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Research Article

Contribution of Banana Production on Household Income Generation Among Smallholder Farmers in Kitagata Town Council, Sheema District

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Abstract

The study was about contribution of banana production on house hold income generation among Smallholder farmers in Kitagata town council, Sheema District. The specific objectives included to; examine the socio-economic characteristics of smallholder banana farmers, establish innovative strategies to improve banana production and income among smallholder banana farmers and identify the factors affecting banana production and income among smallholder banana farmers. The study adopted a cross-sectional survey that applied both quantitative and qualitative approaches for data collection. Data was captured from a sample of 302 respondents using both questionnaire and interviews. Data was analyzed using SPSS software version 22.0 to generate both descriptive and inferential statistics. The study concluded that there were socio-economic characteristics of farmers which also affected banana production. Such characteristics included; age, marital status, level of education land size and gender. The study also concluded that there were innovative strategies to improve banana production and income among smallholder banana farmers in Kitagata town council, Sheema district. These included; Integrated Pest Management, use of hybrid varieties, Irrigation, mulching, climate-Smart Agriculture through use of drought resistant varieties, agro-forestry, use of fertilizer application and organic manure to replenish soil fertility. The study finally concluded that there were factors affecting banana production and income among smallholder banana farmers. Such as; access to extension and advisory services which had a significant effect on production and smallholder farmer's income at (p=.004), access to financial services was a strong predictor of production improvement and farmer's income at (p=.002), a positive and a significant relationship were observed between availability of quality farm inputs and banana production (at p=.023), The study further discovered that ready market was a strong predictor of production and small holder farmer's income at (p=.003) and Lastly, a positive and a significant relationship were observed between banana varieties grown and banana production as well as income at (p=.005). The study recommends that the government, NGOs, Ministry of Agriculture, Animal, Industry and Fisheries in collaboration be established with the aim of implementing innovative agricultural strategies geared towards banana productivity increments, there is also a need for the government to provide enough facilities to extension agents that will help them facilitate enhanced training to farmers and inform them of new techniques in farming, there is a need for the government to provide some production inputs at subsidized cost.

Keywords

Banana Production, Income Generation, Smallholder Farmers, Sheema District

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1. Introduction

Bananas are one of the most popular fruits globally, with a long history of cultivation and consumption [1, 2]. The cultivation of bananas has deep historical roots, dating back thousands of years in regions like Southeast Asia [9]. However, the modern commercial production of bananas began to take shape in the late 19th and early 20th centuries, particularly in tropical regions with suitable climates [3].

Banana production has a rich historical background, and its significance in household income generation among smallholder farmers has evolved over time [19]. Historically, bananas have been cultivated for thousands of years, with evidence of their cultivation dating back to ancient civilizations in Southeast Asia and the Pacific Islands [2].

In Africa, bananas are cultivated in diverse agro-ecological zones, ranging from humid tropical regions to semi-arid areas. Smallholder farmers typically dominate banana production, utilizing traditional farming methods alongside some modern techniques [6]. Bananas serve as both a staple food crop and a cash crop, with their importance varying by region and local preferences, where it serves as a vital source of nutrition and income for millions of smallholder farmers [4]. The contribution of banana production to household income is influenced by various factors, including agro-ecological conditions, socio-economic dynamics, market access, and agricultural practices [4, 5].

In Uganda, bananas play a crucial role in smallholder farming systems, contributing significantly to household income and food security [8]. Smallholder farmers rely on banana cultivation for income generation, sustenance, and employment opportunities for family members and laborers. For example, in Sheema District, located in the western region of Uganda, banana farming is a vital economic activity for smallholder farmers. Bananas are a major cash crop in Sheema District, contributing significantly to household income and food security. Smallholder farmers in this district rely on banana cultivation as a primary source of livelihood, with the sale of bananas providing income to support their families' needs [17]. Bananas are a staple food crop in Sheema District, providing both food and income for households. Smallholder farmers cultivate bananas on their plots of land, often in mixed cropping systems with other crops such as beans and maize [15, 17].

2. Problem Statement

In an ideal scenario, smallholder farmers in Sheema District have access to resources, knowledge, and infrastructure that optimize banana production. They benefit from efficient market access, minimal post-harvest losses, and supportive policies that ensure fair prices for their produce [15]. This ideal situation results in increased household income, improved living standards, and enhanced food security for farmers and their families [10].

Currently, smallholder farmers in Sheema District encounter challenges such as limited market access, pests and diseases affecting banana yields, inadequate infrastructure for transportation and storage, and fluctuating market prices. These realities constrain their ability to maximize income from banana production and negatively impact their livelihoods [17].

Through targeted interventions and research, the expected outcome is to address the challenges faced by smallholder banana farmers in Sheema District. By improving market access, implementing pest management strategies, enhancing infrastructure, and providing support for value addition initiatives, farmers can increase their income from banana production [16, 17]. This would lead to improved household income, enhanced food security, and economic empowerment for smallholder farmers and their communities.

Despite existing research on banana production in Sheema District, there remains a research gap in understanding the specific mechanisms to optimize household income from banana farming [17] Further research is needed to explore innovative solutions tailored to the local context, address emerging challenges, and identify opportunities for value addition and market diversification. Besides banana being on-demand in Kitagata Town council, there are gaps in data gathered on innovative strategies of improving banana production commonly used by farmers, factors affecting production and their influence on income generation. This has prompted the researcher to carry out a study on the contribution of banana production on income generation among smallholder farmers in Kitagata town council, Sheema district to fill this research gap.

3. Research Objectives

The general objective of the study was to assess the contribution of banana production to household income among smallholder farmers in Kitagata town council, Sheema District. The specific objectives were to; examine the socio-economic characteristics of smallholder banana farmers, explore innovative strategies to improve banana production and income among smallholder banana farmers and identify the factors affecting banana production and income among smallholder banana farmers.

4. Significance of the Study

To farmers; the findings of the study will directly benefit banana farmers in Sheema District by identifying the key challenges they face and proposing practical solutions to improve their livelihoods. Understanding the factors affecting household income from banana farming will enable farmers to make informed decisions regarding banana crop management,

market engagement, and investment in value addition activities [11].

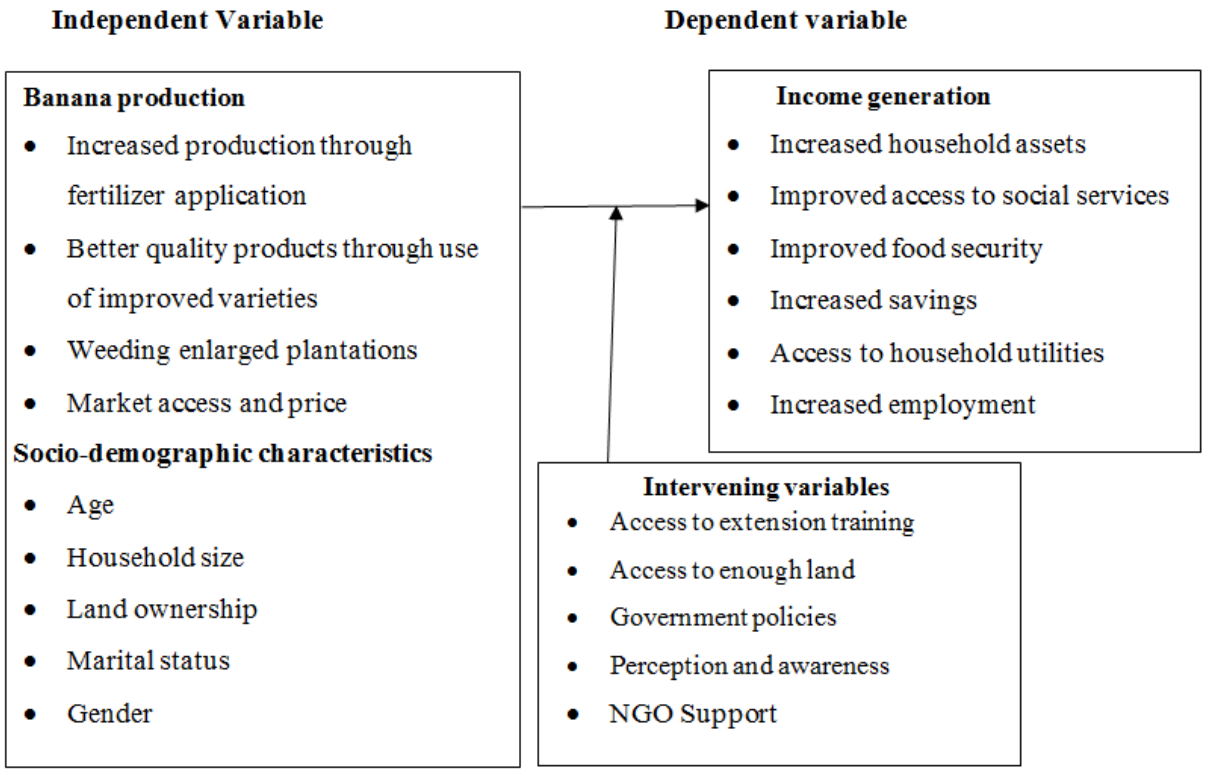
To development partners; the study's insights will contribute to the overall socio-economic development of the community in Sheema District by strengthening the agricultural sector, which is a major source of livelihood for many residents. Development partners and non-governmental organizations (NGOs) working in the area of agriculture and rural development can use the study's findings to design and implement more effective programs and initiatives that address the specific needs of banana farmers in the district.

To policy makers; Policy makers at the local, regional, and national levels can use the evidence-based recommendations from the study to formulate policies and strategies that support banana production and enhance household income in Sheema District. The study may influence policy decisions related to agricultural extension services, market infrastructure development, access to credit, and value addition initiatives, thereby fostering a more conducive environment for banana farming and rural development [9, 11].

To scholars; The study will contribute to the existing body of knowledge on banana production and household income in Uganda, particularly in the context of Sheema District. Scholars and future researchers can build upon the study's findings and methodologies to conduct further research on related topics, such as the impact of climate change on banana farming, gender dynamics in agricultural livelihoods, or the role of agricultural cooperatives in enhancing farmers' income.

5. Conceptual Frame Work

The conceptual framework based on a systems model as specified by Ludwig Von (2011) which provides an analytical framework for development interventions. It was based on a three factor model shown in the diagram below: consisting of a) banana production as the independent variable; b) income generation as dependent variable and c) the intervening variables.



Source: Ludwig Von, 2011, System model

Figure 1. *Conceptual frame work.*

6. Materials and Methods

The study will be carried out in Kitagata Town council located, Sheema district, South Western Uganda.

The study adopted a descriptive cross-sectional survey to assess relationship between pre-harvest and harvest management practices and banana quality. The design was commonly used to gather information about a particular phenomenon or variable of interest from individuals within a population or sample at a specific moment. This design was used for the study because it was useful in securing evidence

concerning an existing situation as well as identifying standards and norms with which to compare present conditions in order to plan the next step.

The population of this study comprised of all women and men involved in banana farming activities, local leaders and agricultural service providers at town council level. Farmers gave original innovative production strategies and how they contributed towards household income and food security. Local leaders and service providers provided addition information required including official statistics about banana production management and how farmers had trained to use innovative production strategies and how to identify some factors limiting banana production.

The sample size was determined using Cochran formula (1963) taking into account of a confidence level of 95% and 5% margin of error.

$$n_0 = \frac{Z^2 * p * q}{e^2}$$

n_o is the sample size, Z^2 is the area under the acceptance region in a normal distribution (1– α), e is the preferred level of precision/marginal error, p is the estimated proportion of an attribute that is present in the population, and q is 1-p

$$n_0 = \frac{1.96^2 * 0.5 * (1-0.5)}{0.05^2} = 384$$

A combination of proportionate stratified sampling and random sampling techniques were used to choose the households from different ward found in Kitagata Town council. Ward was divided into strata's and respondents were selected from the using simple random sampling technique. This technique was used to select the respondents from a list of farmers at ward level to come up with the required number of respondents. The researcher applied random numbers to pick farmers from each ward and consider them as respondents. On the other hand, purposive sampling involved the selection of key informants who were interviewed from their places of work using face to face interviews.

Interview guides were commonly used to collect qualitative information from key informants. By providing a framework for the interview, it helped to minimize bias and ensured that all participants were asked the same questions, allowing for more reliable data collection and analysis. The study targeted respondents who had unique insights on the research topic for example extension agents and community stakeholders.

The questionnaires were also used and began with open-ended questions to allow respondents to provide detailed quantitative information about banana production. These open-ended questions enabled researcher to gather rich, in-depth insights into the specific practices employed by banana farmers.

The collected data was analyzed qualitatively and quantitatively; Qualitative data was analyzed using thematic content analysis where the researcher wrote the responses from respondents, conceptualize the data, segment the data basing on the study objectives. Quantitative data was analyzed using Statistical Package for Social Sciences (SPSS). version 23.0. Descriptive statistics measures such as frequency distribution and percentages were used to analyze continuous and nominal data at Univariate level. Inferential statistics were applied to generate and interpret any significant associations between dependent and independent variables at both bivariate and multivariate level.

7. Study Results

The results are presented in tables and diagrams. The analyzed data was arranged under themes that reflected the research objectives. The demographic information of the farmers, descriptive statistics of the findings and regression analysis as well as a summary of the chapter is provided

The results indicated the majority of farmers as 70% were male while 30% were female.

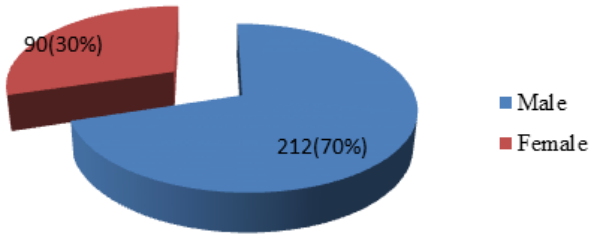


Figure 2.*. Gender of respondents.*

The study findings indicated that majority were aged 41-50 as this was reported by 46%. Followed by 30% of farmers who were aged below 31-40, 16.5% were aged above 50, 6.5% were aged 21-30 and the youngest being less than 20 years

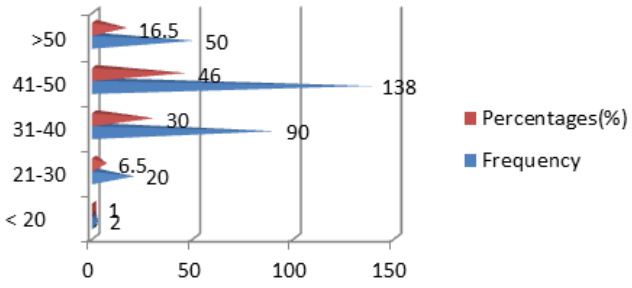


Figure 3*. Age of respondents.*

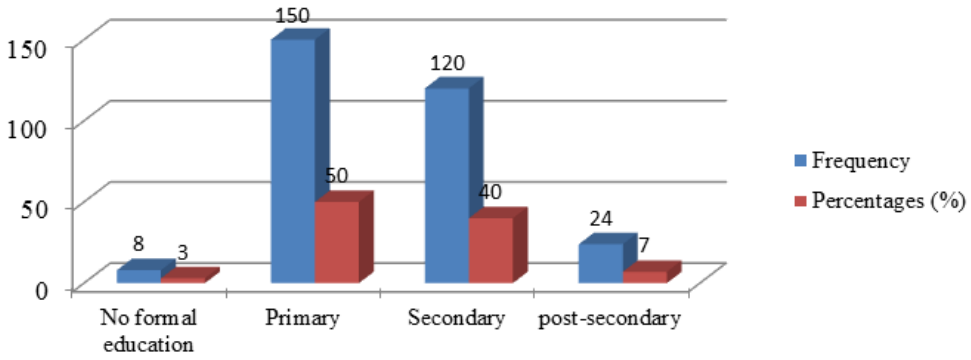


Figure 4. *Level of education.*

The study findings in figure 4 indicate that 3% of the farmers had no formal education at all, 50% had attained primary education, 40% had secondary education and 7% had gone through post-secondary.

The study results revealed that majority of the respondents constituting to 83% were married, followed by 13% were single, 3% were divorced and 1% widow.

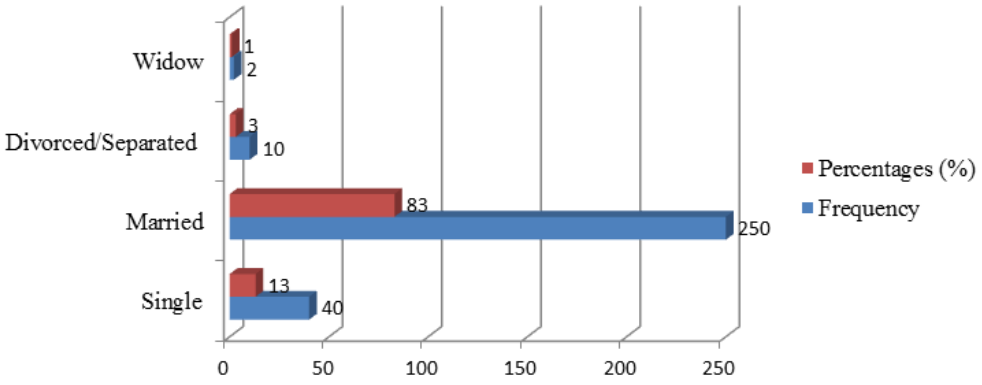


Figure 5 *Marital status.*

The study sought to ascertain the acres of land under banana production. According to the study, 12% of the respondents said that the area under banana cultivation in the farms is between 0.1 to 0.3acres, 18% between 0.4 to 0.75 acres 69% between 1 to 3 acres, and 1% above 4 acres respectively.

Table 1. *Acres under Banana production.*

Response	Frequency	Percentage (%)	Cumulative Percent
0.1 to 0.3acres	35	12	12
0.4 to 0.75 acres	56	18	30
1 to 3 acres	210	69	99
4 and above	01	01	100
Total	302	100	

Source: Field data, 2024

Table 2. Model Summary for Soil Management Strategies.

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Standard error of the estimate**
1	.660[a]	0.434	0.423	0.78454

Predictors; mulching, use of fertilizers, organic manure use, intercropping, agro-forestry

Dependent variable: banana production

The R which is the coefficient of correlation, 66% shows there is a strong relationship between the dependent and independent variables. 43.4% of the individual independent variables can be used to predict the yield per acre hence they are good predictors of the model. From the results obtained, the adjusted R square is 42.3% which means that the proportion of the dependent variable explained by the independent variables combined in the regression equation is 42.4%.

Table 3. ANOVA Results for Soil Management Strategies.

ANOVA[a]						
Model		**Sum of squares**	**df**	**Mean square**	**F**	**Sig.**
1	Regression	139.506	6	23.267	37.792	.000[b]
	Residual	181.002	294	0.615		
	Total	320.508	300			

a. Dependent variable

From the table the model is statistically significant at 5% level of significance, ($F = 37.7$, $p < 0.05$). Based on the regression results, soil management strategies were statistically significant influencing banana production.

Table 4. Coefficients of Soil Management Strategies (Independent Variables).

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	**Standard error**	**Beta**		
1	Constant	9.546	0.443		21.563	0.000
	Agroforestry	-0.542	0.466	-.076	-0.62	0.246
	Precision nutrient management	0.844	0.301	.134	2.804	0.05
	Fertilizer use	0.377	0.133	.132	2.845	0.05
	Organic manure use	0.469	0.165	.146	2.808	0.05
	Soil amendments for disease management	-0.256	0.325	-.068	-0.793	0.428

Dependent variable; banana production

Based on the regression results, soil management strategies statistically significant affecting banana production. Precision

nutrient management had a positive significant effect (t =2.804, p value < 0.05) on banana production. A unit increase in utilizing soil testing and nutrient mapping technologies would help farmers accurately assess soil nutrient levels and apply fertilizers precisely where they are needed. Use of fertilizer had a positive and significant influence on banana production as given by (β = 0.377, t = 2.845, p<0.05). The implication of these findings was that a unit increase in use of fertilizer would lead to increased banana production by 37.7%. Use of organic manure had a positive and a significant influence on banana production as given by (β = 0.469, t = 2.808, p<0.05).

Agroforestry and Soil amendments for disease management did not show positive significance as expected.

Respondents during survey were asked irrigation methods they use to improve production, responses were captured, analysed and presented in figure 6;

Majority 63% of the respondents do not use any form of irrigation, they are dependent on rainwater, followed by 29% respondents revealed use of drag horse method of irrigation, 4% revealed use of pump water from water sources, followed by 3% who revealed use of horse pipe and 1% use sprinkler irrigation.

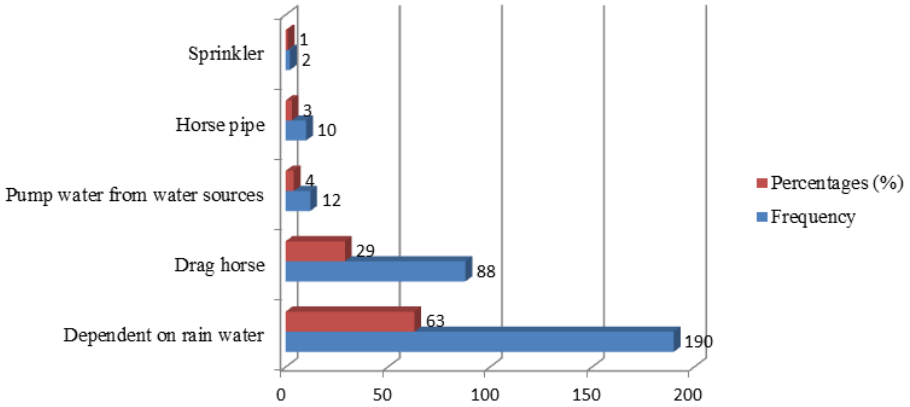


Figure 6. *Methods of irrigation used by farmers.*

Table 5. *Model Summary for Water Management Strategies.*

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Standard error of the estimate**
1	.685[a]	0.469	0 0.454	0.7627
Predictors; methods of irrigation				
Dependent variable: banana production				

The R which is the coefficient of correlation, 68.5% shows there is a strong relationship between the dependent and independent variables. The coefficient of determination shows that 46.9% of the individual independent variables can be used to predict the yield per acre hence they are good predictors of the model. The adjusted R square is 45.4% which means that the proportion of the dependent variable explained by the independent variables combined in the regression equation is 45.4%.

Table 6. *Coefficients of Water Management Strategies (Independent Variables).*

Model	**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Sig.**
	B	**Standard error**	**Beta**		

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Standard error	Beta		
1	Constant	6.791	0.068		99.944	0.000
	Dependent on rain water	1.410	0.107	.206	13.167	0.002
	Drag horse	1.198	0.202	.139	25.916	0.001
	Horse pipe	0.575	0.544	.127	1.057	0.29
	Pump water from water sources	2.310	0.230	.131	3.920	0.005
	Sprinkler	0.181	0.263	.117	0.686	0.493

Dependent variable; banana production

Based on the regression results, water management strategies statistically significant affecting banana production. Dependency on rain water had a positive and significant effect ($\beta = 1.410$, $t = 13.167$, p value < 0.002) on banana production. Use of drag horse had a positive and significant effect on banana production by 1.1 chance as given by ($\beta = 1.198$, $t = 25.916$, $p=0.001$). Use of pumping water from the water source had a positive and significant influence on banana production as given by ($\beta = 2.310$, $t = 9.632$, $p<0.05$).

Table 7. *Sources of banana cultivars (multiple responses generated).*

Response	Frequency	Percentage (%)	Cumulative Percent
Recycle from the farm	100	25	25
From fellow farmers	210	53	78
From authorized agricultural institutions	15	04	82
Operation wealth creation	68	18	100
Total	393	100	

Source: Field data, 2024

The table 7 shows that a very small percentage of the respondents get their banana seedlings from authorized agricultural institutions (4%), followed by 18% who gets from the government through Operation wealth creation, followed by 25% who recycle from their own farms and majority constituting to 53% get from fellow farmers.

Table 8. *Coefficients of Banana Management Strategies.*

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Standard error	Beta		
1	Constant	32.540	3.935		8.269	.000
	Integrated Pest Management (IPM)	4.292	1.885	.176	2.277	.001
	Mulching	3.047	1.012	.134	2.046	.003
	Use of hybrid varieties	1.260	3.096	.132	.997	.005
	Irrigation	2.931	1.746	.146	1.533	.004

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Standard error	Beta		
Climate-Smart Agriculture	-1.588	1.875	-.058	-.851	.396

Dependent variable; banana production

Based on the regression results, banana management strategies statistically significant affecting banana production. Use of Integrated Pest Management (IPM) had a positive and significant effect (β = 4.292, t =2.277, p value= 0.001) on banana production. Use of mulching had a positive and significant effect on banana production by 3 chances as given by (β = 3.047, t = 2.046, p=0.003). Use of hybrid varieties had a positive and significant influence on banana production as given by (β = 1.260, t =.997, p=.005). Use of irrigation had a positive and significant influence on banana production as given by (β = 2.931, t =.146, p=.004).

Table 9. *Regression output between factors affecting banana production and income.*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7977.381	217038.607		6.361	.000
	Access to extension and advisory services	5577.638	2901.520	.151	2.923	.004*
	Access to financial services	7963.031	2571.941	.214	3.097	.002*
	Size of the land	-4592.418	2749.321	-.123	-1.670	.096
	Land ownership	1673.124	3143.252	.037	.532	.595
	Availability of farm inputs	6071.260	2651.615	.158	2.290	.023*
	Ready market	9635.799	3075.170	.227	-1.418	.003*
	Banana varieties grown	2722.320	2648.326	.078	1.028	.005*
	Low prices	4239.388	2989.105	-.102	3.133	.159

*statistically significant at p<0.05

Results in table 9 above indicated that out of the eight (8) hypothesized factors indicators, only five (5) had a significant effect on banana production and income. The analysis in table 9 above indicated that access to extension and advisory services had a positive significant effect on production and smallholder farmer's income at 5% level of significance. The coefficient β = 5577.638 significant at p=.004

Access to financial services was a strong predictor of production improvement and farmer's income at 5% level of significance. An observed coefficient β = 7963.031, significant at p=.002. Furthermore, a positive and a significant relationship were observed between availability of quality farm inputs and banana production as well as smallholder farmer's income at 5% level of significance. A coefficient (β = 6071.260 at p=.023). The study further discovered that ready market for ready produced bananas was a strong predictor of small holder farmer's income at 5% level of significance. A positive and significant coefficient (β =9635.799 at p=.003). Lastly, a positive and a significant relationship were observed between banana varieties grown and banana production as well as income at 5% level of significance. A coefficient (β = 2722.320 at p=.005).

8. Discussion of Results

The study findings established that a big percentage of the farmers use 1 to 2.5 acres of land. This can be an indication that most of them practice mixed farming for survival based on the land size. This can be compared withBellamyet al., [7] who reported that larger land areas can accommodate more banana plants, leading to higher overall production. This scale can translate to economies of scale, reducing per-unit costs and increasing total output. The same authors said that with more land, farmers can experiment with different banana varieties, which can diversify income sources and potentially lead to higher profits through niche markets.

The study revealed that marital status is a major determinant in improving banana production and income. They further explained that this gives them zeal to work hard to improve production and become income secure to meet basic family needs. This finding agrees with Burneyet al., [12, 11] who said that married farmers often have access to more family labor, as spouses and children can contribute to farm activities. This can increase the overall labor force, improving productivity and efficiency on the farm. The author further revealed that different family members might specialize in certain tasks. For instance, men might handle heavy fieldwork while women manage marketing and sales, leading to a more efficient division of labor.

The study results revealed that use of organic manure had a positive and a significant influence on banana production at 5% level of significance. This finding agrees with Cooper et al., [13] Organic manure provides essential nutrients such as nitrogen, phosphorus, and potassium, which are crucial for banana plant growth. Unlike synthetic fertilizers, organic manure releases nutrients slowly, ensuring a steady supply over time. The author further revealed that organic manure enhances microbial activity in the soil, promoting the decomposition of organic matter and the release of nutrients in forms readily available to plants.

The study results revealed that mulching had a positive and significant effect on banana production at 5% level of significance. This can be compared with Fagerberg et al., [14] Mulch suppresses weed growth by blocking sunlight from reaching the soil surface. Fewer weeds mean less competition for nutrients and water, allowing banana plants to grow more vigorously. With fewer weeds, farmers spend less time and resources on weeding, allowing them to focus on other productive tasks.

The study results indicated that access to extension and advisory services had a positive significant effect on production and farmer's income at 5% level of significance. This is consistent with Kabungaet al., [18] who revealed that extension services educate farmers on best practices for banana cultivation, including planting techniques, spacing, pruning, irrigation, and pest and disease management. This knowledge helps farmers optimize their production processes and maximize yields. Extension agents advise farmers on soil fertility management, including soil testing, nutrient supplementation, and organic matter incorporation. Proper soil management ensures optimal growing conditions for banana plants, leading to healthier crops and improved productivity.

The study results established that access to financial services was a strong predictor of production improvement and farmer's income at 5% level of significance. This is in line with Kamira et al., [20] who reported that financial support enables farmers to invest in farm infrastructure such as irrigation systems, drainage facilities, and storage units. Improved infrastructure enhances farm efficiency, productivity, and resilience to environmental risks, leading to higher yields and better income.

9. Conclusion

The study concluded that there were socio-economic characteristics of farmers which also affected banana production. Such characteristics included; age, marital status, level of education land size and gender and among others.

The study also concluded that there were innovative strategies to improve banana production and income among smallholder banana farmers in Kitagata town council, Sheema district. These included; Integrated Pest Management (IPM), use of hybrid varieties, Irrigation, mulching, climate-Smart Agriculture through use of drought resistant varieties, agro-forestry, use of fertilizer application and organic manure to replenish soil fertility.

The study finally concluded that there were factors affecting banana production and income among smallholder banana farmers. Such as; access to extension and advisory services which had a significant effect on production and smallholder farmer's income at (p=.004), access to financial services was a strong predictor of production improvement and farmer's income at (p=.002), a positive and a significant relationship were observed between availability of quality farm inputs and banana production (at p=.023), The study further discovered that ready market was a strong predictor of production and small holder farmer's income at (p=.003) and Lastly, a positive and a significant relationship were observed between banana varieties grown and banana production as well as income at (p=.005).

10. Study Recommendation

There is a need to promote climate-smart agricultural practices that enhance farmers' resilience to climate change and variability. These practices include water-saving technologies, drought-tolerant crops, agro forestry, and soil conservation measures, which help mitigate production risks and safeguard farmers' livelihoods.

There is a need to recruit more extension agents to educate farmers about crop insurance schemes and risk management strategies to protect their investments and income from production-related risks, such as crop failure, pest outbreaks, and adverse weather events.

There is a need for the government to provide some production inputs at subsidized cost for example irrigation equipments, fertilizers, improved banana plantlets, water harvesting equipments. This will help farmers increase their banana production and ensure sustainable income, food production throughout the year for both local consumption and export.

There is a need for the majority of banana farmers to adopt drag hose irrigation method which was recently initiated and implemented by the government to avoid seasonal production and ensure sustainable production throughout the year to secure their income.

Acknowledgments

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Abbreviations

NGOs	Non-Governmental Organizations
IPM	Integrated Pest Management
FAO	Food Agriculture Organization

Conflicts of Interest

The authors declare no conflicts of interest.

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