that coverage schemes have a considerable positive influence on the revenue of rice growers in the Philippines, and that the average loss of unprotected properties is 94% larger than the average loss experienced by covered producers. Weldensie (2017) noted that agricultural coverage in Kansas should be evaluated for its influence on agricultural production (allocative efficiency and creativity). The direct and indirect effects on various efficiency metrics are evaluated using the Data Envelopment Analysis (DEA) method. There are three approaches to gauge the impact of subsidies on agricultural innovation and technological effectiveness. Using a 'catch-up' effect, a researcher can see how farm subsidies affects technological efficiency. Secondly, as a consequence of a frontier-shifting effect, crop insurance has a direct influence on technical innovation. Through using Malmquist indicator, researcher calculated an aggregate farm production index (i.e., the product of catch-up and frontier-shift impact).

There are three types of agriculture coverage: livestock, crop, and farmland property and equipment coverage programs. There are, even so, some issues with the farmland risk pool, such

as an insufficient amount of financial subsidy monies at the local level, a solitary form of coverage, the difference between the insurer study and real remuneration fee, the lack of understanding of growers' involvement in liability coverage and a major ethical dangers, even as the industry for crop coverage expands rapidly overall (Guozhu & Qiao, 2018).

Spörri, Baráth, Bokusheva and Fertö (2015) studied how yield coverage affects agricultural profitability and found that it had a negative effect. A landowner's involvement in contract farming is significantly impacted by significant increases in harvest insurance payments. According to Ashimwe (2016), unsecured Rwanda smallholding owners' yearly income was on average $100 lower than the income of covered growers, according to a study on the effect of crop coverage policies on Rwandan smallholding families.

1.2 Statement of the Problem

Regardless of the efforts of the Rwandan government and other entities to assist farmers and agricultural growth. Investing in agriculture is not as simple as investing in brick or mortar. When agricultural output fails or succeeds is determined not just by a landowners' agricultural knowledge, but also by climatic and environmental variables that are typically outside the grower's control. Three variables appeared from the research and group trips as barriers to succession plans farming and animal insurance which are a lack of distribution channels in the food crop sector, a preference for governance risk over production risk in the commercial crops sector and shortage of information in the cattle industry (Access to Finance Rwanda, 2012).

Daniel, Nana and Francis (2021) assessed access to and acceptance of agricultural insurance: a case study of smallholder farmers in Ghana According to the findings, small-scale farmers' accessibility to and acceptance of crop insurance is low (14%) and rare, yet many (90%) believe it is a beneficial instrument for dealing with agricultural hazards. Akinrinola, *Et al* (2014) studied farm coverage effects on Farming Productivity in Ondo State According to the findings, the farmers' participation in the insurance plan was motivated only by the availability of financing. Growers, on the other hand, confirmed that there was a rise in investing, which resulted in increased production.

Lucy (2015) analysed the impact of insurance products as a risk assessment strategy on the outcomes of large-scale maize producers in Kesses Subcounty, Uasin Gishu County, Kenya. The findings demonstrate that majority of the farmers recognize the benefits of using insurance as a control strategy to reduce losses caused by unforeseen situations. Based on the samples, many farmers are aware of agricultural insurance, although a significant percentage are not covered.

Several studies have been conducted on contribution of agriculture insurance Daniel, Nana and Francis (2021), Akinrinola, Olumide, Okunola and Akinbode (2014) as well as Lucy (2015) analysed the influence of agricultural insurance as a risk management tool on large studied the impact of agricultural insurance schemes on household income of but none of them examined the impact of Agriculture insurance on farmers performance in Rwanda with a case of National Agriculture Insurance Project.

Researcher found that agriculture is risky. Indeed, the exposure to a wide variety, complexity, and scale of risks can make it one of those rare activities where the risks are too high and the rewards too low. The researcher therefore finds it imperative to conduct a study which examined this particular field. As such, this study sought to investigate the effects of agriculture insurance and farmers' performance in Rwanda and none specifically from the case of NAIP.

1.3 Objectives of the Study

i. To examine farm production of insured famers before and after joining National Agriculture Insurance Project.
ii. To assess farm income of insured famers before and after joining National Agriculture Insurance Project.
iii. To evaluate savings level of insured famers before and after joining National Agriculture Insurance Project.

2.1 Empirical literature review

The section below describes numerous studies conducted on agriculture insurance and farm production, agriculture insurance and farm income, agriculture insurance and savings level as specific objectives of the study.

2.1.1 Agriculture insurance and farm production

Akinrinola, Olumide, Okunola and Akinbode (2014) the impact of the farm compensation scheme on Ondo State Agriculture Production Risk. A cross selection strategy was utilized to choose 120 insured producers from two county council regions, and data was collected from the producers through a well-organized survey. The acquired data was examined using statistical analysis. According to the findings, the producers' participation in the insurance plan was motivated only by the availability of financing. Producers, on the other hand, confirmed that there was an improvement in inputs, which resulted in increased production.

Agnieszka, *et al* (2022) Harvest Coverage, Soil Quality, and the Environment: A Path Forward in the European Union the TOPSIS (Technique for Order Preference by Similarity to an Ideal Solution) approach of arranging items is used in this essay. According to empirical findings, the degree of insurance coverage may encourage an improvement in soil production, thereby contributing to sustainable development. Crops with the greatest production level had a truly affordable premium that was twice that of farms with the lowest productivity level.

Yu, Aoron and Daniel (2018) A discussion of the findings and experimental adopt to the correlation Among Farming Security and Climate Uncertainties for Farming Product Utilization. Parameter estimation and hazard in the farming concept have been introduced to investigate the influence of farm subsidies and climate payments on farmers' production behavior. The environmental consequences of cultivation production operations play an essential part in policy disputes over the government's involvement in the agricultural sector of the economy. It has been suggested that federal measures that minimize a performer's yield generate possible motivations for the farmer to engage in environmentally destructive operations.

Daniel, Nana and Francis (2021) insurance products acceptance and connect directly: a case study of smallholder agricultural producers in Ghana. The research used a mixed-methodologies strategy that included both quantitative and qualitative methods. According to the findings, cultivators' participation to and acceptance of agricultural insurance is low (14%) and rare, yet many (90%) believe it is a beneficial instrument for dealing against farming hazards.

2.1.2 Agriculture insurance and farm income

Ashimwe (2016) assessed effect of crop insurance enrolment on Huye District family income in Rwanda. Using a moderately survey, 246 families were randomly selected to participate in a multi-stage random sampling technique. Farmer involvement and uptake of crop insurance were characterized using summary analysis. Huye District farmers were shown to be more likely to participate in crop insurance if they were a participant of a group (p=0.001), had access to drainage (p=0.060), had diversified crops (p=0.001), and were rich (p=0.004), according to a logit model. It was observed that the difference in family income between participants and non-participants was around US$100. This demonstrates that the weather index-based insurance had a beneficial influence on Huye District members' salaries.

Cai (2017) used the influence of an agricultural insurance model on household output, borrowing, and conserving conduct in China may be evaluated using both distinction and triple-difference estimates. A 20 percent increase in the production area of covered crops was observed when protection was implemented. Processing variety was also reduced as a result of this policy. A further research indicated that offering coverage increased credit demand by 25 percent, but reduced family savings by 30 percent. It became, however, no discernible impact on household earnings.

De Nicola (2016) estimated climate coverage on Malawian farmers' expenditure, infrastructure, and wellbeing using a dynamic stochastic optimization model. Research indicated that climate security might raise expenditure by over 17%, which is a significant rise in overall wellbeing. Weather-based insurance enabled farmers to use riskier, but more profitable, enhanced seeds, which boosted producer welfare benefits from higher revenues, according to a model expansion.

Varadan and Kumar (2018) growers in Tamil Nadu, India, were studied using the Simpson Index of Diversification (SID) to determine the level of agricultural production and the influence of farm subsidies. The research concluded that crop insurance had efficiently absorbed production risk and had encouraged farmers to specialize in a single crop. Furthermore, it was shown that insurance influenced the usage of high-value inputs to improve farm profits. As a result of factors such as access to finance, schooling and off-farm income, crop insurance uptake was considerably impacted by farmers' location.

2.1.3 Agriculture insurance and savings level

Marcien, Marcel and Jean (2020) studied an indicator crop insurance uptake in Burundi under restricted obligations was quantified by a population census and focus group talks, with particular attention paid to the impact of existing Village Savings and Loan Associations (VSLAs). Some 40 crop insurance users in the Gitega area of Burundi were surveyed, as well as another 40 people who had never purchased crop insurance. Attending VSLA meetings frequently, as well as saving money for the next month's premium payment, both increased the relative risk ratio (RRR) from 0.21 to 0.01, both significantly increasing insurance uptake. Accordingly, researchers advocate enhancing VSLAs' procedures, saving for future social security payments as negotiated and stipulated in the legislation, and encouraging landowners to administer their farms with coordinated agricultural management.

Clara (2015) quantified an indicator crop insurance uptake in Burundi under restricted obligations by a population census and focus group talks, with particular attention paid to the impact of existing Village Savings and Loan Associations (VSLAs). Some 40 crop insurance users in the

Gitega area of Burundi were surveyed, as well as another 40 people who had never purchased agricultural subsidies. Attending VSLA meetings frequently, as well as cutting costs for the next month's prepayments, both increased the relative risk ratio (RRR) from 0.21 to 0.01, both significantly increasing insurance uptake. Accordingly, investigators advocate enhancing VSLAs' procedures, saving for future social security payments as negotiated and stipulated in the legislation, and encouraging landowners to administer their fields with coordinated agricultural management.

Lucy (2015) sought to determine the impact of financial planning via crop insurance on sizable maize producers at Kesses Subcounty, Uasin Gishu County, Kenya, the. Cross-sectional quantitative approach was used in this study. The questionnaires were used to gather the information. According to the findings, large-scale farmers at least comprehend the benefits of taking out coverage as a form of risk management in the event of an unforeseen event. According to the sample, many farmers are aware of agricultural insurance, but a significant proportion of them have not yet taken out a policy.

2.2 Theoretical Review

The main theory underlying this study are Results based management theory, goal setting theory and decision theory. Those theories are reviewed in the following section.

2.2.1 Results Based Management Theory

In the mid-1980s, the Australian government pioneered the results-based management (RBM) idea; the theory gained popularity in the 1990s, helped by the organization for Economic Cooperation and Development (OECD). This theory is outcome-driven, as the name indicates. After studying earlier theories including government management, process improvement by action, goal setting, new public management (NPM), and total quality management (TQM), the Results Based Management Group (RBMG) saw how the results-based theory developed through time.

To put it simply, RBM is a management technique. To guarantee long-term success, all ground players who support to the attainment of specified development objectives must ensure that their activities, goods, and outputs contribute to the achievement of those goals. Results-based management (RBM) is based on clearly defined responsibility. As well as setting goals, it necessitates tracking and evaluating progress toward achieving those goals, which includes keeping track of one's own productivity (Crawford & Bryce, 2013)

Hwang and Lim (2013) illustrated the RBM model, As an ongoing way of regular, structured taxation based on the client input, replication, critique, data aggregation, analysis of particular performance (using indicators), and evaluate the development; Proper control necessitates the establishment of reliable information systems and the regular collection of relevant data. Most projects and programs begin with a certain amount of preliminary information to gauge how well they are doing so far. Agriculture insurance helps farmers to manage the input and output to maintain production gain. Effective management is very important technique used to increase the farm production. Hence research used result management theory to inspire the farmers to manage resources in effective manners.

2.2.2 Goal setting theory

As an approach philosophy, goal-setting was created in the early 1970s the theory's core concept is that a predefined objective may function as a performance motivator. Performance outcomes are likely to be better when specific objectives and tough quality standards are attached to them. The mere act of deciding on a goal may elicit strong feelings of motivation and drive. Interested parties are more likely to experience emotional pain if their objectives are not met, while those that are not more likely to cause them to feel dissatisfied (Lunenburg, 2011).

To better understand incentive, Latham and Locke (2007) incorporated goal setting theory into a long-term high-performance cycle (HPC). This theory holds, according to HPC, that a worker's engagement to a company is influenced by his or her level of job satisfaction and contentment with their work. Discontentment with one's employment might have a negative impact on one's dedication to the company. The circular nature of HPC is shown by the fact that work happiness promotes work engagement, which in turn leads to the setting of high objectives (Borgogni & Dello, 2012). The theory is applied in this research to support and clarifies how goal influence farmers to increase production, income as well as saving. The farmers work hard to achieve on its goals as he, she set before.

2.2.3 Decision theory

Leonard Savage's decision theory as published in his 1954 book the foundations of statistics, is unquestionably the most well-known normative theory of choice under uncertainty, particularly in economy and the technology in the context. Decision theory is concerned with strategies for selecting the best course of action when there are many options available yet their implications cannot be predicted with confidence. When the responsible party is aware of the real status of the world, decision theory dictates that she chooses the choice she believes is best. When she is unsure about the real condition of the world, she must decide how likely each of the potential situations is and choose the choice with the highest anticipated benefit compared to such possibility assessments (Stefánsson, Orri & Richard, 2019). Appropriate and effective decision is very important in improving performance of farmers. The theory explains how decision making help someone to reach on ambition.

2.3 Conceptual Framework

This study makes use of a conceptual framework to lay out the main concepts and variables to be examined, and the connections that exist between them. To put it another way, a conceptual framework is a method for organizing ideas to accomplish the goals of a study.

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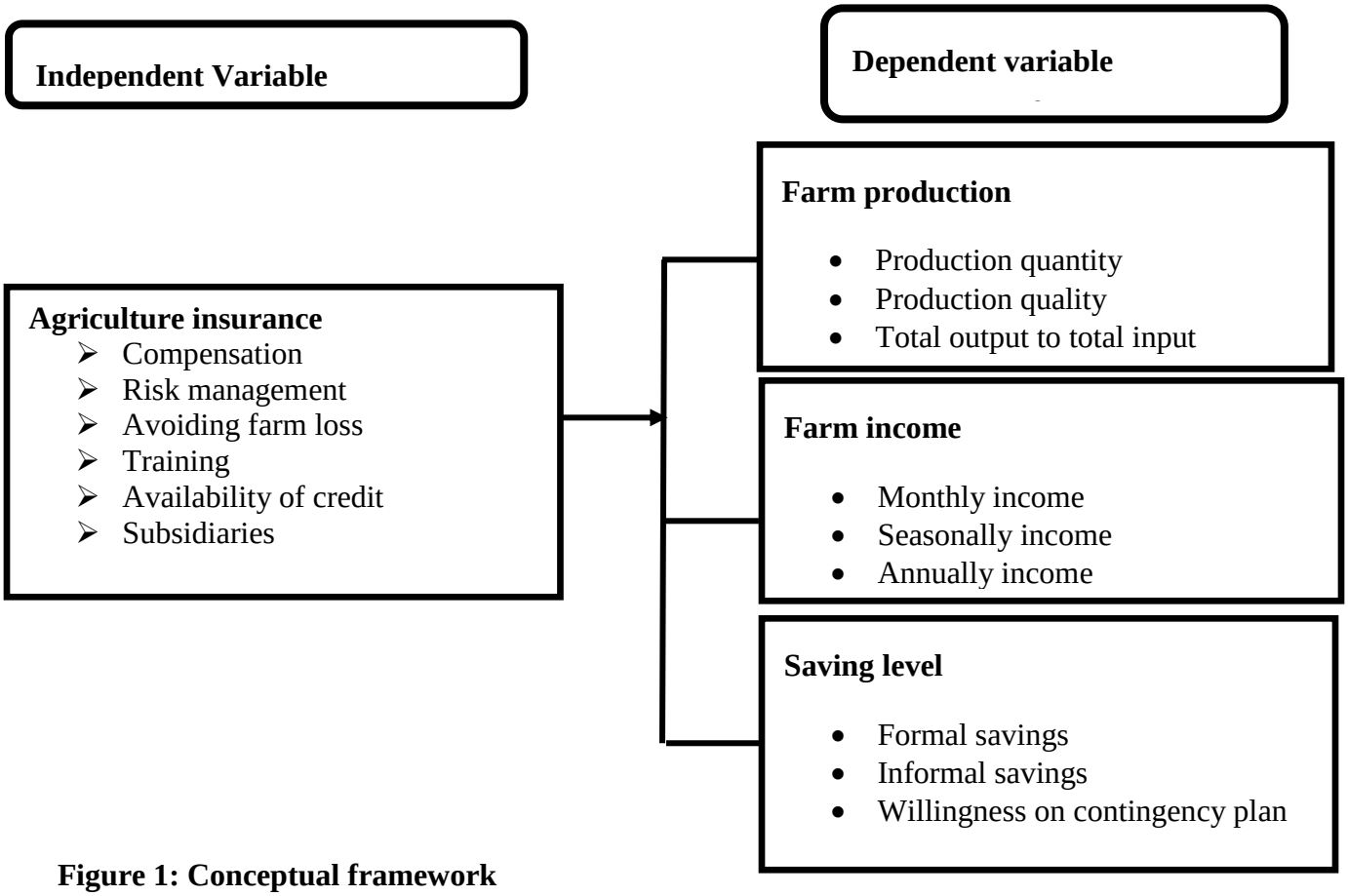

Figure 1: Conceptual framework

Source: Researcher Conceptualized, 2023

Independent variable of this study is agriculture insurance while dependent variable is farmers' performance with sub variables including farm production, farm income and saving level. Indicators of farm production are production quantity, production quality and total output to total input. Indicators of farm income are monthly income, seasonally income and annually income. Indicators of saving level are formal saving, informal saving and willingness on contingency plan. Agriculture insurance has effect on all those mentioned dependent variables.

3.0 Research Methodology

The scholar employed qualitative research methodologies due to the nature of the issue. It comprises method, which is often used as a synonym for any data gathering technique (such as a survey) or data analysis process that creates or utilizes actual information, including graphs or statistical analysis (Soeters, Shields & Rietjens, 2014). The researcher conducted both descriptive and correlational studies. The study population was 241 farmers as cooperatives representative in National Agriculture Insurance Project. Solvin formula was used to determine the sample size of 150 respondents as shown below.

$$n = \frac{N}{1 + N(e)^2}$$

Where n is the sample size, N is the population size, and e is the marginal of error (5%).

$$n = \frac{241}{1+241\ (0.05)^2} = \frac{241}{1+241\ (0.0025)} = \frac{241}{1.6025} = 150$$

Table 1: Sample size

Population Category	Population size	Sample size
Western Province	62	39
East Province	77	48
North Province	58	36
South province	34	21
City of Kigali	10	6
Total	**241**	**150**

Source: Project Manager, 2023

The study applied the following tools of data collection; questionnaire and documentary technique. Wilson and Ruiten (2013) defines questionnaire is a collection of inquiries that is often sent or delivered to participants and completed out by them without assistance from the interviewer. The inquiry is mostly made up of response options. Closed inquiries confine collectors as replies to certain solutions or selecting from a selection of options. The questionnaires were distributed to 150 Farmers insured by National Agriculture Insurance Project.

Soeters, Shields and Rietjens (2014) noted that Documentary is the investigation of data stored in containers, foundations of businesses, or concealed in the heart of a device. In this study, the investigator gathered pre-existing data by locating where it is housed or filed. This strategy was used by the researcher to collect relevant literature. The researcher employed selected documents throughout the historical analysis procedure after studying and assessing the significance of writings to this inquiry. Researchers organized them on papers and then input them into a computer for compilation. This is significant because it examines the academic papers and seeks global viewpoints in order to provide viewers with a comprehensive context for evaluation and discussion.

To confirm the validity and reliability of the questionnaires before they are given to the participants, the researcher conducted a well before. For also before the, a small sample of 10 people was selected at random. Cronbach alpha technique was used by the scholar to assess dependability. Increased dependability is indicated by a higher Cronbach's alpha value, which

ranges from 0 to 1. All items tested indicated alpha Cronbach of greater than 0.7 which confirms, data collection instruments are valid and reliable

The study utilized multiple linear regression analysis for making inferences to the survey. The following regression analysis model was used;

$Y_1=\beta_0+\beta_1X_1+Ɛ$, $Y_2=\beta_0+\beta_2X_2+Ɛ$ and $Y_3=\beta_0+\beta_3X_3+Ɛ$

Y_1 is Farm production, Y_2 is Farm income and Y_3 is saving level.

β_0 is constant coefficient

i. $\beta_{1\text{-}3}$ = Regression Coefficient

ii. ε = error term

X_1, X_2 or X_3 is agriculture insurance.

4.0 Findings and Discussions

This section discusses the data analysis as well as the interpretation of the findings. The general objective of the study was to determine the effect of agriculture insurance on farmers' performance in Rwanda, a case of National Agriculture Insurance Project.

4.1 Descriptive Statistics

The presentation is done basing on the following research objectives, to examine farm production of insured famers before and after joining National Agriculture Insurance Project, to assess farm income of insured famers before and after joining National Agriculture Insurance Project and to evaluate savings level of insured famers before and after joining National Agriculture Insurance Project.

4.1.1 The farm production of insured famers before and after joining National Agriculture Insurance Project

This section reveals the farm production of insured famers before and after joining National Agriculture Insurance Project, responses were analysed using Likert scale ranging from No extent (N.E), Little extent (L.E), Moderate extent (M.E), Great extent (G.E) and Very great extent (V.G.E) trough percentages, mean and standard deviations were also provided. Researcher was interested in asking such as question to establish the effect of agriculture insurance project on the farmers' performance.

Table 2: The farm production of insured famers before and after joining National Agriculture Insurance Project

Responses		N.E	L.E	M.E	G.E	V.G.E	Mean	St. Dev
Production quantity from my farm have been increased	**Before**	16.7	34.0	32	12	5.3	2.6	1.07
	After	0.7	1.3	21.3	40	36.7	4.1	.82
There is an improvement on production quality	**Before**	12.7	33.3	32.7	13.3	8	3	1.5
	After	0.7	1.3	18	41.3	38.7	4.2	.81
Total output from my farm was greater than total input	**Before**	9.3	28	43.3	13.3	6	2.8	0.99
	After	1.3	2	16.7	42	38	4.1	.85
Farmers are knowledgeable for agriculture production strategies	**Before**	2.7	30	46.7	12	8.6	3.2	1.4
	After	0.7	2.7	16.7	42.7	37.3	4.1	.83
Farmers overcome the challenges inhibited their production	**Before**	4.6	26.7	46.0	16.0	6.7	2.9	.94
	After	1.3	2.7	12.7	44.0	39.3	4.2	.84

Source: Primary Data (2023)

Table 2 displays the farm production of insured famers before and after joining National Agriculture Insurance Project. The results indicated that production quantity from the farm have been increased at little extent before farmers joining agriculture insurance. Further, respondents agreed at the lowest mean of 2.6 and high standard deviation of 1.07. Meanwhile the findings confirmed that there is significance increasing of production quantity after joining agriculture insurance. Also, respondents confirmed that production quantity from farm have been increased at mean strong mean of 4.1 and slightly different of standard deviation of 0.82.

When researcher asked respondents whether there is an improvement on production quality the responses showed significance variation before and after farmers joining agriculture insurance project. Basing on the measurement tendency, there is an improvement on production quality before farmers joining agriculture insurance at mean of 3 and standard deviation of 1.5. On whetehr the results become more positive after farmers joining agriculture insurance project, the results confirmed by mean high mean of 4.1 and low standard deviation of 0.81. Majority of respondents indicated that total output from my farm was greater than total input at moderate level as indicated by results with a mean of 2.8 and standard deviation of .99. Contrary, the results showed that majority of respondents affirmed that total output from farm was greater than total input after joining agriculture project as shown by a mean of 4.3 and standard deviation of 0.85.

The researcher observed that farmers are knowledgeable for agriculture production strategies before joining agriculture insurance project. The responses had mean of 3.2 and highest standard deviation of 1.4. The findings showed big variation after farmers join the agriculture insurance

project, 37.3% and 42.7% affirmed that very great extent and great extent respectively the farmers are knowledgeable for agriculture production strategies followed by 16.7% indicated moderate extent. At the end, 2.7% and 0.7% admitted that little extent and No extent. Addition, majority of respondents agreed at mean of 4.1 and standard deviation of 0.83. Concerning to farmers overcome the challenges inhibited their production before joining agriculture insurance project, the statement had low mean of 2.9 and high standard deviation of 1.9. Despite, farmers overcome the challenges inhibited their production after joining agriculture insurance project at significance level, majority of respondents confirmed at 39.3% revealed that very great extent, 44% responded that great extent, 12.7% asserted that moderate extent, 2.7% stated that little extent and 1.3% asserted that No extent. On the other hand, the respondents confirmed the statement at high mean of 4.2 and standard deviation of 0.80 meanwhile statement was confirmed at mean of 4.29 and standard deviation of 0.84.

The agriculture insurance project facilitates farmers to increase production due to numerous advantages gained by insured farmers, farmers are able capable to be compensated once crops or livestock are attacked by diseases or insects. Additional, agriculture insurance projects provide training, quality of seeds and advanced agriculture method to be applied leading to the increase of quantity and quality of production. Agriculture insurance is very important practices helping farmers to minimize, mitigation and avoiding natural adverse events that affect farmers' production. Agriculture insurance is regarded as one of the most effective methods for addressing agricultural risks and motivating farmers to adopt cutting-edge production techniques with more potential for higher-quality and better yields. One strategy used by farmers to maintain farm income and investment and protect against the catastrophic effects of losses caused by natural disasters or low market prices is agricultural insurance. In addition to stabilizing farm income, crop insurance enables farmers to resume production following a difficult agricultural year. The study agreed with the research done by Agnieszka, *et al* (2022) who indicated that the degree of insurance coverage encourage an improvement in soil production as well as farmers production, thereby contributing to sustainable development

4.1.2 The farm income of insured famers before and after joining national agriculture insurance project

This section emphasizes on farm income of insured famers before and after joining national agriculture insurance project, the researcher asked this question to assess the extent to which agriculture insurance facilitates farmers to increase their income. Recently in order to minimize the farmers loss insurance is important aspects.

Table 3: The farm income of insured famers before and after joining national agriculture insurance project

Responses	(%)	N.E	L.E	M.E	G.E	V.G.E	Mean	St. Dev
Monthly income has been increased	**Before**	2	16	34.7	29.3	18	3.45	1.02
	After	0.7	0.7	19.3	45.3	34.0	4.11	.78
There is significance increase on seasonally income	**Before**	1.3	22	35.3	26.7	14.7	3.31	1.01
	After	0.7	2	20	44.7	32.7	4.07	.81
Annual revenue rose compared to the previous year	**Before**	2.7	20.7	34.7	28.7	13.3	3.29	1.02
	After	0.7	0.7	20	43.3	35.3	4.12	.79
There is appreciation on agriculture income	**Before**	3.3	12	46	26	12.7	3.32	.95
	After	1.3	2	18.7	44.7	33.3	4.07	.84
Predicted income has grown more than the way farmer was expected	**Before**	4	15.3	47.3	18.7	14.7	3.24	1.01
	After	2	2.7	22.7	40.7	32	3.98	.91

Source: Primary Data (2023)

The Table 3 displays farm income of insured famers before and after joining national agriculture insurance project. The responses had mean of 3.45 and standard deviation of 1.02. However, the monthly income has been increased extensively during the time farmers joined in agriculture insurance project, the following responses were obtained majority of respondents agreed 34% indicated very great extent, 45.3% responded that great extent, 19.3% said that moderate extent, 0.7% chose little extent and 0.7% revealed that No extent. Also, the responses had strong mean of 4.11 and standard deviation of 0.78. Researcher interested in knowing whether there is significance increase on seasonally income. On the other hand, the results showed significance increasing of results after farmers joined in agriculture insurance project, as shown by the strong mean of 4.07 and standard deviation of 0.81

The study was interested in knowing whether annual revenue rose compared to the previous year, the following results were observed in both approach before and after farmers joined in agriculture insurance project. The findings showed that annual revenue rose compared to the previous year after farmers joining agriculture insurance project at positive level. The respondents affirmed the statement at mean of 4.12 and standard deviation of 0.79.

The findings indicated that there is appreciation on agriculture income, the responses had mean of 3.32 and standard deviation of 0.95. On the other hand, the results showed that there is appreciation on agriculture income after farmers joining agriculture insurance project. The statement was

confirmed at mean of 4.07 and standard deviation of 0.84. Lastly, the respondents affirmed that predicted income has grown more than the way farmer was expected before joining agriculture insurance project with a mean of 3.24 and standard deviation of 1.01. On the other hand, predicted income has grown more than the way farmer was expected after farmers joining agriculture insurance project. The responses indicated mean of 3.98 and standard deviation of 0.91.

The farmers get opportunity of increasing income from participating in agriculture insurance project due to numerous assistances offered by insurance projects, farmers eradicate and maximize revenues obtained from farm production. Farmers have more chance of getting return on investment even seeds and fertilizers are planting in high risk, the chance of becoming self-sufficient and less affected agriculture circumstances since the insurance companies compensated damaged crops. The findings concurred with results of Varadan and Kumar (2018) who stated that crop insurance had efficiently absorbed production risk and had encouraged farmers to specialize in a single crop. Furthermore, it was shown that insurance influenced the usage of high-value inputs to improve farm profits.

4.1.3 The savings level of insured famers before and after joining National Agriculture Insurance Project

This subsection shows the information related to the savings level of insured famers before and after joining National Agriculture Insurance Project. It focuses on the various ways agriculture insurance support farmers to increase the savings due to the increase of production and income. The findings were analysed using percentage, mean and standard deviation

Table 4: The savings level of insured famers before and after joining National Agriculture Insurance Project.

Responses		N.E	L.E	M.E	G.E	V.G.E	Mean	St. Dev
Farmers employed both traditional tactics and savings groups	**Before**	2.7	3.3	49.3	26.7	18	3.5	.91
	After	0.7	10	24.7	34	30.6	3.8	0.7
On regular basis, farmers save money in savings accounts	**Before**	6	14	44.7	24	11.3	3.2	1.01
	After	0.7	8	18.7	44.6	28	3.91	.91
Monthly savings amount has been increased	**Before**	4.7	22.7	34	26.7	12	3.18	1.06
	After	0.7	7.3	18	44	30	3.95	.91
Farmers have a contingency plan for their future	**Before**	12.7	26	26.7	26	8.7	2.9	1.17
	After	0.7	2	27.3	40	30	3.96	.84
My saving can save me for every situation	**Before**	16.7	22.7	29.3	23.3	8.0	2.83	1.19
	After	0.7	3.3	31.3	38	26.7	3.86	.87

Source: Primary data (2023)

Table 4 shows that the savings level of insured famers before and after joining National Agriculture Insurance Project. The study established that farmers employed both traditional tactics and savings groups after joining National Agriculture Insurance Project, the responses had mean of 3.5 and standard deviation of 0.91. Although, farmers employed both traditional tactics and savings groups after joining National Agriculture Insurance Project, the respondents affirmed this with a mean of 3.8 and SD of 0.99. Furthermore, researcher asked whether farmers save money in savings accounts after joining National agriculture Insurance Project. The respondents affirmed the statement at mean of 3.2 and standard deviation of 1.01. On the other hand, the findings showed that farmers save money in savings accounts after joining National agriculture project at appreciation level. The responses had mean of 3.91 and standard deviation of 0.91.

The responses indicated that monthly savings amount has been increased. This was confirmed at mean of 3.18 and 1.06 standard deviation. When researcher asked respondents whether monthly savings amount has been increased after farmers joined National Agriculture Insurance project, the number has increased in positive way, 30% responded very great extent, 44% showed that great extent. Also, the results were confirmed by strong mean of 3.95 and low standard deviation of 0.81Farmers have a contingency plan for their future before joining National Agriculture Insurance project, results were low because there is significance variation before and after farmers join National Agriculture Insurance Project. Respondents agreed the responses at mean of 2.9 and standard deviation of 1.17. On the other hand, farmers improved the contingency plan for their future after joining National Agriculture Insurance project as indicated by results with a mean of 3.96 and standard deviation of 0.84. Finally, researcher asked respondents whether farmers' saving can save them for every situation before joining National Agriculture Insurance Project, the responses had mean of 2.83 and standard deviation of 1.19.

Agricultural insurance is a useful tool for transferring risk and is important for enhancing the robustness of agricultural output, minimizing the losses brought on by natural disasters to agricultural production, and safeguarding farmers' overall income. Also, it is important for transferring financial risks, economic compensation, and agricultural risks leading to the improvement of farmers' savings level. Agriculture insurance reduces risks affecting farmers through obtaining credits and enhancing farm liquidity through various financial facilitates crop leading to the increasing of incoming as well as savings. Further, through risk balancing is important technique encourage investors to invest in agriculture sector. Affordable and sufficient agriculture insurance project is crucial catalyst pushing investors to make agriculture business

The study is concurred with the research done by Clara (2015) who conducted research about contribution of agriculture insurance on the farmers' performance in Japan, the findings showed that agriculture insurance help farmers to mitigate losses caused by disasters as well as increasing income. Further, he added that agriculture insurance is approach help farmers to increase output compare to input and make farmers to be safeguard

4.1.4 Performance of farmers

The research assessed the contribution of agriculture insurance project on the performance of farmers using various indicators as shown in below table. Responses were summarized in table 5 as follows.

Table 5: National Agriculture insurance project and performance of farmers

Statements	SA	A	N	D	SD	Mean	St. Dev
Agriculture insurance supports in the expansion of my farm.	42	52.7	1.3	2.7	1.3	4.31	.75
There has been no loss from the day farmer joined this insurance	47.3	40	4.7	7.3	.7	4.26	.9
Insurance benefits contributed in market competition	38.7	49.3	3.3	6.7	2	4.16	.92
Because to this insurance, farmers are able to practice modern agriculture	44.4	53.3	0.7	1.3	0.7	4.38	.64
Insured farmers are able to meet personal needs as well as those of family	39.3	50	3.3	6	1.3	4.2	.86

Source: Primary data (2023)

Table 5 illustrates the National Agriculture insurance project and performance of farmers Project. The researcher was interested in knowing whether Agriculture insurance supports in the expansion of my farm. The findings indicated that greater number of respondents agreed with mean of 4.31 and standard deviation of 0.75. Also, the study revealed that there has been no loss from the day farmer joined this insurance, the findings showed that 47.3% strongly agreed and 40% agreed with strong mean of 4.26 and standard deviation of 0.90.

The respondents indicated that insurance benefits contributed in market competition. The findings showed that 38.7% strongly agreed and 49.3% agreed with highest mean of 4.16 and low standard deviation of 0.92. The study indicates that National Agriculture Insurance project encourage farmers to practice modern agriculture at agreement of 44.4% strongly agreed and 53.3% agreed, 0.7% were neutral at mean of 4.38 and standard deviation 0.64.

Finally, respondents revealed that insured farmers are able to meet personal needs as well as those of family with a strong mean of 4.2 and standard deviation of 0.86. National agriculture insurance project enhances performance of farmers in various aspects, the production of farmers increases due to farmers use quality seeds, fertilizers as well as getting new agriculture skills obtained from training provided by projects. Additional, National agriculture insurance projects cover different losses caused by natural circumstances as well as disasters affecting crops and livestock. The study agreed the research of Varadan and Kumar (2018) who indicated agriculture insurance cover disasters and risks beyond farmers control make them to sort out the negative effect affecting farmers' production, income and savings. They added that a crop insurance plan helps to stabilize agricultural production and lessens the negative effects it has on farmers' livelihoods.

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4.2 Correlational Analysis between National Agriculture Insurance Project and performance of Farmers

Researcher applied correlational analysis to measure the relationship between independent variables and dependent variable. Independent variables were constituted by farm production, farm income and savings level while dependent variable is farmers' performance. The results are shown in the below table.

Table 6: Pearson Correlation Matrix

		Farm production	Farm income	Saving level	Farmers performance
Farm production	Pearson Correlation	1.000			
	Sig. (2-tailed)				
Farmers income	Pearson Correlation	.970**	1.000		
	Sig. (2-tailed)	.000			
Saving level	Pearson Correlation	.921**	.953**	1.000	
	Sig. (2-tailed)	.000	.000		
Farmers performance	Pearson Correlation	.935**	.896**	.886**	1.000
	Sig. (2-tailed)	.000	.000	.000	

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Primary data, 2023

The table 6 indicates how independent variables correlated with dependent variable, the results showed that there is high positive relationship between farm production and performance of farmers' production because of the positive value for correlation coefficient. National agriculture insurance project facilitated farmers to increase production leading to the performance of farmers at high positive correlation of 0.93.5 (93.5%). Thus, farmers increase production if they participate in National agriculture insurance project due to numerous benefits gained by farmers taking services provided by National Agriculture Insurance project. Further, the finding indicated that farm income increases at high positive correlation once the farmer joins the National Agriculture Insurance project where the results indicated coefficient correlation of .896 (89.6%). The losses caused by unexpected natural events reduced if farmers involved in National agriculture Insurance project since all damaged crops and livestock are covered by insurance companies for insured farmers.

Further, the findings indicate that there is strong correlation between saving level and farmers performance where researcher observed that farmer who participates in National Agriculture Insurance Project improve the level of savings enhancing farmers performance at strong positive correlation of .886(88.6%). All results showed that there is statistically significance due to p-value

is 0.000 which is less than 0.01 as suggested by SPSS program. The findings agreed with Guozhu and Qiao (2018) who said that Agriculture insurance worldwide is the means of assisting agriculture sector to react and manage quickly to production as well as supporting farmers to get financial resources needed to invest in agriculture practices to increase the production, income and savings level through minimizing risks and losses.

4.3 Regression analysis

This section illustrates the relationship between independent variable (agriculture insurance) and dependent variable which is farmers' performance. Analysis was done using regression linear to find out the effect of agriculture insurance on the farmers performance a case study of National agriculture insurance project. The components of independent variable are farm production, farm income and savings level. In this study model summary, variances and coefficients of variables were determined as shown in the following tables.

Table 7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.943[a]	.890	.888	1.30675

Source: Primary Data (2023)

a. Predictors: (Constant), farm production, farm income, saving level

Table 7 shows that regression analysis revealed (R = .943) which is a favorable connection while the R square of 0.890 indicated that the model's predictors, farm production, farm income and saving level computes an 89% correlation with the dependent variable as farmers performance. Further, the research concluded that combination of all components of independent variable raise farmers' performance.

Table 8: Analysis of Variance (ANOVA)

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	2015.329	4	671.776	393.402	.000[b]
Residual	249.311	146	1.708		
Total	2264.640	150			

Source: Primary Data (2023)

a. Predictors: (Constant), farm production, farm income, saving level

b. Dependent Variable: Farmers performance

Table 8 shows that the model indicates that 89% of the differences in farmers performance (2015.329 out of 2264.640), while other variables not captured by the model where it can explain

11% percent (249.311 out of 2264.640). F value of the model is 393.402, where significantly different from zero. P-value of 0.000 is below predetermined level which indicates statistical significance of independent variables to the dependent variable.

In recommendation, the model is good to indicate the performance of farmers

Table 9: Regression coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	3.574	.563		6.342	.000
Farm production	1.076	.107	1.136	10.052	.000
Farm income	.421	.139	.639	2.019	.000
Saving level	.349	.080	.397	4.373	.000

Source: Primary Data (2023)

i. Dependent Variable: Farmer Performance

Table 9 shows the responses of the regression coefficients. The farmers' performance was established through determination of unstandardized coefficients (B). In reference to the T-statistics, the higher farm production, farm income and saving level has direct influence to the performance of farmers. Where the results indicated that agriculture insurance influence farmers performance through farm production, farm income and saving level, the results showed that farm production (=1.076), farm income (= 0.421), saving level (=0.349).

In addition to, a unit change in farm production from participating in National agriculture insurance project would lead to the farmers performance at multiple of 1.076, the greatest predatory of the study, any factor change in farm income due to participating in National agriculture insurance project would contribute to the farmers performance at 0.421 times, and a section change in farmer saving level rom National agriculture insurance project leads to farmers performance at 0.349 times. All p-values in the research were less than 0.05, it explains that variables are statistically confirming independent variables influence farmers' performance as dependent variables significantly. The study concurred results of Weldensie, Jason and Ben (2017) who indicated that agriculture insurance project influence performance of farmers through increasing production, advising farmers to apply modern agriculture, working financial institutions and sensitizing farmers to make savings as the way of improving life standard.

4.4 Results of Hypotheses Testing

This section indicates the linear regression model summary. Hence, the table indicates (R^2), the essential effects so as to confirm whether hypotheses are acceptable or reject according to the results of hypothesizes test.

Table 10: Results of Hypotheses Testing

Hypothesis developed	Beta (β)	P-values	Decision on Ho	R^2
Farm production	1.136	.000	Rejected	
Farm income	.639	.001	Rejected	
Savings level	.397	.000	Rejected	.890

Source: Primary Data (2023)

Table 10, the first hypothesis revealed that there is no statistically variation on farm production of insured famers before and after joining National Agriculture Insurance Project, the second hypothesis relates that There is no statistically variation on farm income of insured famers before and after joining National Agriculture Insurance Project and third hypothesis indicates that there is no statistically variation of savings level of insured famers before and after joining National Agriculture Insurance Project. All hypothesizes are rejected because p-value were less than 0.005 which means that all variables have significantly on the farmers performance. The findings showed that National agriculture insurance project has big contribution on the farmers' performance in consideration of farm production, farm income and boosting famers to save since income increases due to production obtained once farmers working with National agriculture insurance project.

5.0 Conclusions

The study concluded farm production of insured famers before and after joining National Agriculture Insurance Project increased, agriculture insurance project helps farmers to increase the quantity and quality of where input invested by farmers generated more output. The more strategies and knowledge are improved to the farmers because they join National agriculture insurance project. Agriculture insurance is designed to help farmers to mitigate, manage and get the adequate skills needed to increase the quantity and quality of agriculture production.

The study also concluded that farm income of insured famers before and after joining national agriculture insurance project, the findings of this research show that the monthly income of farmers, seasonally income and annual revenue has increased at significance level after farmers joined National Agriculture Insurance project. Training and agriculture assistances provided to the farmers boost income generated by agriculture sector.

The study confirmed that savings level of insured famers before and after joining National Agriculture Insurance Project increased, monthly income, farmers save money in savings accounts increased extensively after farmers join National agriculture insurance project. The farmers improve knowledge about important of savings after working with project as the way of helping farmers to have better life once crops and livestock affected by unexpected situation.

The overall conclusion, showed that farmers increased production, income and savings leading to the farmers' performance. Moreover, positive and significance farm production, income and savings level increased extremely after farmers joined National agriculture insurance project. Agriculture insurance plays significance contribution to the increase of production, minimizing agriculture risks and losses, income and farmers performance.

6.0 Recommendations

The study has demonstrated that agriculture insurance project contributes to farmers' performance. However, the results showed that the variation decreases from farm production to savings level, thus research recommended farmers to increase the savings as the farm production increased.

The results showed that small number of female are involved in National Agriculture Insurance Project. Hence research suggested National Agriculture Insurance project to encourage female to participate agriculture insurance. The findings showed that small number of youths are working in agriculture practices. Therefore, research recommended that concerning agencies in agriculture sector to encourage youths to invest in agriculture industry to increase agriculture productivity.

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