



Comparison of farming productivity on economic well-being between households using conventional and indigenous farming methods in the Midlands of Embu County in Kenya

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ABSTRACT

Agriculture is vital to Kenya's economy, supporting over 80% of rural residents, contributing one-third of GDP, and supplying 65% of export earnings. Despite international and national efforts to promote conventional and sustainable farming, global food insecurity has worsened, with acute hunger rising by 10% to affect 343 million people in 74 countries. Industrial-scale, high-yield agriculture has often destabilized sustainability, causing environmental harm, social inequality, chronic diseases, and increased food insecurity. With the global population expected to reach 10.4 billion by the 2080s, transforming agri-food systems is crucial for resilient food security, environmental resiliency and economic stability. The reliance on rain-fed agriculture at the Midlands of Embu County highlights the need to compare conventional and indigenous farming productivity to better understand their effect on economic well-being. The objective of the study was to determine the effect of farming productivity on economic well-being between conventional and Indigenous farm households at the midlands of Embu County in Kenya. The study adopted the comparative research design and descriptive survey design. The study population comprised of 66,878 farmer households and key informants in the Midlands of Embu County in Kenya. A sample size of 384 was drawn from the farm households according to the Cochran formula. Stratified random sampling, Purposive and systematic random sampling techniques were used. Data was collected using semi-structured questionnaires, interview schedule and observation check lists. A pilot test of the research instruments was conducted on 36 respondents from Evurori, Kirimari and Gachoka wards where a Cronbach's Alpha coefficient of 0.965 was obtained showing high level reliability of the research instruments. The data was then analyzed using SPSS version 25. Descriptive statistical analysis was used to summarize results on respondents' responses on the effect of the farm productivity on economic well-being. T-test was used to compare the productivity of indigenous and conventional farming methods while simple linear regression was used to establish the relationships between farm productivity and house hold economic well-being. The simple linear regression on farm Productivity (FP) indicated a significant negative effect on Income Total, with $p = .001$ for the indigenous farming practices with $R^2 = 0.060$ while for conventional farming the results revealed a statistically significant relationship between the two variables with a correlation coefficient (R) of 0.152 and an R-squared value of 0.023. The study recommends implementation of policies that promote sustainable farming, protect small scale farmers and encourage biodiversity conservation. The results obtained will guide adoption of sustainable farming practices, policy reviews and add to the existing knowledge of research.

Key words: Conventional, Economic Well-Being, Farming Method, Food Security, Indigenous.

1.0 INTRODUCTION

Globally, economic well-being is strongly linked to farming methods, particularly for smallholder farmers who form a large portion of the agricultural sector (Woodhill, 2022). Agriculture serves as a fundamental economic pillar for the global population driving economic growth, providing livelihoods and contributing to overall economic well-being

(Adefila, 2024). Agriculture is the main source of income and employment for many, impacting food security, poverty reduction, and the development of local economies. Sustainable farming practices significantly impact economic well-being, with sustainable and climate-smart agriculture potentially boosting incomes, enhancing food security, reducing poverty and fostering resilience to climate change. Farmers practice both conventional and indigenous farming methods in an effort to achieve food security. Conventional farming, also known as industrial agriculture, encompasses various methods characterized by the use of synthetic fertilizers, pesticides, herbicides, and other intensive inputs (Otieno, 2024). With the advent of industrial-scale agriculture and mass production of synthetic fertilizers, many connections with indigenous agriculture fundamentals (such as soil health and biodiversity), have been ignored in favour of high yield production methods. The objective of this study is to examine the effect of farm productivity on economic well-being between farm households using indigenous and conventional farming methods in the Midlands of Embu County in Kenya.

2.0 LITERATURE SURVEY

Global agricultural value has increased by 89 percent in real terms over the past two decades, reaching \$3.8 trillion in 2022 (Steensland, 2021). Despite this growth, agriculture's contribution to global economic output has remained relatively low, and the proportion of the global workforce employed in agriculture has decreased, from 40 percent in 2000 to 26 percent in 2022 (Davis, 2023). Sharma (2023), study on adoption process and comparative economics of natural and conventional farming in Himachal Pradesh in India, concluded that conventional agriculture uses advanced technology, it is less labor intensive than traditional agriculture, and the yield quantity is larger because there is a focus on maximizing production and maintaining a consistent quality. The study however, did not assess the effect of conventional and indigenous farming methods on household economic well-being. There is often insufficient comparative data on yields from conventional versus Indigenous farming methods across various crops and regions. This gap hinders the ability to make general conclusions about the efficacy of the different farming practices.

Hunger in the Arab region worsened amid deepening crises in 2023 (UNICEF, 2023). The Near East and North Africa Regional overview of Food Security and Nutrition warns that the Arab region remains off-track to meet the food security and nutrition targets of the Sustainable Development Goals by 2030 (UNICEF, 2024). In 2021, approximately 278 million people were affected by hunger in Africa (UNICEF, 2024). In Sub-Saharan Africa, 63% of the population was affected by food insecurity in 2021 (Wudil *et al.*, 2022). In 2023, 66.1 million people, approximately 14 percent of the population in the Arab region, faced hunger (FAO, 2024). As of 31st March 2024, 158.5 million people across seven selected West African countries had insufficient food for consumption, an increase of 300,000 people over the previous month's level (Zecca & Zolotareva, 2024). In 2019, total Agricultural demand exceeded production by 70.3 million metric tons a gap that is expected to increase to 572 million metric tons by 2043 (UNICEF, 2023) at the same time 35 percent of the population in Sub Saharan Africa were estimated to be living in extreme poverty compared to 9% in South Asia or 1% in East Asia and the Pacific (Tetteh & Lakner, 2023). For African countries to achieve food security as envisioned in vision 2030, more sustainable farming methods are required.

Indigenous farming practices can contribute significantly to household food security and sustainable land management. Amayo (2021) study on farming practices and livelihood outcomes of women in Eastern Uganda concluded that the indigenous farming practices used had inadequately enhanced income, food security, well-being and resilience to shocks and stresses. However, since 1990, government breeding programs in Uganda have promoted the replacement of the resilient, Ankole Longhorn cattle-traditionally raised by the Bahima herders-with exotic breeds, pushing the Ankole Longhorns toward extinction and threatening the loss of the Bahima's ancestral cattle-rearing knowledge (Ransom, 2023).

Kenyan economy heavily relies on agriculture but faces significant food security challenges mainly due to climate variability. Although agriculture contributes about 33% of the Kenya's GDP and employing 70% of its rural population (Nzomoi, 2022), frequent droughts, unpredictable rainfall and land degradation have undermined food production, particularly in the vast arid and semi-arid lands (ASALs). Given the importance of the agricultural sector, the Kenyan government has been developing and promoting agri-based policies and strategies aimed at promoting sustainable food production practices. For instance, the Vision 2030 agenda support strategies that enhance

agricultural productivity and resilience. The strategies include promoting drought-tolerant crops, expanding irrigation infrastructure and supporting smallholder farmers. Despite these efforts, approximately 36.5% of the Kenyan population remains food insecure (Dzigbede, 2020). In addition, Kenya has a serious level of hunger, with a score of 25.0 in the 2024 Global Hunger Index (Index, 2024). Famine early warning system network (FEWS NET) estimates that 2.5 to 2.99 million people will require humanitarian assistance between October 2024 and May 2025 (Global Hunger index, 2024).

Research comparing conventional and organic farming yields shows mixed results. While organic yields are generally lower, the difference varies by crop type, growing conditions, and management practices (Sahay & Chakraborty, 2023). A meta-analysis found organic yields to be 19.2% lower in the short term, but in the long term, conventional yields decreased by 31-50% due to soil degradation (Yadav *et al.*, 2024). However, some studies report comparable total food production between indigenous and conventional systems (de la Cruz, *et al.*, 2023). Indigenous Farming practices, such as rotating fallow-based systems, have shown higher millet yields compared to conventional methods in Senegal (Faye *et al.*, 2020). Organic farming has been found to reduce input costs without affecting net margins (de la Cruz, *et al.*, 2023) and also improve long-term soil health by increasing soil carbon stock, nutrient release, and microbial activity (Yadav *et al.*, 2024). These findings suggest that indigenous farming methods may offer sustainable alternatives to conventional practices, particularly for small-scale farmers.

3.0 PROBLEM STATEMENT

Agriculture is a central pillar of Kenya's economy and a primary source of livelihood for rural communities, with over 80% of the population in rural areas relying on farming for their income and food security. Numerous international organizations and initiatives support both conventional and indigenous farming methods with the goal of enhancing socioeconomic well-being and sustainability. Despite these efforts global food insecurity remains a critical issue, with acute hunger affecting 343 million people across 74 countries in 2024, a 10% increase from the previous year. With the advent of industrial-scale agriculture and mass production of synthetic fertilizers, many connections with sustainable agriculture fundamentals have been ignored in favour of high yield production methods. The focus on low adoption of modern agricultural practices often neglects the reasons behind farmers' reliance on indigenous knowledge, impeding climate-smart agriculture efforts and jeopardizing national economic well-being. The dominance of conventional farming has increased yields but eroded the ecological and social significance of food, contributing to chronic diseases, environmental degradation, inequality, and malnutrition by undermining biodiversity and resilience. In contrast, indigenous agricultural practices despite their support for sustainable livelihoods and community well-being are increasingly marginalized, and the lack of comprehensive comparative studies on their economic impacts limits policymakers' ability to design effective, context-sensitive strategies for sustainable community development

4.0 RESEARCH METHODOLOGY

The study was delimited to the midlands of Embu County which lie approximately between 1,200 and 1,525 meters above sea level and form a transitional zone between the highlands and lowlands of the county. This area is characterized by warm and humid climatic conditions, making it suitable for diverse agricultural activities. The midlands receive moderate rainfall, generally between 640 mm and 1,495 mm annually, depending on the exact altitude, with a bimodal rainfall pattern featuring long rains from March to June and short rains from October to December. The County has a population of 516,212 persons, 254,303 males and 261,909 females (KNBS, 2019). The Midlands of Embu County was especially chosen due to its capacity for cereal and pulse production, and availability of regenerative Agriculture (RA) technologies. Additionally, over 70% of households relies on Agriculture and only 5% of farmland is irrigated leaving rain-fed agriculture systems vulnerable to climate change.

Descriptive survey and the comparative research designs were used in this study to enable the researcher obtain information that describes existing phenomena by asking individuals about their farming practices and how they think these practices impact on sustainable food production. Stratified, purposive and systematic sampling procedures were used to select the respondents. Purposive sampling was used to obtain equal number of farm households practicing conventional and indigenous farming methods and also to ensure that similar ecological conditions are compared. The

midlands of Embu County was stratified into five Agricultural Ecological Zones (AEZ) Upper Midlands (UM2), UM3, Lower Midland (LM3), lower midlands (LM4), lower midlands (LM5) in order to cover the areas with similar ecological zones. Two wards were purposely selected from each AEZ covering the similar ecological zones. One agricultural extension officer, community development worker and one area chief were randomly selected from each administrative ward. The study's sample size was 384 respondents which included 354 households' heads, 10 extension officers, 10 area chiefs and 10 community development workers based on the Cochran formula (Cochran, 1977). Questionnaires, interview schedules and observation check lists were used to obtain information from agricultural extension officers and farm household heads.

The data was edited first to identify the errors made by the respondents. Quantitative data was coded, tabulated, and analyzed using the Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistical analysis was used to summarize results on characteristics of the households and farm productivity. Inferential statistical analysis included use of T-test to compare the means of yield, income and cost of production in conventional and indigenous farming methods. Linear regression was used to show the effect of farm productivity on economic well-being.

5.0 RESULTS AND DISCUSSIONS

5.1 Descriptive Statistics and T- test Comparison of Farming Inputs, Yields and Income

The means of the cost of input, yield of beans and income earned season one and season 2 were calculated and T-test was used to compare the means (Table 1). A t-test is a statistical tool used to compare the means of two groups to determine if a significant difference exists between them (Kim, 2015).

Table 1: Comparison of Cost Input, Yield and Income Generated for Indigenous and Conventional Farm Households.

Factor	categories	N	Season one	Season two
Cost of input	Indigenous	178	10653.33 ± 3352.67*	10327.78 ± 4015.45
	Conventional	178	14022.41 ± 5139.11	14399.43 ± 6006.69
Yield of beans	Indigenous	178	209.56 ± 75.20	228.71 ± 80.54
	Conventional	178	231.43 ± 72.62	234.71 ± 78.36
Income	Indigenous	178	40633.38 ± 16691.94*	44458.61 ± 29486.59
	Conventional	178	47878.16 ± 47252.90	45023.56 ± 17329.38

Data reported as Mean ± SD, and values with an asterick represent significant differences at $p \leq 0.05$.

Source: Researcher data, 2025

Both indigenous and conventional farming techniques produced comparative yield of beans and as well as income earned per season per hectare (Table 1). A comparative analysis by T- test showed that there was no significant differences in the cost of input, yield of beans and income between the two seasons at $p \leq 0.05$ for both indigenous and conventional farming methods. A comparison of productivity between indigenous and conventional farming techniques indicated that the cost of input and income generated in season one was significantly lower in conventional farming methods adopted by the farmers ($p < 0.05$). The cost of production however increased in season two and there was a decline in the income earned this was attributed to increased use of expensive synthetic fertilizers.

On the contractually the cost of input in indigenous farming method was slightly lower in season two compared to season one while the yield of beans and income in the second season increased. This is consistent with a meta-analysis study which found organic yields to be 19.2% lower in the short term, but in the long term, conventional yields decreased by 31-50% due to soil degradation (Yadav *et al.*, 2024). The farmers attributed the increase in yield and income earned to increase in soil organic matter as a result of using organic manure. Organic farming has been found to reduce input costs without affecting net margins (de la Cruz, *et al.*, 2023) and also improve long-term soil health by increasing soil carbon stock, nutrient release, and microbial activity (Yadav *et al.*, 2024).

For conventional farming methods cost of production season two increased and there was a decline in yield and income earned in season two. The farmers attributed the increase in cost of production to increased use of expensive synthetic fertilizers which increased soil acidity leading to decline in the yields and hence income earned (Table 1). Conventional farming practices, while effective for short-term productivity, have been shown to negatively impact long-term soil fertility and environmental sustainability (Campbell, 2020; Yadav *et al.*, 2024).

One of the agricultural Extension officers during the interview schedules said “*well managed organic soils can actually lead to higher yields during drought conditions thanks to the better water retention,*’ she continued to explain ‘*when I started farming I was using synthetic fertilizers which were quite expensive then I discovered this organic fertilizer it took me three years of dedicated soil building without the use of artificial fertilizers and now my vegetables, beans and tomatoes yield more than for the conventional farmers*” Key informant KI6.

5.2 Reasons for decline or increase in yield for indigenous households

For the indigenous farm households a majority (89) of the farmers indicated that the use of organic manure increased their yield, 48 farm households attributed the increase in yield to manual weeding which aerated the soil leading to increased productivity. The increase in yield was also attributed to use of certified seeds, few number of farm households (3) attributed the increase in yield to use of irrigation while 29 said increased rainfall led to increase in yield while a few attributed the decline to lack of finances (Figure 1)

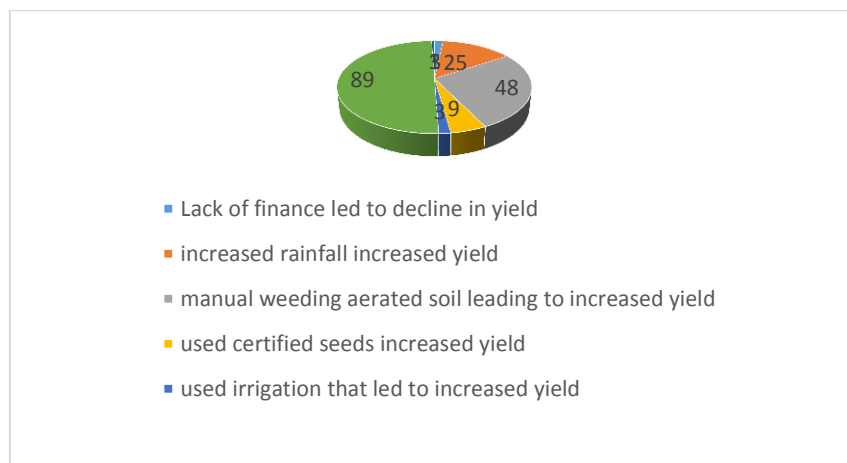


Figure 1: Reasons for decline or increase in yield for indigenous farmers

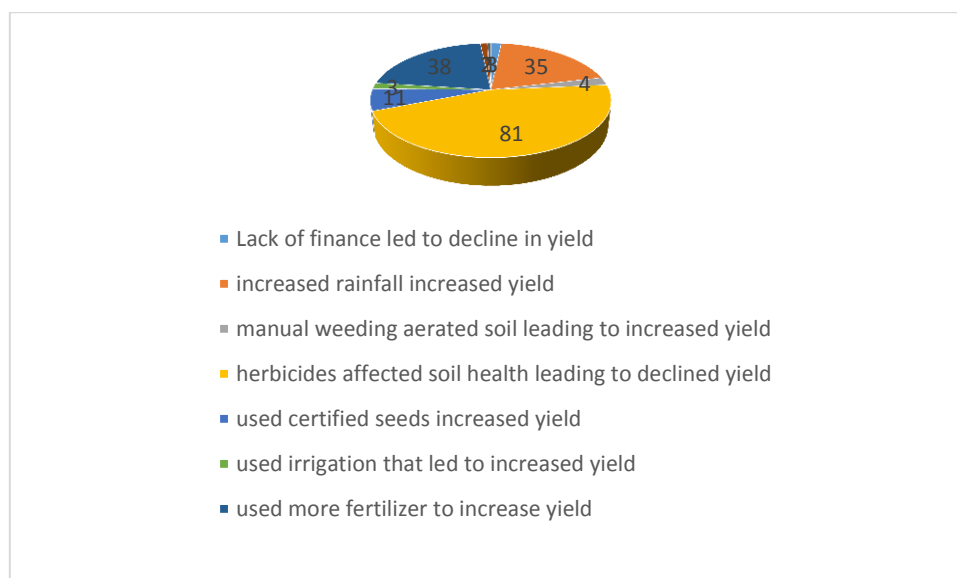


Figure 2: reasons for decline or increase in yield for conventional farmers

For the conventional farm households a majority (81) attributed the decline in yield to excess use of herbicides which affected the soil health leading to decline in productivity while 38 attributed the increase to use of certified seeds 35 farm households however used more fertilizer to be able to increase the yield (Figure 2). The findings are similar to a study by Adil *et al.*, (2007), on economics of vegetable production in Pakistan who observed that fertilizer use enhances vegetable yield substantially when applied at the proper time. However, excessive or improper use of fertilizers can lead to various negative environmental and health impacts, including water pollution, soil degradation, and greenhouse gas emissions (Jote, 2023). These impacts can affect ecosystems, human health, and agricultural sustainability. Organic manure on the other hand contribute to improving soil health over the long term (Singh *et al.*, 2018). They contain organic matter that helps enhance soil structure, water retention and nutrient availability. Some of the conventional farmers lamented that over use of herbicides caused a reduction in yield. *“When we over-apply our herbicide either through dosage or application frequency a microbial imbalance is created in the soil. Some species of microbes vulnerable to the chemicals die while encouraging the population of others that are adapted to thrive on breaking down that specific material.”*

One of key informants during the interviews said that “Herbicide offers increased productivity, improved produce quality, decreased labor-intensive hand weeding, and decreased soil erosion and topsoil loss due to requiring less cultivation and tillage but the more we use the herbicides the more stronger herbicides are required” KI9. While herbicide is effective in controlling weeds and unwanted vegetation, it has negative environmental and human health impacts. For example, there is a strong link between herbicide exposure and disease, particularly cancer. For instance in Kenya Cancer is a significant public health concern, ranking as the third leading cause of death. In 2022, Kenya reported approximately 44,726 new cancer cases (Ahrberg *et al.*, 2024). Safety and health precautions must therefore be taken when handling herbicides. Certain herbicides can be vulnerable to volatilization, leaching, and runoff, which may cause them to accumulate in soils, water bodies, and tissue. Additionally, these substances could harm unintended organisms.

5.3 Effect of Farming Productivity on Economic Well Being

The effect of farm productivity on economic well-being was measured using six indicators namely; the inputs used, income stability, sustained yields, cost of production, continuous food supply and employment rates. Each of the six items was rated on a 5-point Likert-scale from 5 (Strongly Agree) to 1 (strongly disagree). The responses obtained were as recorded in Table 2.

Table 2: Effect of farming productivity on economic well being

Indigenous farming productivity						Conventional farming productivity				
Item	SA	A	N	D	SD	SA	A	N	D	SD
Farm productivity	41 (22.2%)	100 (55.6%)	38 (21.1%)	2 (1.1%)	0 (0.0%)	26 (14.9%)	55 (31.8%)	50 (28.9%)	44 (25.4%)	-
1.Indigenous farming reduces reliance on expensive inputs as opposed to conventional farming methods										
2.Conventional farming provides higher short term income stability while Indigenous farming provide long term income stability	54. (29.3%)	92 (50.8%)	31 (17.1%)	3 (1.7%)	1 (0.6%)	25 (14.2%)	69 (39.9%)	49 (28.3%)	27 (15.6%)	5 (2.9%)
3.The farming method used leads to higher sustained yields	65 (35.9%)	82 (45.3%)	31 (17.1%)	3 (1.7%)	1 (0.6%)	25 (14.2%)	19 (10.9%)	47 (26.9%)	77 (44.0%)	7 (4.0%)
4.Cost of production using indigenous farming method is lower than in conventional farming	84 (46.4%)	61 (33.7%)	31 (17.1%)	4 (2.2%)	1 (0.6%)	31 (17.7%)	32 (18.3%)	52 (30.3%)	55 (31.4%)	4 (2.3%)
5. Indigenous farming methods leads to continuous supply of food as opposed to conventional farming method	45 (24.0%)	85 (47.5%)	46 (25.7%)	5 (2.8%)	0 (0.0%)	35 (20.0%)	47 (26.7%)	48 (27.7%)	39 (22.5%)	6 (3.5%)
6.Indigenous farming methods offer higher levels of employment than conventional farming methods	52 (28.3%)	76 (42.2%)	43 (23.9%)	10 (5.6%)	0 (0.0%)	39 (22.2%)	47 (26.9%)	55 (31.4%)	27 (15.4%)	7 (4.1%)

When examining farming productivity and economic well-being, most of the respondent agreed that the use of indigenous farming methods reduces reliance on expensive inputs (55.6%; 31.8%). Conventional farming emerged as the stronger option in the short term income stability while indigenous farming provides long term income stability (50.8% and 39.9%). The indigenous households agreed that the farming method they used provided higher sustained yields and income stability, with the majority of indigenous farmers reporting sustained yields and productivity (45.3; 10.9%). Importantly, indigenous farming was associated with greater employment opportunities, reflecting its labor-intensive nature and contribution to rural livelihoods (42.2%; 26.9%) (Table 10). The findings are consistent with Athawale *et al.*, (2024) in Arunachal Pradesh, India who observed that indigenous farming reduced total cultivation costs by 29.49% compared to conventional methods, resulting in higher net returns despite lower yields Similarly, agro ecological rice farming in Malaysia demonstrated higher revenue and lower production costs than conventional farming, primarily due to reduced labor, seed, and synthetic input expenses (Kumur *et al.*, 2021). In the Philippines, organic rice farming showed higher returns above total costs, although yields were 23% lower than conventional methods (Rubinos *et al.*, 2007). These findings suggest that indigenous farming practices can offer economic advantages while promoting environmental sustainability and food security for small-scale farmers.

5.4 Simple Linear Regression of Effect of Farming Productivity on Economic Status for Farmers Using Indigenous and Conventional Farming Techniques

For the indigenous farm households the linear regression analysis revealed that the Farming Productivity Category (FPC) has a significant negative effect on Income Total, with $p = .001$ for the indigenous farming practices. The model explains 6.0% of the variance in income ($R^2 = 0.060$), and the effect size is moderate (Beta = -0.245) (Table 3). This means that as farming productivity category (which is a combination of cost of inputs, yield produced and income earned) worsens rather increases, income tends to decrease significantly.

The finding from the linear regression analysis indicates that for indigenous farm households, increased Farming Productivity Category (FPC) leads to a decrease in Total Income, which is a counterintuitive result, as higher productivity is typically expected to increase income. This suggests that higher productivity levels may be associated with factors that negatively impact income for these specific households, possibly due to increased production costs, market access issues due to over production, or other complex socioeconomic factor. An increase in farm productivity doesn't inherently decrease farmer incomes; rather, factors like a surplus of produce can lead to lower prices if demand doesn't keep pace, or if access to markets and technologies for high-productivity farming is unequal. In many cases, especially in developing economies, higher productivity is seen as essential for reducing poverty and stimulating broader economic growth by increasing farm incomes (Ayoo, 2022). However, disparities in technology adoption, access to resources, and market demand can create situations where overall output increases while individual farmer earnings remain stagnant or even decline.

One of the key informants explained that *“when farmers produce more the market is flooded and therefore the prices decline leading to low incomes earned from farming, however more production means increased food security as the farmers have enough food and can therefore safe income earned from other sources”* KI6

Another key informant said *“when farmers have produced more they do not have a market for their produce and only depend on brokers who buy their produce at very low prices”* KI2

The linear regression analysis for the conventional farm households examined the effect of Farming Productivity Category on total income (IT). The results revealed a statistically significant relationship between the two variables. The model showed a correlation coefficient (R) of 0.152 and an R-squared value of 0.023, for conventional farming methods indicating that approximately 2.3% of the variance in IT can be explained by the farming productivity category. Although this is a small proportion, the model was still statistically significant, with an F-statistic of 4.058 and a p-value of 0.046. This suggests that changes in farming productivity levels are meaningfully associated with changes in Income Total (IT) (Table 3-5).

Looking at the coefficients, the analysis found that the unstandardized coefficient (B) for farming productivity category was -7,742.99, with a significant p-value of 0.046. This means that, on average, moving to a lower farming productivity (possibly implying high production cost) category is associated with a decrease in IT by approximately 7,743 units, holding other factors constant. The findings suggest that lower farming productivity negatively affects IT, reinforcing the importance of improved productivity in agricultural practices for better IT-related outcomes or overall income levels (Table 6-8). High production costs in conventional farming can lead to low income because excessive spending on external inputs like synthetic fertilizers and pesticides, coupled with inefficient practices and market volatility, can diminish profit margins, especially for smallholder farmers (Durham & Mizik, 2021). Integrating indigenous and conventional farming methods, such as use of organic manure and reducing reliance on expensive chemicals, can lower costs and increase profitability by enhancing natural resource use and reducing environmental impacts

Table 3: Model Summary for Linear Regression Analysis for Farm Productivity Indigenous Farming Method on Economic Well being

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.245 ^a	.060	.055	40118.26284	.060	11.284	1	177	.001

a. Predictors: (Constant), FPC.

Source: Researcher data,2025

Table 4: ANOVA Table for Linear Regression Analysis for Farm Productivity Indigenous Farming Method on Economic Well being

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18160864771.341	1	18160864771.341	11.284	.001 ^b
	Residual	284877077293.006	177	1609475012.955		
	Total	303037942064.346	178			

a. Dependent Variable: Income Total

b. Predictors: (Constant), FPC

Source: Researcher data, 2025

Table 5: Table of Coefficients for Linear Regression Analysis for Farm Productivity Indigenous Farming Method on Economic Well being

Model		Unstandardized Coefficients		Standardized Coefficient	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero order	Partial	Partial	Tolerance	VIF
1	(Constant)	119544.531	10381.096		11.516	.000					
	FPC	-9796.577	2916.408	-.245	-.339	.000	-.245	-.245	-.245	1.000	1.000
	Categ				3.359	.001	.245		.245		1.000

a. Dependent Variable: Income Total

Source: Researcher data, 2025

Table 6: Model Summary for Linear Regression for Farm Productivity for Conventional Farm Households on Economic Well Being

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.152 ^a	.023	.017	56234.271	.023	4.058	1	172	.046

a. Predictors: (Constant), Farming Productivity Categ

Source: Researcher data, 2025

Table 7: ANOVA Table for Linear Regression Farm Productivity for Conventional Farm Households

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1283185699 6.520	1	1283185699 6.520	4.058	.046 ^b
	Residual	5439144324 86.238	172	3162293212. 129		
	Total	5567462894 82.759	173			

a. Dependent Variable: IT

b. Predictors: (Constant), Farming Productivity Source: Researcher data, 2025

Table 8: Table of Coefficients Linear Regression Analysis Farm Productivity for Conventional Farm Households on Economic Well Being

Model	Unstandardized Coefficients	Standardized Coefficient	t	Sig.	Correlations	Collinearity Statistics
	B	Std. Error	Beta		Zero order	Partial Tolerance VIF
1 (Constant)	116709.194	12564.063	9.289	.000		
Farming Productivity Categ	-7742.990	3843.838	-2.014	.046	-.152	1.000

a. Dependent Variable: IT

Source: Researcher, 2025

The relationship between the dependent and predictor variable can be expressed as follows:

$$Y = \beta_0 + \beta_1 X_1 + \varepsilon \quad \text{Equation one}$$

Where Y is the dependent variable; Income total and the X1 is the independent Farming productivity (PC) and ε is the error term allowable for this expression. The various equations derived for each farming method is as shown below:

Indigenous: Income Total = 119545 – 9797Farming Productivity + 10381.

Conventional: Income Total = 116709.19 – 7743 Farming productivity + 12564.06

Productivity levels in indigenous farming methods produce consisted yields as compared to the conventional farming practices (Table 9). This is attributed to low cost of farm inputs and soil enrichment practices (Yaday *et al.*, 2024, Dela Cruz *et al.*, 2023). A comparison of the indigenous and conventional farming practices in this study revealed that most respondents agree that indigenous farming reduces the reliance on expensive inputs compared to conventional farming methods. They also agreed to conventional methods providing short term income stability while indigenous provides long term income stability. Equally, the cost of production is lower leading to a continuous supply of food and guarantees a higher level of employment than conventional techniques.

Increased productivity can lead to market saturation resulting to lower prices and thus lower income for farmers if productivity rises without a corresponding increase in demand. To increase productivity without compromising the farmer income farmers should adopt sustainable farming practices that lower the production cost such as use of natural inputs like compost manure, value addition to reduce post-harvest losses and diversification into high-value products that can increase income alongside higher productivity

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusions

For the indigenous farm households the linear regression analysis revealed that the Farming Productivity Category (FPC) has a significant negative effect on Income Total, with $p = .001$ for the indigenous farming practices. The model explains 6.0% of the variance in income ($R^2 = 0.060$), and the effect size is moderate ($Beta = -0.245$). This means that as farming productivity category worsens, income tends to decrease significantly. The model showed a correlation coefficient (R) of 0.152 and an R-squared value of 0.023, for conventional farming methods indicating that approximately 2.3% of the variance in IT can be explained by the farming productivity category. Although this is a small proportion, the model was still statistically significant, with an F-statistic of 4.058 and a p-value of 0.046. This suggests that changes in farming productivity levels are meaningfully associated with changes in Income Total

6.2 Recommendations

- i. Policies should be developed to enhance productivity through the provision of seminars and workshops where farmers would acquire more training on sustainable farming methods for increased production. This would enable farmers to improve their productivity and hence profitability.
- ii. The government should implement policies that support sustainable farming practices and encourage the integration of both conventional and indigenous farming method by offering subsidies for organic inputs and technologies that improve efficiency without harming the environment.

6.3 Suggestions for Further Research

- i. There is need to explore the combined effects of both farming methods and other related factors that can be employed to increase farm productivity and hence economic well-being of farm households.
- ii. There is need to compare using experiments the nutritional value of crops grown using indigenous and conventional farming methods

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