Poverty Eradication through Maize Production Initiative and Household Income: A Case of Kamwenge Sub County in Kamwenge District Uganda.

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ABSTRACT

The study Investigate the relationship between poverty eradication through maize production and household income in Kamwenge Sub County, Uganda. Its objectives were to examine the influence of maize products, maize markets, and improved maize seed varieties on household income. Using a quantitative approach and correlation design, the research surveyed 195 participants from a population of 378, with data collected via structured questionnaires and analyzed using SPSS. The findings revealed a significant positive relationship between maize products, maize markets, improved maize seed varieties, and household income ($p = 0.000 < 0.05$; $p = 0.000 < 0.05$; $p = 0.019 < 0.05$, respectively). The study concludes that maize production initiatives can significantly increase household income and improve the livelihoods of maize farmers, thus contributing to poverty reduction. It recommends that policymakers invest in targeted poverty eradication initiatives that support maize production, aiming to enhance income and promote sustainable agricultural development.

Keywords: Poverty Eradication, Maize Production, Household Income

INTRODUCTION

In many non-African nations, particularly in Latin America and parts of Asia, maize has been vital to agricultural growth and poverty reduction. Its flexibility and high yields have made it central to agricultural reforms aimed at improving food security, rural incomes, and economic growth. Mexico, the historical origin of maize, has long relied on it for rural development and food security, adopting high-yielding varieties during the Green Revolution. India expanded maize cultivation in the 1990s, and by 2007, maize was integral to the National Food Security Mission. In China, maize gained importance under agricultural reforms in the 1980s, contributing to rural development and poverty reduction, particularly through hybrid varieties. Brazil also embraced maize in the late 20th century as part of its strategy to combat poverty, most notably through President Lula's Zero Hunger program. Despite economic challenges and structural adjustment programs (SAPs) in the 1980s that liberalized agricultural markets and reduced subsidies, maize remained essential for smallholder farmers. SAPs opened new opportunities for private sector participation and international trade. In the 1990s, African governments and international development organizations focused on food security and poverty reduction, recognizing maize as a critical crop. Southern Africa, through the Southern African Development Community (SADC), emphasized maize for regional food security, while the Comprehensive Africa Agriculture Development Programme (CAADP) in 2003 prioritized maize for rural economic growth. Countries like Tanzania and Ethiopia integrated maize into their poverty reduction strategies, with Ethiopia's Agricultural Growth Program and Tanzania's Kilimo Kwanza project promoting maize as a key crop for improving food security and reducing poverty. During the Millennium Development Goals (MDGs) period

(2000–2015), maize played a significant role in poverty reduction and food security efforts in Africa, especially in the context of MDG 1 (Eradicate Extreme Poverty and Hunger). Programs like the Millennium Villages Project emphasized maize production through high-yielding varieties and improved farming practices. In the Sustainable Development Goals (SDGs) era (2015–2030), maize continues to be central to achieving SDG 1 (No Poverty) and SDG 2 (Zero Hunger), with countries like Zambia, Kenya, and Uganda integrating maize cultivation into broader agricultural programs aimed at enhancing rural livelihoods and food security. Initiatives like Kenya's National Accelerated Agricultural Inputs Access Program and Uganda's Operation Wealth Creation focus on improving market access, agricultural infrastructure, and access to hybrid maize seeds and fertilizers.

In Uganda, maize has become increasingly vital for poverty alleviation and food security. Historically grown for subsistence during the colonial period, maize gained importance due to its high yield and adaptability to various agro-ecological zones. After independence in 1962, while cotton and coffee dominated agricultural policies, maize began receiving more attention as part of efforts to ensure food security. Investments in maize research and extension services grew, though maize remained secondary to export crops. During the 1980s, Uganda adopted Structural Adjustment Programs (SAPs), which liberalized agricultural markets and removed subsidies, negatively impacting maize production. However, the private sector's involvement in maize marketing increased, opening up new market opportunities for smallholder farmers. In 1997, the Ugandan government introduced the Poverty Eradication Action Plan (PEAP), recognizing maize as a key crop for both food security and income generation. The PEAP supported improved seed distribution, farmer training, and market linkages, emphasizing maize's role in reducing poverty and improving rural livelihoods.

In the early 2000s, Uganda implemented the Plan for Modernization of Agriculture (PMA) to transition subsistence farming into commercial agriculture. Central to this was the National Agricultural Advisory Services (NAADS), which provided smallholder farmers with modern technologies, such as high-yield maize seeds and fertilizers, and improved market access. During the Millennium Development Goals (MDGs) period (2000–2015), maize was integrated into strategies aimed at poverty eradication. In 2013, the government launched Operation Wealth Creation (OWC) to enhance agricultural productivity through the distribution of maize seeds and modern farming methods. Under the Sustainable Development Goals (SDGs) from 2015 to 2030, maize remains vital for achieving SDG 1 (No Poverty) and SDG 2 (Zero Hunger). Uganda prioritizes maize production to improve food security and rural livelihoods. Uganda has also become a leading maize producer in East Africa, increasing exports to neighboring countries like Kenya, Rwanda, and South Sudan, which has boosted the incomes of small-scale farmers and reduced poverty. The government continues to emphasize maize production in its National Development Plan (NDP III) to drive poverty reduction and economic growth.

Globally, maize production was projected to reach 130 million tons in 2019, with small-scale farmers accounting for a significant portion of output. Investments in agriculture, particularly in Africa, have raised rural household incomes, with maize contributing to poverty reduction. Agricultural growth has shown to be more effective in reducing poverty than non-agricultural growth. Data from household and farm surveys between 1999 and 2009 further support the role of maize in improving farm-level outcomes in Africa.

According to State House (2019), although Uganda imports 18% of its grains, primarily maize, compared to 2% in 1990, State House (2019) reports that import dependence is quite high among "modern" food enterprises. In 2010, over 400,000 tonnes of cereals were imported net. The demand on Western food and beverage corporations to commit to more local and "sustainable" sourcing is growing, but actually making this happen is a difficult task. According to UBOS (2022), approximately 39% of children in western Uganda suffer from stunting as a result of eating inadequate food. They find themselves in a precarious situation because insufficient resources hinder their capacity to generate and market a sufficient surplus, which is then required to finance upgrades and expansions to the farm in addition to fulfilling other essential household requirements. Meanwhile, because the quality, affordability, and dependability of local items are so low, food and maize enterprises, as well as supermarkets in expanding metropolitan areas that are frequently owned by large multinational corporations, import a sizable portion of the goods they sell (OVC Report, 2019).

In Western region, Kibale East and Kibale counties are giant maize producers. According to URT (2019), Kamwenge district alone produces more than 45% of the maize. Due to this, maize serves as the primary source of income for many of Kamwenge district households, which contributes to reduction of income poverty and the improvement of household income. However, according to theories, growing maize production has helped millions of people through greater earnings, more affordable and plentiful food, and the creation of employment-intensive development patterns that benefit both rural and urban areas (Mulumba, 2019). Thought the success of the maize production and the green revolution in increasing, Kamwenge districts' economic growth can be attributed in part to the fact that maize production, like other agricultural production activities, is linked to growth in the broader economy (Mayona, 2017). Production of maize in Kamwenge district contributes significantly to its economic growth as people can have food, money, and industrial input.

Theoretical Perspective

The study is based on Resource Dependency Theory (RDT), developed by Jeffrey Pfeffer and Gerald R. Salancik in the 1970s. RDT explains how households and organizations rely on external resources to achieve their goals, with the availability and control of these resources influencing their wellbeing. The theory suggests that households or organizations can improve their outcomes by managing external dependencies through strategies like integration, diversification, and legal or social actions to create more favorable environments. RDT emphasizes that the control of essential resources leads to power, and the success of households or organizations often depends on their ability to acquire and utilize resources more effectively than their competitors. For households, especially in economic contexts, factors like assets, income, and labor contribute to bargaining power, which can empower women and families. For organizations, access to raw materials and external resources can critically affect their performance.The theory also highlights how external factors impact behavior, and managers or households can adopt strategies to reduce reliance on uncertain environments. The core of these strategies is managing power dynamics to maintain access to vital resources while reducing dependence on others.

Maize production plays a crucial role in Uganda's economic growth, as noted by the Ministry of Agriculture, Animal Industry and Fisheries (Midamba et.al. 2024, MAAIF, 2022). This study conceptualized maize production through key indicators such as maize products, markets, and improved seed varieties. Globally, poverty eradication remains the primary goal for sustainable development, which is vital for achieving the unmet Millennium Development Goals (MDGs). Efforts to eliminate poverty focus on reducing both absolute and relative poverty, addressing inequality, and providing social protection for vulnerable groups such as children, the elderly, and indigenous communities. Success in poverty reduction is linked to progress in other development areas, highlighting its multidimensional nature (Acharya and Sophal, 2021; Anderson and Eswaran, 2019).

Poverty Eradication Initiatives

The Ugandan government, in collaboration with international development agencies, has implemented several poverty reduction frameworks, including the Poverty Eradication Action Plan (PEAP), the National Development Plan (NDP), and the Plan for Modernization of Agriculture (PMA). These initiatives focus on improving agricultural productivity, enhancing market access, and boosting rural livelihoods, particularly for smallholder farmers. The PEAP prioritized promoting food security, increasing household incomes, and reducing vulnerability in rural communities. These programs often include measures to support smallholder farmers by providing access to technology, materials, and infrastructure improvements.

Maize production Initiatives

Maize production initiatives in Uganda focus on key areas such as the National Agricultural Advisory Services (NAADS) and Operation Wealth Creation (OWC), which promote the use of high-yielding maize varieties, pest control, and modern farming techniques to enhance productivity. These initiatives provide farmers with

access to extension services, improved seeds, fertilizers, better post-harvest management, and market access to increase household earnings. The World Social Summit emphasizes that eradicating poverty is an ethical and social imperative, urging governments to address its root causes and ensure the impoverished have access to resources like credit and education. Poverty is characterized not only by a lack of income-generating resources but also by hunger, restricted access to services, social marginalization, and unequal experiences among different socioeconomic groups.

Household Income

Household income is defined by the World Bank (2016) as the total net income of all individuals over a certain age living in a household, regardless of their relation to one another. The FAO (2018) further clarifies that it includes all income generated by individuals residing under one roof, including dependents. This income is critical for assessing the standard of living in a region and serves as an important risk factor for lenders evaluating loan applications, as lower-income households tend to have higher default rates (FAO, 2021). Household income is typically calculated based on earnings of individuals aged 15 and older, while those younger are not included (Analoui, 2019). Economists and government agencies use household income as a valuable indicator to monitor the financial resources of households, with higher incomes often correlating to greater disposable income (Blumberg, 2016). Uganda, located in East Africa, is rich in diverse ecosystems but faces significant challenges, including poverty, food insecurity, and unemployment. As of 2020, about 27% of Ugandans lived below the national poverty line, particularly in rural areas (Uganda Bureau of Statistics, 2020). Agriculture is crucial to Uganda's economy, contributing approximately 24% to the GDP and employing around 66% of the workforce, primarily through smallholder farming reliant on subsistence crops and limited modern technology (World Bank, 2021). The government aims to enhance agricultural productivity and food security through initiatives like the National Development Plan (NDP).

Kamwenge District, located in Western Uganda, covers about 3,007 square kilometers and has a population of around 300,000 (Uganda Bureau of Statistics, 2020). Its economy is largely agricultural, focusing on crops like maize, beans, and cassava. However, the district struggles with inadequate infrastructure, limited market access, and unpredictable weather, which impact agricultural production. Efforts are underway to improve practices, promote crop diversification, and enhance livelihoods (Kamwenge District Local Government, 2020). Kamwenge Sub County, part of Kamwenge District, is predominantly rural and heavily reliant on subsistence farming, particularly maize. Recent initiatives aim to boost maize production by improving farming practices, access to quality seeds, and farmer training. However, farmers face challenges in marketing their produce; 70% of maize farmers struggle to sell their crops due to inadequate storage facilities and market access (Kamwenge District Agricultural Office, 2022). Many are left with unsold maize during harvest season, as reported by the Kamwenge District Local Government annual report (2019), highlighting the need for improved market opportunities to combat poverty in the region.

Statement of the Problem

Maize is a vital staple and cash crop in Uganda, providing a primary income source for many rural households. However, the agricultural sector in Kamwenge District faces significant challenges that hinder maize production and household income. In Kamwenge Sub County, many farmers rely on traditional methods and outdated seed varieties, resulting in average maize productivity of about 1.5 tons per hectare, well below the potential yield of 3-5 tons with improved practices (Kamwenge District Agricultural Office, 2022).

Households in this region experience persistent poverty, exacerbated by low agricultural productivity and limited market access. Barriers such as the use of traditional seeds, poor infrastructure, lack of transportation, and fluctuating prices prevent farmers from maximizing their output and selling their produce at fair prices. Additionally, limited access to credit facilities and agricultural inputs further hampers investments in better farming practices, leading to stagnant household incomes. The reliance on outdated farming methods contributes to low productivity, while volatile maize markets and unstable pricing structures impede farmers from reaping economic benefits, perpetuating the cycle of poverty. Women, who are crucial in maize

production, face additional challenges, such as limited access to resources and decision-making roles (Oxfam, 2019).

To address these issues, this study aims to explore how maize products, markets, and improved seed varieties influence household income in Kamwenge Sub County. By understanding the factors affecting maize production and market dynamics, targeted interventions can be developed to enhance productivity and market access, ultimately improving economic conditions and alleviating poverty for maize-producing households.

General Objectives

This study establishes the relationship between poverty eradication through maize production initiative and household income, a case of Kamwenge Sub County, Kamwenge District.

Specific Objectives

1. To examine the influence of maize products on household income in Kamwenge sub county, Kamwenge District
2. To examine the extent to which maize markets have impacted on household income in Kamwenge sub county, Kamwenge District
3. To analyze the relationship between improved maize seed varieties and household incomes in Kamwenge sub county, Kamwenge District

Research Hypothesis

This study was guided by the following null hypotheses:

$H0_1$ There is no significant relationship between maize products and household income in Kamwenge sub county, Kamwenge District.

$H0_2$ There is no significant relationship between maize markets and household income in Kamwenge sub county, Kamwenge District.

$H0_3$ There is no significant relationship between improved maize seed varieties and household income in Kamwenge sub county, Kamwenge District.

Scope

The research was conducted in Kamwenge Sub County, part of Kamwenge District, primarily an agricultural area with key trading centers at Ganyenda and Nyabitusi. The sub county includes five parishes: Ganyenda, Nkongoro, Kyabandara, Kiziba, and Busingye, with its headquarters in Kibale County. Established in 2000, Kamwenge District was previously known as Kibale County within the Toro Kingdom and comprises two counties: Kibale and Kibale East. The district has five town councils and eight sub counties, bordered by various districts including Kasese, Kabarole, Kyenjojo, Kyegegwa, Kazo, Kitagwenda, and Ibanda. The study spanned one year (2023-2024), with secondary data from 2015 to 2024 utilized, providing a robust opportunity for data collection necessary for the research.

LITERATURE REVIEW

The Resource Dependency Theory

Resource Dependency Theory (RDT) suggests that organizations depend on external resources to survive and succeed, leading them to adopt strategies that manage uncertainty and relationships with other entities (Pfeffer & Salancik, 1978). This theory is particularly relevant in analyzing maize markets, the adoption of improved seed varieties, and their effects on household income. It highlights that farming households are not self-

sufficient but reliant on external resources for their success. By understanding these dependencies, strategies can be developed to improve access to enhanced seeds, thereby increasing productivity and income for farmers. Policymakers can utilize insights from RDT to create interventions that improve resource access, such as investing in agricultural extension services, supporting seed supply chains, and fostering collaborations between farmers and research institutions. Addressing these external dependencies can enhance household income and food security in maize-producing areas.

The Contribution of Maize Products on Household Income

Despite wide variations in yields, maize is cultivated all across the world to provide food security. Commodities that are deemed edible and contain nutrients are included in the Food and Agriculture Organization (FAO) of the United Nations indices of agricultural production of maize. These indices display the relative level of the aggregate volume of agricultural production for each year in comparison with the base period of 1999–2001 (Alene & Hassan, 2018). According to estimates, the globe produced 875,226,630 tons of maize in 2012; the United States, China, and Brazil harvested 31%, 24%, and 8% of the total, respectively and has saved world refugees from hunger and starvation (Ali, 2019). The FAO's food balance sheets, which are called FAOSTAT food balance sheets in reference to the database that collects the data, are frequently used as a source of information for estimating patterns, levels, and trends of country diets (FAO, 2019). Bamlaku et al., (2017), maize and corn production has reduced poverty levels among agrarian economies in East Africa, Central America, and by nation in 2012, FAOSTAT Country 2011 Maize Production (million MT/year) America the United States 274 China 208 Brazil 71 Mexico 22 Argentina 21 India 21 Ukraine 21 Indonesia 19 France 16 Canada 12 South Africa 12. It gives a thorough picture of how a nation's food supply has reduced poverty over a given reference period. The availability of maize for human consumption is displayed in the FAOSTAT food balance sheets, which align with the sources of supply and the crop's use (FAO, 2019). The supply available during a given period can be calculated by adding the entire amount of maize produced in a country to the total amount imported, then adjusting for any changes in stockpiles that may have occurred since the start of the reference period (Beshir, 2018). Regarding utilization, there is a differentiation established between the amounts of maize that are exported, utilized as seed and fed to cattle, lost during transportation and storage, and supplies that are fit for human consumption. The corresponding quantity is then divided by the relevant statistics on the population that actually consumes it to determine the per capita supply of maize that is accessible for human consumption (FAO, 2019). The amount and relevant food composition parameters for maize, such as dietary calorie value, protein, and fat content, are applied to represent data on the per capita supply of maize (Koedler, 2019 and FAO, 2019).

The production of maize has been cited by others as having positively impacted household income, which is one of the criteria for reducing poverty. For instance, a research conducted in Malawi found that the annual per capita income of households producing maize was 26% greater than that of control groups (Heffner, et al. 2021). Additionally, it revealed that 50% of the households producing maize had yearly incomes of more than 200,000 Kwacha, compared to 29% of the control group (Lu, et al., 2020).

The influence of maize markets on household incomes

Approximately two-thirds of the rural population in developing countries live in small farm households, often on land smaller than 2 hectares, facing poverty and food insecurity due to a lack of access to improved seed varieties that can withstand climate change (FAO, 2020). Maize farmers particularly struggle to find resilient seed options in local markets. The Climate Resilience Agribusiness for Tomorrow project emphasizes the need for collaboration between public and private sectors to promote climate-smart agricultural practices throughout the value chain.bMaize is primarily consumed without much processing, although value addition, such as precooking, offers significant benefits. Common bean production faces challenges like erratic rainfall and declining soil fertility, with about 50% of households relying on crop farming for income. Value addition at the industrial level could improve both household income and nutrition (Kasakya, 2022).

While the National Agricultural Research Organisation (NARO) has invested in developing improved maize and bean varieties, the impact on productivity, income, and food security is not well documented. A recent

study evaluated the effects of these varieties over the past five years using data from 30 districts and found that their adoption significantly increased productivity and household income, although outputs remained below potential levels. This highlights the need for farmer training on complementary inputs and practices to fully leverage the benefits of improved varieties. The challenges of rising demand, persistent poverty, and climate change necessitate coordinated efforts from public and private sectors to enhance livelihoods for impoverished farm households, particularly for women and young adults. Such collaboration is crucial for achieving global food security and poverty eradication (Kahama et al., 2020).

Household Income

A review by Blundell et al. (2022) examined the impact of the COVID-19 pandemic on household income inequality across 17 countries. It found that low-income households experienced more severe income shocks due to their vulnerability in job markets, leading to widened income disparities despite some mitigating government interventions.

Additionally, Gentilini et al. (2021) highlighted the role of social protection programs, such as cash transfers and universal basic income (UBI), in supporting household income during economic downturns. Analysis of pilot programs in Spain, Kenya, and Brazil showed that households receiving these benefits enjoyed greater income stability and were less likely to fall below the poverty line, underscoring the importance of effective social safety nets during crises.

Further research by Narayan et al. (2023) focused on household income growth and economic mobility in middle-income countries like India, South Africa, and Mexico. It revealed limited upward mobility for lower-income households due to barriers such as access to quality education and healthcare. The longitudinal data indicated that income gains were often temporary, necessitating structural reforms for sustained progress in income growth.

Conceptual framework

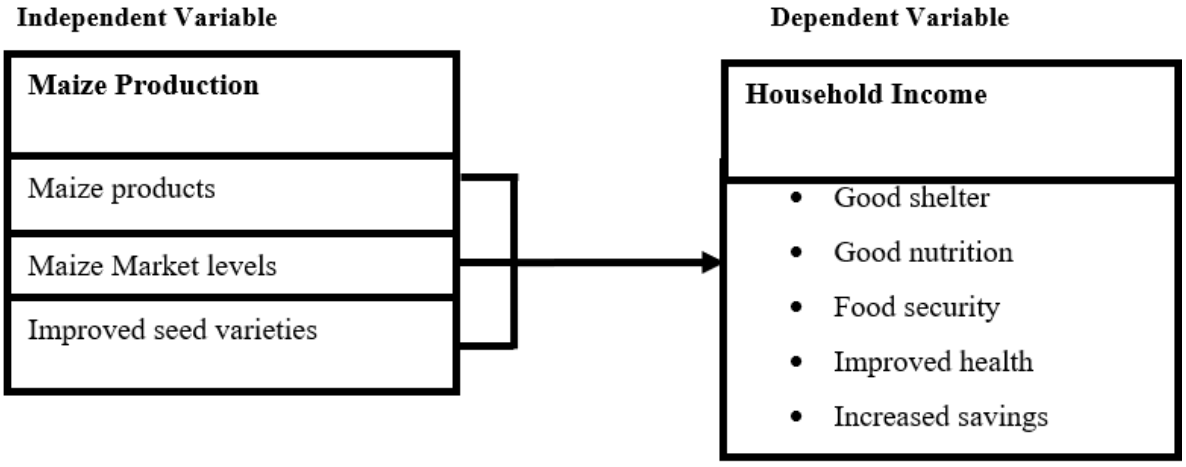


Figure 1: Conceptual framework

Source: Researcher, (2024)

Framework Description

The conceptual framework suggests that maize production can significantly contribute to poverty alleviation and increase household income. By cultivating maize, households can enhance their income, enabling them to invest in essential activities such as constructing homes, purchasing clothing and furniture, acquiring household equipment, buying food, and paying for healthcare and education. As a result of increased spending in these areas, the model anticipates improvements in various welfare indicators, including higher literacy

rates, better housing, adequate clothing and food supplies, and improved health status. When these welfare indicators are achieved, it signifies an overall enhancement in household well-being.

METHODOLOGY

Research Design

The researcher employed a correlational design to examine the relationship between poverty eradication through maize production initiatives and household income in Kamwenge Sub County, Kamwenge District. This approach was suitable as it captures information at a specific moment, allowing for the assessment of existing conditions (Amin, 2005). The researcher aimed to determine the quality of the relationship between these variables, concluding that a correlational design was the most appropriate method for the study. Additionally, a quantitative method was utilized in the research.

Table 1: Study Population

Category	***Target population***
Household farmers	280
Local leaders	40
Maize produce Business owners	50
Agriculture extension staff	8
Total	**378**

Source: Researcher, 2024

Sample Size

According to Kyale (2010), sampling is a technique that involves taking samples from the population, especially in order to help determine a hypothesis about the population. The Yamane formula from 1967 was used to determine a sample size of 195 from the target population of 378, as follows:

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

Where;

n= sample size

N= target population

e= margin of error (5%)

$$n= \frac{378}{1+ 378\,(0.05)^2}$$

n= 195

Table 2: Sample Size

Category	**Target population**	**Sample size**
Household farmers	280	140
Local leaders	40	14

Maize produce Business owners	50	36
Agriculture extension staff	8	5
Total	**378**	**195**

Source: Researcher, 2024

Sampling Techniques

The study population was heterogeneous in nature and as a result stratified random sampling was used to obtain strata that are proportional. Thereafter, simple random sampling was used to select individual respondents from each stratum. This hence forth became units of analysis.

Correlation analysis

Table 3: Correlation between Maize Products and Household Income in Kamwenge Sub County, Kamwenge District

		Maize Products	***Household income***
Maize Products	Pearson Correlation	1	.259**
	Sig. (2-tailed)		.000
	N	192	192
Household income	Pearson Correlation	.259**	1
	Sig. (2-tailed)	.000	
	N	192	192
** Correlation is significant at the 0.01 level (2-tailed).			

Source: Primary Data, (2024)

Correlation results indicated a significant positive relationship between maize Products and household income ($r = .259^{**}$, $p= 0.000$, $p<.05$). This is confirmation that supporting family incomes, Maize products fetch enough income, middlemen benefit from incomes, and profits from maize production had a positive effect on household income, which enabled the farmers and society to attain its farming goals.

The results imply that if effective maize products were in favour of household income in Kamwenge Sub County, Kamwenge District, this would positively affect poverty levels in Kamwenge Sub County, Kamwenge District

Table 4: Correlation between Maize Markets and Household Income in Kamwenge Sub county

		Maize markets	***Household income***
Maize markets	Pearson Correlation	1	.845**
	Sig. (2-tailed)		.000
	N	192	192
Household income	Pearson Correlation	.845**	1
	Sig. (2-tailed)	.000	
	N	192	192

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

Source: Primary Data, (2024)

The results in table 4 above reveal that maize markets had a positive correlation with the household income (r = 0.845**, P=.000, p<.05). This means that the two variables are positively related. This supports the hypothesis that there is a positive relationship between maize markets and household income in Kamwenge sub county, Kamwenge District since the p value 0.000 is less than 0.05.

Table 5: Correlation between Improved Maize Seed Varieties and Household Income

		Improved seed varieties	***Household income***
Improved seed varieties	Pearson Correlation	1	.736**
	Sig. (2-tailed)		.019
	N	192	192
Household income	Pearson Correlation	.736**	1
	Sig. (2-tailed)	.000	
	N	192	192

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

Source: Primary Data, (2024)

The results in table 10 above reveal that improved seed varieties had a positive correlation with household income (r=.736**, p= .019, p< .05). This implies that the two variables are positively related. This supports the hypothesis that there is a positive relationship between improved maize seed varieties and household income in Kamwenge sub county, Kamwenge district.

Table 6: Results Kolmogorov–Smirnov and Shapiro–Wilk

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Maize products	.096	192	.069	.978	192	.074
Maize Markets	.098	192	.073	.970	192	.121
Improved maize seed varieties	.066	192	.037	.991	192	.256
Household income	.129	192	.060	.965	192	.118
a. Lilliefors Significance Correction						

Source: Field Data (2024)

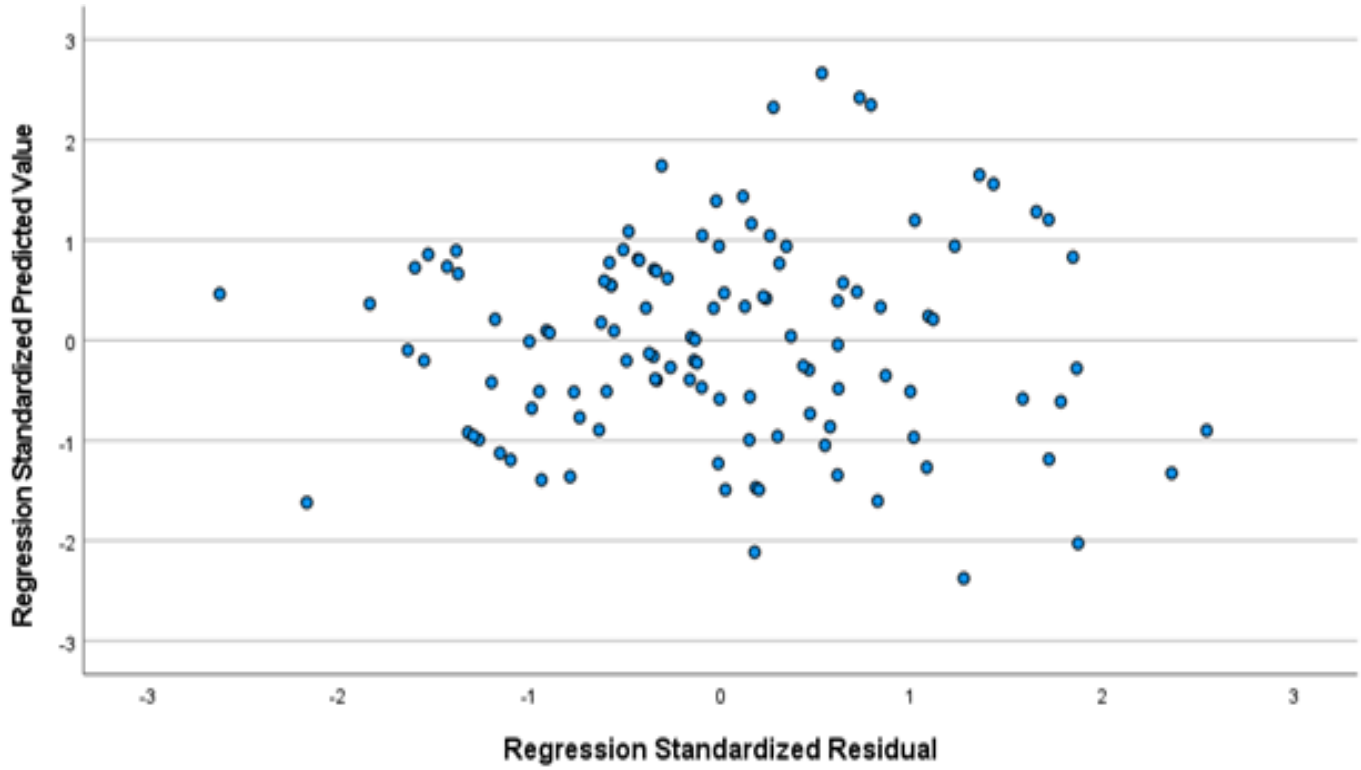
Test for Linearity

Abdulhafedh (2022) highlights that linear regression used to determine whether or not there is a substantial linear relationship between the independent and dependent variables. If the value of significant linearity was less than 0.05 or Deviation from Linearity was more than 0.05, then data was said to be having a linear relationship.

Figure 2: Linearity Test Data

Scatterplot

Dependent Variable: Household income



Source: Field Data (2024)

This scatterplot shows the relationship between the regression standardized residuals (x-axis) and the regression standardized predicted values (y-axis) for the dependent variable "Household income". In terms of normality, the plot suggests a reasonably normal distribution of residuals. The points are generally scattered in a random pattern around the horizontal zero line, with most clustered between -2 and +2 on both axes. This pattern indicates that the residuals are approximately normally distributed. There's no clear funnel shape or curve, which would suggest heteroscedasticity or non-linearity. However, there are a few outliers, particularly on the lower end of the y-axis, which might slightly deviate from perfect normality. While not perfect, the plot suggests that the assumption of normality for the residuals is reasonably met, supporting the validity of the regression analysis for household income.

Model Summary on maize products and household income.

The researcher conducted a simple linear regression on the above variables and the results are shown in the table 7 below;

Table 7: Model Summary

Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*
1	.169[a]	.028	.023	.36927

a. Predictor (construct): maize products

Source: Primary Data, 2024

In reference to the above model summary, this shows that maize products varieties account for a variation of 2.8% on the dependent variable household income.

Further analysis tested the goodness of fit of the model using ANOVA as shown in table 13

Table 8: ANOVA[a]

Model	***Sum of Squares***	***Df***	***Mean Square***	***F***	***Sig.***
Regression	1.037	1	1.037	13.625	.000[b]
Residual	14.458	192	.076		
Total	15.495	192			

a. Dependent variable: Household income
b. Predictor (Construct): maize product

Source: Primary Data, (2024)

The table shows the regression output (F1,192) = 13.625, p<.05). The significance value (p-value) is 0.000 less than the conventional threshold of 0.05 indicates that the regression model is statistically significant, suggesting that maize products has a significant relationship with the dependent variable in this analysis.

The study further computed statistical analysis and obtained coefficient of determination as shown in table 8.

Table 9: Coefficients a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.316	.354		3.716	.000
	HI	.438	.098	.311	4.478	.000

a. Dependent variable: Household income

Source: Primary Data, 2024

From the above table (t=3.716, p=.000, p<.05 signifies a significant relationship between maize products and household income. This is because the calculate p value is less than the critical value of 0.05 hence rejecting the null hypothesis and accepting alternative hypothesis

Model Summary of maize markets and household income

The researcher conducted simple linear regression on the above variables and the results are as shown in table 10

Table 10: Model Summary

Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*
1	.236[a]	0.056	0.051	.36927

a. Predictor (construct): Maize Markets

Source: Primary Data, 2024

In reference to the above model summary, this shows that maize markets account for a variation of 5.6% on the dependent variable household income.

Table 11: ANOVA[b]

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	11.060	1	11.060	473.845	.000[a]
Residual	4.435	192	.023		
Total	15.495	192			

a. Dependent variable: Household income
b. Predictor (Construct): Maize Market

Source: Primary Data, 2024

The table shows the regression output (F1,192) = 473.845, p<.05). The significance value (p-value) is 0.000 less than the conventional threshold of 0.05. This indicates that the regression model is statistically significant, suggesting that maize market has a significant relationship with the dependent variable in this analysis.

The study further computed statistical analysis and obtained coefficient of determination as shown in table 12

Table 12: Coefficients a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.316	.354		3.716	.000
	HI	.438	.098	.311	4.478	.000

a. Dependent variable: Household income

Source: Primary Data, 2024

From the above table (t=3.716, p=.000, p<.05) signifies a significant relationship between maize markets and household income. This is because the calculate p value is less than the critical value of 0.05 hence rejecting the null hypothesis (H0) and accepting alternative hypothesis (H1) that states there is a significant relationship between maize markets and household income.

Model Summary of improved maize seed varieties and household income

The researcher conducted simple linear regression on the above variables and the results are as shown in table 18 below;

Table 13: Model Summary

Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*
1	.252[a]	.064	.014	.36927

a. Predictor (construct): Improved Maize Seed Varieties

Source: Primary Data, (2024)

In reference to the above model summary, this shows that improved seed varieties account for a variation of 6.4% household income.

Table 14: ANOVA[b]

Model	*Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig.*
1 Regression	.758	1	.758	5.556	.019[a]
Residual	25.909	192	.136		
Total	26.667	192			

a. Dependent variable: Household income
b. Predictor (Construct): Improved maize seed varieties

Source: Primary Data, (2024)

Table 15: Coefficients a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.678	.332		8.072	.019
		.054	.087	.045	.622	.019

a. Dependent variable: Household income

Source: Primary Data 2024

CONCLUSIONS

Influence of Maize Products on Household Income

The analysis demonstrated a highly significant positive correlation between maize products and household income, with a p-value of 0.000, indicating that this relationship is unlikely to be due to chance. This suggests that increased production or sales of maize products significantly enhance household earnings.

Influence of Maize Markets on Household Income

The research identified a strong link between the maize market and household income, evidenced by a p-value of 0.000, indicating a statistically significant relationship. This finding underscores the maize market's significant impact on household earnings, suggesting that market fluctuations can directly affect income levels.

Influence of Improved Seed Varieties on Household Income

The study found a strong positive correlation between the adoption of improved seed varieties and household income, with a p-value of 0.019 indicating a significant relationship. This suggests that utilizing improved seed varieties significantly enhances household earnings, likely due to increased crop yields, better disease resistance, and improved market access5.2. Recommendations

Influence of Maize Products on Household Income

To enhance livelihoods, priority should be given to initiatives that boost maize production and marketing. This can be accomplished through strategic investments in agricultural extension services, provision of high-quality farming inputs, and training in optimal maize production and marketing practices. Policies promoting maize value chain development, such as market access support and value addition, can increase economic benefits. Additionally, maize production systems should be made resilient to shocks like climate change, pests, and diseases by promoting climate-resilient practices, crop insurance schemes, and access to credit facilities for farmers during challenging times.

Influence of Maize Markets on Household Income

To promote economic stability and resilience, it is crucial to recognize the maize market's significant impact on household income. Initiatives that enhance market stability, such as price stabilization mechanisms, can reduce the effects of market fluctuations on earnings. Improving maize market development is essential for boosting household economic well-being, which can be achieved by investing in market infrastructure, like storage and transportation facilities, to enhance efficiency and accessibility. Additionally, households dependent on the maize market need training in market analysis, risk management, and diversification strategies to navigate market dynamics effectively. Policymakers should develop targeted interventions to support vulnerable households, ultimately building resilience and promoting economic stability.

Influence of Improved Seed Varieties on Household Income

To enhance household income and economic resilience, strategic investments in promoting and adopting improved seed varieties are essential. Initiatives should prioritize seed production, distribution, and access, particularly for smallholder farmers who stand to benefit the most. Developing robust seed systems and infrastructure is crucial for ensuring equitable and timely access to these improved varieties. Collaboration among seed companies, community-led programs, and public-private partnerships can improve seed availability and affordability. Additionally, targeted capacity-building and training programs for farmers and extension agents are necessary to optimize yields and returns through best practices in seed management. Policymakers should view the adoption of improved seed varieties as a vital poverty reduction strategy and a significant driver of economic prosperity in rural communities, thereby unlocking agriculture's potential for sustainable growth and development.

Suggestions for Further Studies

Future studies should focus on exploring the mechanisms linking improved seed varieties to household income, particularly how new crop varieties, disease tolerance, and market access contribute to increased earnings. Additionally, further research is needed to identify other significant factors affecting maize production, as the three independent variables studied accounted for only a small percentage of the variation in household income.

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