

## The effect of devolved agricultural extension services on food production in Kwanza sub-county, Kenya

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<https://doi.org/10.51867/ajernet.6.4.97>

### ABSTRACT

Devolution in Kenya was introduced with the expectation that shifting service delivery responsibilities from the national government to county governments would improve efficiency, accessibility, and responsiveness across key sectors. Agriculture was one of the major functions assigned to counties, with the aim of bringing extension services closer to farmers and enhancing food production at the grassroots. In Kwanza Sub County, however, the actual influence of devolved agricultural extension services on food production has not been fully studied or documented since devolution took effect. This study was guided by the Four Pillars of Food Security Theory, which highlights availability, access, utilization, and stability as the main factors that shape food security outcomes. The purpose of the study was to examine how devolved agricultural extension services affect food production, with a focus on maize farming, which remains the county's main staple and food security crop. A descriptive survey research design was adopted for the study. The target population consisted of 26,767 maize farmers in Kwanza Sub County. From this population, a sample of 379 farmers was selected through simple random sampling to ensure fairness and representation. In addition, eight key informants drawn from both public and private agricultural institutions were selected through purposive sampling due to their direct involvement in agricultural extension and policy implementation. Data collection involved the use of structured questionnaires, semi-structured questionnaires, and an interview guide. The collected data were analyzed using descriptive and inferential statistics with the support of SPSS software, and the results were presented using tables, charts, and graphs for clarity. The findings revealed widespread dissatisfaction among farmers regarding the effectiveness of agricultural extension services under devolution. A total of 70 percent of respondents disagreed that extension services had contributed to an increase in maize production, and this view was reflected in the low mode and median scores obtained. The results also indicated that several persistent challenges continue to affect extension service delivery. These include limited funding for extension activities as reported by 55 percent of respondents, inadequate staffing as reported by 60 percent, and logistical limitations that restrict extension officers from reaching farmers consistently. The study concludes that, although devolution has the potential to improve agricultural services, the current gaps in funding, staffing, coordination, and farmer engagement continue to hinder meaningful progress in food production in Kwanza Sub County. The study recommends targeted policy reforms, better resource allocation, and enhanced participatory planning to improve the effectiveness of extension services and support sustainable food security in the region.

**Keywords:** Agricultural Extension Service Provision, Challenges, Devolution, Food Production, Kwanza Sub-County, Kenya

### I. INTRODUCTION

Agricultural extension services are essential in improving productivity and promoting food security, especially in areas that face economic and social challenges (Gwademba & Achieng, 2025). In Kwanza Sub-County, Trans Nzoia County, these services have been decentralized through Kenya's devolved system of government, giving county authorities the mandate to plan and deliver agricultural support that responds to farmers' specific needs (Omamo & Collins, 2023). Agricultural Extension and Advisory Services (AEAS) refer to a network of institutions and professionals that help farmers and other value chain actors gain the knowledge, skills, and technologies needed to increase productivity, improve food and nutrition security, and enhance overall well-being (Danso-Abbeam et al., 2018). Globally, effective extension systems form a foundation for agricultural transformation, poverty reduction, and sustainable rural development.

The success of agricultural extension depends on how well it addresses the needs of farmers and contributes to solving wider food insecurity problems that affect household livelihoods. (Gwademba & Achieng 2025) found a strong positive correlation between access to extension services and agricultural productivity in their study in western Kenya. Evaluating the performance of devolution in this area therefore requires understanding how these services are currently

being implemented, the constraints faced by both farmers and extension officers, and the overall influence on food production at the local level.

In this study, the performance of devolution refers to the efficiency and effectiveness of county governments in providing agricultural extension services after responsibilities were transferred from the national government. This performance is reflected in the quality, reach, and accessibility of the services provided to farmers. Indicators such as the number of extension officers in a county, farmer satisfaction levels, the frequency of field visits, and collaboration among agricultural stakeholders help determine how well the devolved system is functioning. Extension Services enhance food crops production (maize included) hence enhance food security (Omamo & Collins, 2023).

Food security, as defined by the World Food Summit held in Rome, Italy in 1996 exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs for an active and healthy life (Food and Agricultural Organization [FAO], 1996). It can be assessed through the availability of food (production levels), access to food (affordability and purchasing power), and the nutritional status of the population. In the context of this research, food security is shaped by the effectiveness of agricultural extension services, which equip farmers with knowledge and resources to raise production and improve access to food (FAO et al., 2019). The Global Food Security Index (GFSI) provides an international benchmark for measuring drivers of food security, including affordability, availability, quality, and sustainability (The Economist, 2022). This framework underscores the importance of accessible extension services in strengthening local food systems.

Despite their importance, agricultural extension services in Kenya face several challenges. These include inadequate funding, limited staffing, poor coordination among actors, and logistical difficulties that hinder regular contact with farmers (Mwamfupe et al., 2019). Identifying and addressing such barriers is necessary to improve the reach and impact of extension programs. This study was therefore designed to examine how devolved agricultural extension services are meeting the needs of farmers in Kwanza Sub-County. It also highlights the role of effective policy frameworks, coordination among stakeholders, and farmer participation in enhancing agricultural productivity and ensuring food security, particularly through maize production, which remains the area's main food crop.

### **1.1 Statement of the Problem**

Despite the constitutional mandate requiring counties to promote food security, the implementation of devolved agricultural extension services in Kwanza Sub-County has remained ineffective. In principle, devolution was expected to improve service delivery by making it easier for farmers to access modern farming technologies, quality inputs, regular training, and strong stakeholder support. However, this has not been achieved in practice, as many farmers still experience persistent food insecurity due to gaps in how these services are provided. (Mbise, 2016), noted that farmers realized improved maize production and proper management practices due to information and support received from extension services. Challenges such as limited funding, an inadequate number of extension officers, poor infrastructure, and weak coordination among key players continue to hinder the proper dissemination of agricultural knowledge and resources (Mwamfupe et al., 2019). Empirical evidence shows that although policies to guide extension services exist (Ministry of Agriculture and Livestock Development, 2022), their implementation at the county level is inconsistent, resulting in reduced farmer confidence and fragmented service delivery. These persistent challenges highlight the need for targeted actions to strengthen the quality, accessibility, and effectiveness of agricultural extension services so that they can play their intended role in improving food production and food security in the region (FAO et al., 2019).

### **1.2 Research Objective**

To assess the effect of devolved agricultural extension services on food production in in Kwanza Sub County, Kenya.

### **1.3 Research Question**

What are the effects of devolved agricultural extension services on food production in Kwanza Sub County, Kenya?

## **II. LITERATURE REVIEW**

### **2.1 Theoretical Review**

The Four Pillars of Food Security Theory provides the foundation for this study because it explains the main elements that determine food security in any setting (FAO et al., 2020). The theory highlights four pillars that must work together for households to be food secure: availability, access, utilization and stability. Each of these pillars contributes to understanding the conditions that influence food security (FAO et al., 2019), especially in communities like Kwanza Sub County where maize is the main staple crop. By using this theory, it becomes possible to assess how agricultural extension services shape farmers' production decisions and overall food availability in the area.

One of the strengths of the Four Pillars of Food Security Theory is its ability to incorporate different factors that influence food security. Availability focuses on whether food is physically present in a region, which depends on

production levels, distribution systems and supply chains. Access looks at whether households have the financial and physical ability to obtain food, which is often linked to income, market access and infrastructure. Utilization refers to how food is consumed and the nutritional value households gain from it, while stability concerns the consistency of availability, access and utilization over time despite shocks such as climate change or economic disruptions (Food Security Cluster Handbook). In Kwanza Sub County, where maize production is central to household well-being, the framework helps show how extension services interact with these pillars.

The theory is also useful because it provides a detailed structure for examining the various elements that influence food security, making it easier to analyze the role of extension services. Since the pillars are connected, improving one area often supports the others. For example, when farmers can access markets more easily, they are better able to obtain food and improve how they use it, contributing to greater stability. This interconnectedness makes the framework appropriate for evaluating extension services, which aim to improve production, information access and household food outcomes.

Its practical application across different contexts further strengthens the theory. Because it can be adapted to various communities, it becomes a suitable tool for examining agricultural issues in rural areas such as Kwanza Sub County. Extension officers can use the framework to design programs that increase maize production and support food security. However, the theory also has limitations. The close relationship between the pillars sometimes makes it difficult to determine the exact influence of each one, and focusing only on the general interactions may overlook local realities that affect food security.

The usefulness of the theory also depends on the availability of reliable data, which is not always easy to obtain in developing regions. This makes it harder to measure each pillar accurately (Webb et al., 2006). In addition, food security conditions change over time due to climate variability, shifting economic conditions and political decisions. The theory may not always capture these rapid changes, showing the need for regular updating of food security strategies. Despite these challenges, the Four Pillars Theory remains valuable. It helps researchers assess how extension services support farmers in key areas of food security. The theory also supports policymakers in making decisions that target the pillars that need improvement most (World Bank, 2018). Regular assessment of each pillar allows planners to adjust their strategies as conditions evolve. The emphasis on community involvement in the model highlights the importance of including farmers in decision-making so that extension programs are more effective.

In conclusion, the Four Pillars of Food Security Theory offers a strong framework for analyzing food security in Kwanza Sub County. Applying this theory to agricultural extension services helps identify the strengths and gaps in current approaches. Understanding both the theory and its practical application can guide improvements in extension service delivery, contribute to better food security outcomes and support increased maize production in the region.

## 2.2 Empirical Review

### 2.2.1 The Effect of Devolved Agricultural Extension Services on Food Production

Studies across Africa show that extension services play a central role in shaping food production outcomes. Chowa et al. (2013) used focus group discussions with farmers and extension officers in Malawi to examine small-scale farmers' experiences with access to multiple extension service providers. The study found that farmers had access to a variety of technical advice and enterprise specific technology. This improves their skills and adopt better production methods, which contributes to greater food security. However, he also discovered that most service providers dominate and decide what to offer by pushing particular technologies rather than addressing the farmers' specific needs.

Mbise (2016) conducted a study in Ludewa district (Njombe region) of Tanzania on the impact of extension services on agricultural production. The outcome showed the importance of extension services in raising both quality and quantity of maize produced by farmers. The study showed that majority of farmers did not access extension services hence the need to support smallholder agriculture in rural Tanzania. He recommended a greater investment in extension to ensure greater access by smallholder farmers in Tanzania.

Research on devolution in Kenya shows that county governments have had mixed outcomes in delivering extension services, Muhumed and Minja (2019) reported that devolution made it easier for farmers in Wajir County to get extension support, farm inputs and financial assistance which improved their food productivity. Their findings reinforced the importance of extension in promoting food security. Mutuga (2018) noted that fish farming productivity went down in Laikipia County because of rising costs, reduced subsidies, staffing shortages and limited funding. Kyambo et al. (2021) found that factors such as gender, education and income levels affected how aware farmers were of devolved agricultural services in Kitui County. These studies demonstrate that devolution has introduced both opportunities and challenges in extension service delivery. Understanding these perceptions is crucial for designing extension programs that benefit all categories of farmers.

Given that Trans Nzoia County differs from others in agricultural potential, climatic conditions and economic structure, this study addresses an existing gap by examining how devolution has influenced extension services and food production specifically in Kwanza Sub County. The findings add to ongoing discussions on devolution and rural

development and provide evidence that can inform policy reforms aimed at improving extension services and strengthening food production in Kenya.

### III. METHODOLOGY

#### 3.1 Research Design

This study was conducted using descriptive survey research design (Siedlecki, 2020). The study is concerned with establishing the nature of relationship between devolution and provision of extension services and its overall impact on food production and food security. It specifically intended to investigate the relationship between devolution of extension services and food production and food security by farmers. Such issues are best investigated through a descriptive survey. The design enabled the researcher to collect, organize and evaluate data from by engaging the respondents who are at the Centre of the study in their natural environment for honesty.

#### 3.2 Target Population

The targeted population is the maize farmers in Kwanza Sub County, Trans Nzoia County. These are 26,767 (91.2%) farmers registered in the maize for food value chain out of the 29,348 total number of farmers registered in Kwanza Sub County in all crop production value chains according to KALRO-NAD portal, 2023/24 National Farmers Registration).

#### 3.3 Sample Size and Sampling Technique

Kwanza Sub County has 26,767 (91.2%) farmers registered in the maize for food value chain out of the 29,348 total number of farmers registered in crops value chains in the Sub County. To determine the appropriate sample size, Krejcie & Morgan (1970) provide a formula for sample size determination in a finite population:

$$n = \frac{X^2NP(1-P)}{e^2(N-1) + X^2P(1-P)}$$

Where:

n = Required sample size

N = Population size (26,767)

e = Acceptable sampling error

X<sup>2</sup> = Chi-square of degree of freedom 1 and confidence 95% = 3.841

P = Proportion of population (if unknown, 0.5)

Using this formula, Krejcie and Morgan (1970) recommend a sample size of 379 for populations up to 30,000. Thus, this study adopted a sample size of 379 respondents, selected using a cluster sampling technique where respondents were grouped in clusters of five farmers apart to ensure adequate representation across the sub-county.

Purposive sampling was employed to obtain the key informants, by handpicking those that satisfy the characteristics of this study. These were from the various public and private agricultural institutions which will include Ministry of Agriculture, Research institutions, non-governmental organizations, and farmers' representatives.

#### 3.4 Data Collection Instruments

Primary data collection was by use of interviews, document analysis and questionnaires which were close and open ended. Close ended questionnaires are useful in quantifying the data that was obtained while open ended are useful in obtaining views, perceptions and opinions of the respondents. The researcher administered interviews to the key informants to obtain true information. The primary data was collected with the help of research assistants who was trained to undertake the administration of questionnaires to the respondents.

#### 3.5 Data Collection Procedure

Both primary and secondary data was collected by use of interviews, document analysis and questionnaires. Primary data was collected from the sample population of farmers in the study area. This contributed to the understanding on how extension services have impacted on food production. Interview guides with open ended discussion questions was used to collect data from selected key informants. Secondary data was obtained by reviewing county annual agricultural reports, county integrated development plans as well as reports from other agricultural institutions.

#### 3.6 Data Analysis and Presentation

Data was cleaned by reviewing all questionnaires and interview guides for completeness and consistency. The data was then captured, coded, analyzed by a statistical package (SPSS) and summarized using mean, median and mode and measures of dispersion such as range, quartile deviation, standard deviation and variance to describe a group of

subjects. Analyzed data was presented in tables, graphs and charts. Correlation and regression analysis was done to show causal effect and for understanding the relationship between variables.

### 3.7 Ethical Considerations

Each respondent was also informed of the purpose of the study, expected duration of the study, any risks or discomforts to the respondents, any benefits and extent of privacy and confidentiality before beginning any interviews. They were also assured of that any sensitive and personal information was not shared in any other forum except for purposes of the study. The respondents were treated with respect and dignity. Age, culture, religion and social class of the respondents were respected. The privacy and confidentiality of the respondents which involves gaining access to some lists and files to obtain samples for study was respected since all information obtained was in strict confidence. The respondents had the right to remain anonymous as well as freedom to ignore items that they do not wish to respond to and participate in the study voluntarily.

## IV. FINDINGS & DISCUSSION

### 4.1 Response Rate

In the study, 379 questionnaires were distributed among selected respondents to fill in relevant information, out of which 374 questionnaires were successfully filled as requested and returned back hence leading to 98.68% return rate.

**Table 1**

*Questionnaire Return Rate*

Questionnaire	Number	Percentage %
Delivered	379	100.00
Returned	374	98.68
Not returned	5	1.32

#### 4.1.1 Effect of Devolved Agricultural Extension Services on Food Production:

Descriptive analysis included description of frequencies, percentages, mode and median and the findings were presented in tables as below. The statements (enablers of maize production) were anchored on a five-point Likert-type scale ranging 5= Strongly Agree (SA), 4= Agree (A), 3= Undecided (U), 2=Disagree (D), 1=Strongly Disagree (SD) and respondents were asked to indicate the extent to which they agreed to the questionnaire statements during data collection.

**Table 2**

*Effect of Devolved Agricultural Extension Services on Food Production*

Statement	1=SD	2=D	3=U	4=A	5=SA	Mode	Median
Agricultural extension services have led to an increase in maize production in Kwanza Sub County.	50%	15%	10%	10%	15%	1	1
Credit facilities are easily accessible to farmers and have improved food security in Kwanza Sub County.	50%	30%	10%	5%	5%	1	1
Farmers have adopted better farming practices due to the extension services provided.	40%	25%	5%	25%	5%	1	2
The information provided by extension services is practical and easy to implement.	50%	10%	5%	30%	5%	1	1
Farmers believe that access to agricultural subsidies has enhanced maize production in Kwanza Sub County.	45%	15%	25%	10%	5%	1	2
The devolved system of government has made agricultural extension services more accessible to farmers.	40%	25%	10%	15%	10%	1	1
Farmers feel that their input is considered in the planning and provision of extension services under the devolved system.	50%	30%	15%	3%	2%	1	1

The descriptive results show clear dissatisfaction among farmers regarding the contribution of devolved agricultural extension services to maize production in Kwanza Sub County. As indicated in Table 2, half of the respondents strongly disagreed that extension services had increased maize production, while another 15 percent disagreed, giving a combined total of 65 percent. With both the mode and median at 1, it is evident that most farmers did not experience any meaningful improvement in productivity from extension support. This finding suggests a need to strengthen extension programs so that they respond better to the production challenges farmers face. Indeed,

Muhumed and Minja (2019) reported that devolution made it easier for farmers in Wajir County to get extension support, farm inputs and financial assistance which improved their food productivity.

A similar trend is observed with regard to access to agricultural credit. The results show that 50 percent strongly disagreed and 30 percent disagreed that credit facilities are easily accessible or supportive of food security efforts. With a mode and median of 1, the data confirm that most farmers face financial limitations. These constraints reduce their ability to buy key inputs such as fertilizers, seeds and machinery, which negatively affects maize production. This results align with Mbise (2016) who posited that limited access to formal credit also pushes farmers toward informal and often costly lending options, indicating the need for counties to work with financial institutions to improve credit outreach.

The findings also show that adoption of better farming practices through extension support remains low. According to Table 2, 40 percent strongly disagreed and 25 percent disagreed that farmers have changed their farming practices as a result of extension services. The mode value of 1 and the median value of 2 point to minimal uptake of recommended techniques. This suggests that existing trainings may not be sufficiently practical or consistent to influence change. This is supported by Guiné et al. (2021) who reinforced the need to restructure how training is offered, including more demonstrations and field-based engagements with farmers.

The practicality of extension information was another area of concern. Half of the respondents strongly disagreed that the information provided is easy to apply, with a further 10 percent disagreeing. The mode and median values of 1 indicate a shared perception that the advice does not fit well with local realities. The findings therefore point to the need for extension messages that are simplified, farmer-friendly and aligned with the conditions and resources available in Kwanza Sub County.

With regard to agricultural subsidies, 45 percent of farmers strongly disagreed and 15 percent disagreed that subsidies have improved maize production, while 25 percent remained undecided. The median value of 2 suggests that although some farmers acknowledge some benefit, the majority have not experienced notable gains. Farmers emphasized that subsidies should extend beyond fertilizers to include certified seeds, pesticides, herbicides and farm machinery, which would have a broader impact on production.

The devolved system of governance has also not been viewed positively in terms of making extension services more accessible. According to the table, 40 percent strongly disagreed and 25 percent disagreed that devolution has improved access to extension officers or services, giving a combined 65 percent. The mode and median values of 1 show that farmers believe service delivery challenges such as staffing gaps and poor coordination remain unresolved, even after devolution.

Similarly, farmers do not feel adequately involved in extension planning. Half strongly disagreed and 30 percent disagreed that their input is considered in decision making. With a mode and median score of 1, the results show that most farmers feel excluded from the processes that shape agricultural services. This limits the effectiveness of extension initiatives because farmer participation is important for developing responsive and context-specific interventions.

Overall, the results show widespread dissatisfaction with extension services, credit access, subsidies and farmer involvement, pointing to gaps in the devolved agricultural system. Farmers believe the current extension approach is not sufficiently practical, accessible or responsive. For more effective outcomes, policies should focus on participatory planning, strengthening extension capacity, improving access to credit and broadening subsidy support. Mbise (2016) study revealed the importance of agricultural extension services in raising quality and quantity of maize production. He recommended greater investment and focus to improve agriculture extension services in Tanzania. Extension services should be designed to ensure greater access by smallholder farmers through greater innovation, including use of ICT and related services.

Despite the general dissatisfaction, qualitative interviews show that a minority of farmers (20 percent) who strongly agreed or agreed with the statements had experienced noticeable improvements. These farmers attributed increased maize production to the fertilizer subsidy program, which expanded maize acreage. Some farmers confirmed improved food availability in local markets, while others noted that those who adopted recommended agronomic practices such as early land preparation, timely planting and use of certified seeds had seen better yields. Chowa et al. (2013) found that farmers who had access to a variety of technical advice and enterprise specific technology improved their skills and adopted better production methods, which contributes to greater food security. This shows that where extension services are applied consistently, positive results are achievable.

Further, 49 percent of the farmers reported an increase in maize production when comparing the 2022 and 2023 seasons. They linked the gains mainly to improved input access and better agronomic practices. Muhumed and Minja (2019) reported that farmers who get extension support, farm inputs and financial assistance improved their food productivity. These insights are summarized in the graph that follows.

**Table 3**  
*Descriptive Statistics for Food Production (Dependent Variable)*

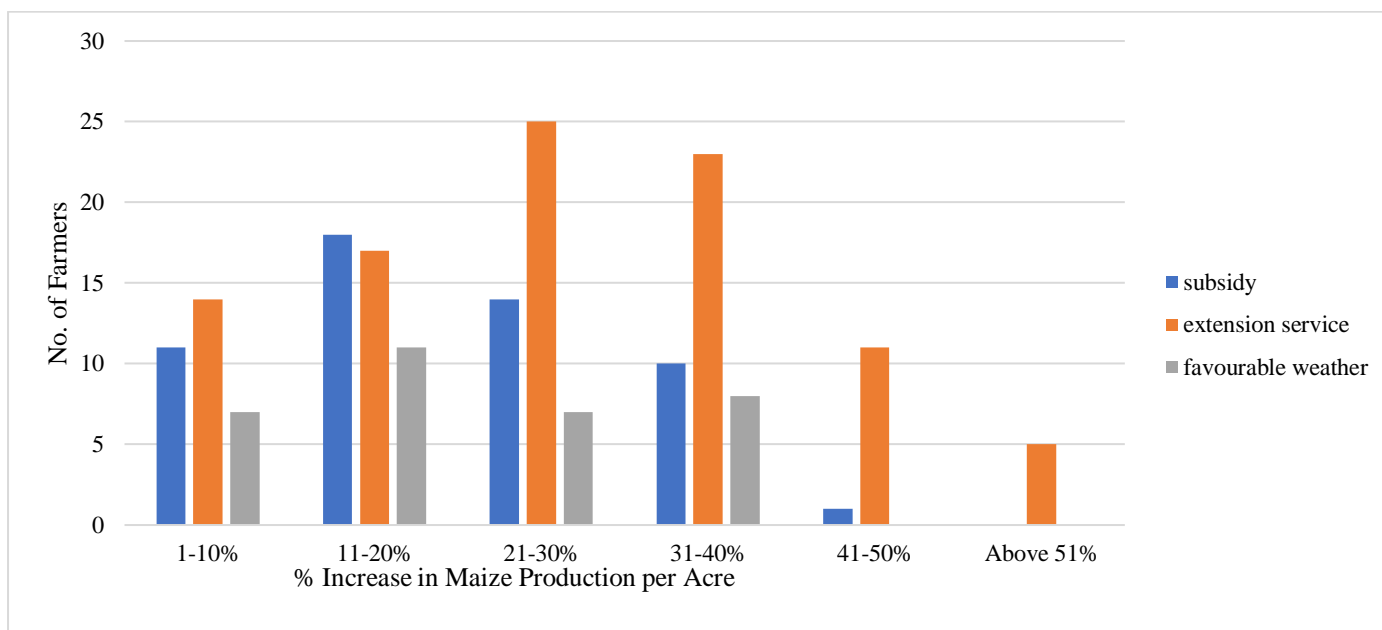
Food Production Indicator	Increased	No Change	Decreased	Mode	Median
Maize yield per acre compared to previous season	49%	35%	16%	1	2
Number of farmers reporting improved maize quality	42%	40%	18%	1	2
Household maize availability throughout the season	38%	44%	18%	2	2
Market availability of maize at affordable prices	53%	32%	15%	1	2

The descriptive results show that food production in Kwanza Sub County presents a mixed picture, with nearly half of the farmers reporting some level of improvement. As shown in Table 3, 49 percent of respondents indicated an increase in maize yield per acre compared to the previous season. This confirms the qualitative findings where 182 farmers acknowledged improved production. However, 35 percent reported no change, while 16 percent experienced reduced yields. The median value of 2 suggests that most farmers are clustered around slight improvement or no change.

Regarding maize quality, 42 percent of the farmers noted improvements, which they attributed to better agronomic practices and, for some, access to subsidized fertilizer. Still, 40 percent saw no change while 18 percent recorded poorer quality harvests, pointing to variability across the sub county.

The results on household maize availability show that 38 percent of households experienced better food availability, although for most respondents (44 percent), availability remained unchanged. This suggests that increases in yield have not yet translated into uniform improvements in household food security. Market availability of maize at affordable prices was reported by 53 percent of respondents, consistent with interview responses noting that maize is more accessible in local markets. This does not automatically translate to improved household food security because some farmers still produce below their household needs. (FAO et al., 2019), reports that when farmers can access markets more easily, they are better able to obtain food and improve how they use it, contributing to greater stability.

Overall, the dependent variable shows that while some farmers are benefiting, food production gains are uneven. The distribution confirms that any positive changes are influenced more by input subsidies (Muhumed & Minja, 2019) and individual effort than by widespread, effective extension service delivery.



**Figure 1**  
*Estimated Percentage Increase in Maize Production/Acre and reasons for increase (2022 versus 2023 seasons).*

The findings presented in the graph illustrate that extension services to farmers leads to better farming practices hence an increase in maize production. At least 52% attributed the increase to access to extension services, another 30% believed it was through the fertilizer subsidy program and only 18% attributed it to favorable weather. Furthermore, as a result of extension the farmers realized a higher percentage increase per acre of between 21% to above 51% as compared to reasons of subsidies and favorable weather.

**Table 4***Correlation matrix for Agricultural Extension Services and Food Production*

Variable	Maize Production Impact	Credit Access Impact	Adoption of Better Practices	Practical Information
Maize Production Impact	1.000	0.988	0.999	0.930
Credit Access Impact	0.988	1.000	0.985	0.975
Adoption of Better Practices	0.999	0.985	1.000	0.923
Practical Information	0.930	0.975	0.923	1.000

The correlation results suggest a strong positive relationship between the components of agricultural extension services and maize production in Kwanza Sub-County. The adoption of improved farming practices shows the highest association with maize production ( $r = 0.999$ ). This is consistent with field reports indicating that farmers who implemented recommended practices, such as timely planting and proper fertilizer use, generally achieved better yields. The strength of this relationship indicates that practical agronomic behaviour remains central to improving production outcomes.

Credit access also shows a strong correlation with maize production ( $r = 0.988$ ). Farmers who are able to secure credit tend to purchase essential inputs more consistently. However, qualitative responses revealed that many farmers still face difficulty in obtaining formal credit, which limits the full potential of this relationship.

The correlation between practical extension information and maize production ( $r = 0.930$ ) further highlights the value of farmer-friendly and context-specific advisory services. Respondents indicated that they benefit more from demonstrations and clear explanations that match local conditions. Extension messages that are difficult to apply tend to have limited impact, even when farmers understand the recommendations.

Although the correlations are high across variables, they should be interpreted as indicating strong associations rather than proof of direct causation. The results point to the importance of strengthening extension delivery methods, improving access to finance, and promoting the adoption of suitable farming practices as part of efforts to enhance food production in the Sub-County.

**Table 5***Regression Analysis for Agricultural Extension Services and Food Production*

Variable	Coefficient ( $\beta$ )	Standard Error	t-value	p-value
Constant	2.7	0.45	6.0	0.08
Credit Access Impact	0.50	0.09	5.56	0.11
Better Practices	0.85	0.07	12.1	<b>0.03</b>
Practical Information	0.30	0.06	5.0	0.13

The findings indicate that the adoption of better farming practices ( $p = 0.03$ ) is the strongest predictor of maize production in Kwanza Sub County. This underscores the importance of translating agricultural knowledge into practical action. Simply providing information is not enough unless farmers actively implement improved techniques. Effective extension services should therefore focus on bridging the gap between knowledge and practice to achieve significant improvements in crop yields.

While credit access and practical information are positively correlated with maize production, their statistical insignificance suggests that financial support alone does not automatically translate to higher yields. Farmers must be equipped with the necessary skills to use credit effectively, ensuring that funds are directed toward productivity-enhancing inputs such as improved seeds, fertilizers, and modern farming techniques. Without proper guidance, access to financial resources may have a limited impact on overall agricultural performance.

To enhance the adoption of best practices, agricultural policies should prioritize hands-on learning approaches. This can be achieved through farmer mentorship programs, practical demonstrations, and the establishment of model farms, where farmers can observe, practice, and refine new techniques under real conditions. By integrating experiential learning with financial and technical support, policymakers can create a more effective and sustainable agricultural extension system that drives long-term productivity gains.

The findings agree with the study titled '*The Impact of Agricultural Extension on Food Security in Sub-Saharan Africa*,' (Omamo & Collins, 2023). They assessed the role of agricultural extension services in enhancing food security across several countries in the region. Their findings indicate that effective extension services led to increased production of staple crops, including maize, thereby improving food security among farming households. This highlights the critical role that extension services play in not only supporting individual farmers but also in contributing to broader food security initiatives. While these studies confirm the importance of extension services, they do not explicitly address the challenges of service delivery, funding, and sustainability in the context of local counties, which requires further exploration.

Similarly, Teye (2013) did a review of impact evaluation reports on agricultural extension programs in Sub-Saharan Africa (SSA). The results of impact evaluations conducted in 10 SSA countries including Kenya, Somali, Ivory Coast, Rwanda, Burkina Faso, Uganda, Zimbabwe, Mozambique, Ethiopia, and Tanzania were collected from various websites for the analysis. In addition, agricultural productivity trends reported by various authors on a variety of reports and websites are included. The study was mainly based on qualitative analysis. The quantitative data were analyzed using simple descriptive statistics. He noted that various extension programmes have been launched in sub-Saharan Africa with the aim of improving agricultural production and productivity. However, agricultural production and productivity is not growing as it should be in the region. Despite this fact, most of the impact evaluation studies conducted on agricultural extension programmes in the region have reported positive and significant impacts.

A paper by Radimi and Kabiti (2019) in the “*South African Journal of Agricultural Extension*”, highlighted various means by which agricultural extension and training can help address food security at the household level. Given that in South Africa, most poor people live in rural areas and that agriculture is their main source of livelihood, focusing on factors that will enhance smallholder agriculture will bring about a lasting solution to the problems of rural poverty and food insecurity. Public agriculture extension service is the main support system available to smallholder farmers in South Africa.

## V. CONCLUSION & RECOMMENDATIONS

### 5.1 Conclusion

The study examined the effect of agricultural extension services on maize production in Kwanza Sub-County. The findings suggest that, overall, these services have had a limited impact on improving maize yields. Most farmers reported little or no benefit, with the majority indicating that extension services had not contributed significantly to increased production. This reveals that current extension approaches may not adequately address the practical challenges farmers face in improving productivity.

A major constraint identified is the limited access to credit facilities, which is critical for purchasing better inputs and adopting modern farming techniques. Many farmers reported difficulties in obtaining credit, highlighting the need for improved financial support mechanisms. Without sufficient funding, even well-designed farming practices cannot be effectively implemented. This limitation restricts farmers’ ability to invest in productivity-enhancing inputs such as improved seeds, fertilizers, and farm machinery.

The adoption of improved farming practices also remains low despite the presence of extension services. A significant number of respondents indicated that they had not implemented recommended techniques, suggesting that training programs may not be sufficiently practical or tailored to farmers’ specific needs. Many struggle to translate theoretical knowledge into actionable strategies, which limits the potential gains from extension support. Additionally, the information provided by extension officers was often viewed as difficult to apply in real farming conditions, creating a gap between advisory services and actual practice. Government support through agricultural subsidies has also fallen short of expectations. A large majority of farmers reported that subsidies had not meaningfully enhanced maize production. This points to a need for better-targeted programs that meet farmers’ real needs. Similarly, the introduction of devolved governance has not significantly improved the accessibility or effectiveness of extension services. Farmers indicated that service availability and engagement under the county system remain largely unchanged.

Finally, farmers feel their input is not adequately considered in the planning and delivery of extension programs. Over half of the respondents expressed that their views are ignored in decision-making processes. This lack of participatory planning reduces the relevance and responsiveness of extension services, emphasizing the importance of including farmers in designing interventions that align with local realities and challenges.

### 5.2 Recommendations

The findings of this study suggest several actions to improve agricultural extension services and maize production in Kwanza Sub-County. The County Government of Trans Nzoia has prioritized agriculture in its development plans, but existing barriers still limit the effectiveness of extension programs. Digitizing services and creating integrated digital platforms could help farmers access extension advice, financial services, and market information more efficiently. Involving multiple stakeholders, including government agencies, non-governmental organizations, private sector actors, and farmer groups, can also improve coordination, resource allocation, and knowledge sharing, making extension services more responsive to local needs.

Another important step is to increase the number of extension officers across all wards. More officers would allow for frequent field visits, personalized guidance, and practical support, helping farmers apply recommended techniques on their farms. Consistent engagement between extension personnel and farmers is essential for turning knowledge into action and improving productivity. Finally, greater financial support for extension services is needed. Funding from both national and private sources would ensure that extension officers have adequate resources, farmers

receive sufficient training, and essential inputs are more widely available. Enhanced investment in extension programs would strengthen service delivery, support sustainable farming practices, and ultimately improve food security and maize production in the sub-county.

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