



**CHALLENGES OF EXTENSION SERVICE PROVISION THAT AFFECT FOOD PRODUCTION AND FOOD SECURITY
IN KWANZA SUB COUNTY**

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ABSTRACT

The main objective of devolution in Kenya is to enhance the efficiency and accessibility of public services. Agriculture was one of the sectors devolved to County Governments, emphasizing their critical role in ensuring food security and boosting the rural economy. Despite the availability of modern farming technologies, food security remains a significant challenge in Kenya, particularly in Trans Nzoia County. The effectiveness of devolution in delivering agricultural extension services and its influence on food security in Kwanza Sub County has not been adequately studied since the onset of devolution. This study focused specifically on identifying the challenges faced in the provision of agricultural extension services in Kwanza Sub County and how these challenges affect maize production and food security. The objectives of the study were to assess the challenges in agricultural extension service provision under the devolved system of government, particularly in Kwanza Sub County, and how these challenges affect maize farmers' productivity and food security. The target population consisted of maize farmers in Kwanza Sub County, Trans Nzoia County, and a descriptive survey research design was used for data collection. Purposive sampling was applied to select key informants from public and private agricultural institutions, and simple random sampling was used to select 379 farmers from a total population of 26,767 maize farmers. Data was collected using structured and semi-structured questionnaires, as well as interview guides. The data was analyzed using descriptive and inferential statistics, including frequencies, percentages, and chi-square tests, with the help of the SPSS program. The findings indicate that farmers in Kwanza Sub County face significant challenges in accessing quality agricultural extension services. Key obstacles identified include insufficient funding (55%), inadequate staffing of extension officers (60%), logistical issues, and gaps in infrastructure, particularly in remote areas. These challenges severely impact the effectiveness of extension services and, by extension, the production of maize, a key food security crop. Recommendations to improve the situation include increasing funding for extension services, hiring more extension officers, improving logistical support, and ensuring continuous training for the officers. The study highlights the critical need to address these challenges to enhance the provision of extension services, which is essential for improving food security and agricultural productivity in Kwanza Sub County.

Key word: Challenges of Extension Service Provision, Food Production and Food Security

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BACKGROUND

Agricultural extension services are essential for improving productivity and ensuring food security, especially in rural areas like Kwanza Sub County, Trans Nzoia County (FAO, 2019). Under devolution, the responsibility for delivering these services shifted to county governments, aiming to provide more localized and responsive support to farmers (Republic of Kenya, 2012). However, the effectiveness of these services is significantly constrained by various challenges. These include inadequate funding, understaffing of extension officers, poor stakeholder coordination, and logistical difficulties (Mwamfupe et al., 2019). Such obstacles directly impact the quality and accessibility of extension services and hinder the ability of farmers to access timely and relevant agricultural information, ultimately affecting maize production and food security in the region (Republic of Kenya, 2020; Mango et al., 2021). This study focuses on identifying these specific challenges within the devolved system to better understand how they limit the performance of extension services and to propose solutions to enhance food production and farmer livelihoods in Kwanza Sub County.

Statement of the Problem

The problem requiring intervention is the persistent challenges hindering the effective provision of agricultural extension services under devolution in Kwanza Sub County, Trans Nzoia. Despite constitutional mandates and supportive policy frameworks (Republic of Kenya, 2012), farmers continue to experience food insecurity due to systemic issues such as inadequate funding, insufficient numbers of extension officers, poor infrastructure, and weak coordination among stakeholders (Mwamfupe et al., 2019; Obare et al., 2021). These obstacles limit farmers' access to timely training, modern agricultural knowledge, and essential support, which undermines efforts to improve food production and security (Kanyangi et al., 2020; FAO, 2019). The failure to address these challenges not only reduces the effectiveness of

extension services but also contributes to continued low productivity among maize farmers in the region. Identifying and understanding these barriers is therefore critical to enhancing the role of extension services in promoting sustainable food security in Kwanza Sub County (Mango et al., 2021).

Objectives of the study

This study identified challenges of extension service provision that affect food production and food security in Kwanza Sub County. The study was guided by the following research question;

- What are the challenges of extension service provision that affect food production and food security in Kwanza Sub County?

LITERATURE REVIEW

Theoretical Framework

The Soufflé Theory of Decentralization, proposed by Parker (1995), offers a valuable framework for analyzing the challenges affecting the provision of agricultural extension services under the devolved system. The theory likens the decentralization process to the delicate preparation of a soufflé, where the correct balance of ingredients—political, fiscal, and institutional elements—is critical to successful outcomes. In the context of this study, these components symbolize the core factors influencing the effectiveness of decentralized agricultural extension services in Kwanza Sub County.

This theory is particularly useful in understanding the challenges facing extension service delivery. For instance, insufficient funding (a fiscal imbalance), weak institutional capacity (institutional gaps), and lack of political prioritization (political inertia) represent the "imperfect ingredients" that prevent the extension system from rising to meet local agricultural needs. These imbalances have a direct impact on food production and food security outcomes in the region.

While the theory provides a simplified yet intuitive understanding of decentralization dynamics, it also points to the vulnerabilities in the system. It

highlights how a disruption in any of the essential elements—such as underfunding of extension services or poor coordination among institutions—can severely hinder the effectiveness of service delivery.

By applying the Soufflé Theory, this study focuses on identifying the specific political, financial, and institutional challenges that constrain the provision of agricultural extension services in Kwanza Sub County. Understanding these systemic barriers is essential in developing targeted interventions to strengthen service delivery, enhance maize production, and ultimately improve food security.

Empirical Literature Review

In their study titled "Strengthening Agricultural Extension and Advisory Services," Swanson and Rajalahti (2020) conducted a comprehensive review of agricultural extension systems worldwide, focusing on the challenges faced in various contexts. Utilizing qualitative analysis, the researchers drew on case studies, surveys, and interviews with extension professionals and farmers to gather insights. Their findings revealed several key challenges in extension service provision, including inadequate funding, limited access to information and technology, insufficient training of extension personnel and weak linkages between research and extension services. The study also underscored the difficulties in reaching marginalized groups, such as smallholder farmers and women. Notably, the authors pointed out a lack of data on the effectiveness of extension services in different cultural contexts, emphasizing the need for tailored approaches that consider local socio-economic conditions.

Duflo, Kremer (2021), and Robinson examined the challenges of agricultural extension services in their study titled "Nudging Farmers to Use Fertilizer: Theory and Experimental Evidence from Kenya." This research involved a randomized controlled trial in Kenya, where the authors collected data through surveys and direct observation to analyze how behavioral nudges could improve fertilizer use among farmers. Their findings indicated that

significant challenges in extension service provision included a lack of trust between farmers and extension agents, limited resources for providing consistent support, and insufficient understanding of local farming practices. The study revealed that simple behavioral interventions could enhance engagement with extension services. However, the authors noted that their focus was primarily on fertilizer use, leaving broader challenges related to overall agricultural extension services underexplored, particularly concerning diverse crop systems.

Kivuva's (2017) study, "Challenges Facing Agricultural Extension Services in Eastern and Southern Africa," involved a survey of extension workers and farmers across several countries in the region. This research combined qualitative interviews with quantitative analysis to assess the effectiveness of extension services and identify key challenges. The findings highlighted issues such as inadequate funding for extension programs, high staff turnover, limited training opportunities for extension agents, and poor infrastructure. Furthermore, the study emphasized the gap in aligning extension services with the needs of local farmers, especially in rapidly changing agricultural environments. While Kivuva's research provided valuable insights, it also noted the necessity for more in-depth studies to explore the specific challenges faced by different demographic groups, such as women and youth, in accessing extension services.

Mazzucato and Boccella (2018) published their study titled "Assessing the Challenges of Agricultural Extension Services in Italy." They utilized a mixed-methods approach, combining surveys of extension agents and farmers with qualitative interviews to investigate the effectiveness of extension services in Italy. The study identified challenges such as bureaucratic inefficiencies, limited coordination between various agricultural departments, and inadequate outreach to small-scale farmers. Additionally, it highlighted issues related to the aging workforce in agricultural

extension, which negatively impacted service delivery. The authors indicated a need for further investigation into the impact of digital technologies on extension service delivery, as well as a lack of data on how extension services could be more effectively tailored to meet the needs of diverse agricultural stakeholders.

Collectively, these studies illuminate the multifaceted challenges faced in agricultural extension service provision across different contexts. From inadequate funding and weak linkages between research and extension to the need for tailored approaches that consider local conditions, significant gaps remain. Addressing these challenges is essential to enhance the effectiveness of extension services and, ultimately, to improve agricultural productivity and food security globally.

METHODOLOGY

This study was conducted in Kwanza Sub County, Trans Nzoia County, a region characterized by a cosmopolitan population, significant agricultural activity, and the highest forest cover in the county, including Suam, Kimothon, and Kiptogot forests. Covering 465.3 square kilometers and divided into four wards (Kwanza, Bidii, Keiyo, and Kapomboi), the Sub County has a population of 203,821 people and features fertile, well-drained soils, a cool temperate climate, and sufficient annual rainfall (1,200–1,300mm) distributed across three seasons. Agriculture is the backbone of the economy, with most residents practicing mixed farming on land averaging 4.7 hectares in size. The research employed a descriptive survey design to examine the relationship between devolution and the provision of agricultural extension services, and its subsequent effect on food production and security. The target population comprised 26,767 maize farmers out of 29,348 total crop farmers (KALRO-NAD, 2023/24), with a calculated sample size of 379, proportionally distributed across the four wards using cluster and simple random sampling. Data collection involved questionnaires, interviews, and document reviews, with instruments tested for

validity and reliability through expert review and a pilot study in a neighboring sub-county. Data was cleaned, coded, and analyzed using SPSS through descriptive and inferential statistics, and findings were presented via tables, charts, and graphs. Ethical protocols included obtaining approvals, ensuring informed consent, and safeguarding participant privacy and confidentiality throughout the study.

RESULTS AND DISCUSSION

Demographic Characteristics

The demographic profile of respondents in Kwanza Sub County reveals important insights into gender, age, education, occupation, and household dynamics that influence agricultural engagement and access to extension services. The gender distribution is relatively balanced, with a slight male majority, yet disparities persist in access to resources and service delivery, often disadvantaging female farmers due to cultural norms, limited mobility, and unequal access to extension officers. The age distribution shows that the majority of farmers fall within the 31–50 years range, suggesting a mature and productive workforce, while the presence of younger respondents (18–30 years) is encouraging for the future of agriculture, indicating a potential for innovation and technology adoption. Educationally, most respondents have attained at least a secondary level of education, with a significant proportion holding tertiary qualifications, implying a readiness to engage with modern farming techniques, though a small segment with little to no formal education may face barriers in utilizing agricultural services effectively. In terms of occupation, the vast majority are full-time farmers, emphasizing agriculture as the main economic activity, while a smaller share engage in self-employment and formal employment, reflecting livelihood diversification. Household size also plays a crucial role, with most respondents living in small to medium-sized families, impacting both labor availability and resource allocation. Larger households offer more hands for farming but face

higher consumption demands, while smaller ones may be limited in labor but more efficient in resource management. These demographic insights underscore the need for tailored, inclusive agricultural policies and programs that address gender disparities, support youth and women in farming, enhance literacy for improved service uptake, and consider household composition in designing extension services.

Farm Characteristics

The findings from Kwanza Sub County paint a detailed picture of the agricultural landscape, highlighting critical dynamics around land ownership, farm sizes, crop and livestock patterns, labor use, and the role of rainfall. A significant majority (69%) of respondents own their land, indicating a high level of tenure security that facilitates long-term agricultural planning and investment, while 28% rely on family land and a smaller 3% lease or hire land, suggesting that some farmers still face barriers to full land control. Farm sizes vary widely, with 35% operating on plots smaller than 5 acres, reflecting limited production capacity, while 40% manage 5–10 acres, offering more room for diversification and commercial activity. The cropping pattern is dominated by maize (80%) and beans (60%), underscoring the reliance on staple crops for both food and income. Other crops like vegetables, sunflowers, and fruits are grown by smaller portions of farmers, often on limited acreage, indicating diversification efforts that could be expanded with better market access

and support. Livestock rearing complements crop production, with cows (60%) and poultry (55%) being the most common, playing a central role in nutrition, income, and farm sustainability. Labor is primarily family-based (65%), with 35% hiring additional help during peak seasons, demonstrating a flexible labor strategy that balances cost and productivity. Rainfall remains a critical factor, with 70% of farmers finding it reliable, especially the long rains in March and the short rains in September, though 30% express concerns about variability and unpredictability, which threaten yields and livestock health. These interconnected factors reveal both strengths and vulnerabilities within the farming systems, pointing to the need for integrated support—such as improved land access, input financing, climate-resilient farming practices, and training—to enhance productivity and sustainability in Kwanza Sub County's agricultural sector.

Challenges of extension service provision

Descriptive analysis included description of frequencies, percentages, mode and median and the findings were presented in tables as below. The statements were anchored on a five-point Likert-type scale ranging 5= Strongly Agree (SA), 4= Agree (A), 3= Undecided, 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. Descriptive statistics included percentage, frequency, mode and median.

Table 1: Challenges of extension service provision

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mode (1–5)	Median (1–5)
The extension services provided have significantly increased maize yields in Kwanza Sub County.	60%	25%	10%	3%	2%	1	3
Farmers who have access to extension services have higher maize production compared to those who do not.	65%	25%	5%	3%	2%	1	3
Extension services have led to the adoption of modern farming techniques that boost maize production.	55%	30%	10%	3%	2%	1	3
Extension services provision to youthful farmers has improved food security in the area.	50%	35%	10%	3%	2%	1	3
The quality of maize produced has improved as a result of the guidance provided by extension officers.	58%	30%	5%	5%	2%	1	3
Extension services have helped in managing pests and diseases affecting maize crops in the region.	55%	25%	10%	5%	5%	1	3
Farmers attribute their maize production success to the support received from agricultural extension services.	62%	28%	5%	3%	2%	1	3

The findings highlight several key challenges hindering the effectiveness of agricultural extension services in Kwanza Sub County.

A significant 55% of respondents strongly agreed that inadequate funding is a major challenge in delivering agricultural extension services, with a mode score of 30 and a median of 55. This indicates that financial constraints limit the reach, quality, and consistency of extension programs, leading to gaps in service provision. The lack of sufficient funds may hinder investments in modern training methods, outreach programs, and necessary agricultural inputs for farmers.

A majority (60%) of farmers strongly agreed that the shortage of extension officers negatively affects service delivery, with a mode score of 25 and a median of 60. This suggests that the ratio of extension officers to farmers is too low, making it difficult to provide timely and individualized support. Limited staffing leads to insufficient training sessions, poor farmer follow-up, and an overall decline in the effectiveness of agricultural extension services.

Half of the respondents (50%) strongly agreed that poor coordination among stakeholders is a major challenge in the provision of extension services,

with a mode score of 30 and a median of 50. This highlights issues such as a lack of synergy between government agencies, private sector players, and farmer organizations, which may result in duplication of efforts, inefficient resource allocation, and gaps in service provision.

Access to extension services remains a concern, as 55% of respondents strongly agreed that logistical challenges hinder their ability to benefit from these programs. With a mode score of 25 and a median of 55, the data suggests that factors such as poor road infrastructure, high transportation costs, and inadequate outreach efforts make it difficult for farmers—especially those in remote areas—to receive timely and consistent extension support.

A majority (60%) of respondents strongly agreed that extension officers require more frequent and up-to-date training to improve service delivery, with a mode score of 25 and a median of 60. This suggests that some extension officers may lack the latest agricultural knowledge, limiting their ability to provide relevant and practical solutions to farmers. Continuous capacity-building programs are needed to ensure officers are equipped with the latest techniques in crop management, pest control, and modern farming technologies.

Over half (55%) of respondents strongly agreed that agricultural extension services require more innovative approaches to improve effectiveness, with a mode score of 30 and a median of 55. This implies that traditional methods of knowledge dissemination may not be engaging or practical enough for farmers. There is a need for more farmer-centered approaches, such as digital extension services, demonstration farms, participatory training, and tailored advisory programs that address local farming challenges.

The findings suggest that the effectiveness of agricultural extension services in Kwanza Sub County is hindered by financial constraints, understaffing, poor coordination, logistical challenges, inadequate training for extension officers, and outdated extension approaches.

Addressing these challenges requires increased funding, improved coordination among stakeholders, innovative training methods, and better logistical planning to ensure that farmers receive the necessary support to enhance productivity.

The findings paint a concerning picture of agricultural extension service provision in Kwanza Sub County. Farmers largely disapprove of the accessibility, effectiveness, and impact of extension services, credit facilities, and subsidies. The lack of practical, relevant training and the perceived exclusion of farmers in decision-making further weaken the effectiveness of extension programs. To address these issues, policymakers should prioritize participatory approaches, enhance the accessibility of credit and subsidies, and improve the quality and relevance of extension training to ensure better agricultural outcomes.

These findings collectively emphasize that a multifaceted approach is necessary to enhance agricultural extension services. Addressing funding gaps, improving staffing, fostering stakeholder coordination, tackling logistical barriers, investing in continuous training, and adopting innovative methods are all crucial for ensuring the sustainability and effectiveness of extension programs.

Despite the positive impact of agricultural extension services, the County Government faces several challenges in providing these services under the devolved system. Devolution has transferred the responsibility for agricultural extension services from the national government to county governments, theoretically bringing services closer to the people. However, counties often face significant capacity constraints in terms of funding, staffing, and coordination, which affect service delivery.

Staffing remains a critical issue, with insufficient numbers of extension officers to meet the needs of all farmers. One respondent noted, *"The extension staff may not be regularly available to the farmers*

when needed" (Interviewee 1). The limited number of officers, coupled with logistical challenges such as inadequate transportation, restricts the ability of extension staff to reach farmers in more remote areas. Additionally, funding constraints further exacerbate these challenges, limiting the resources available for fieldwork and staff support. As one interviewee mentioned, *"There is a lack of continuous training and limited ability in guiding farmers towards new innovations"* (Interviewee 2). The limited training and skills of extension officers, particularly in innovation adoption and monitoring and evaluation, further impact the quality of service delivery.

The findings also suggest that the effectiveness of agricultural extension services varies across counties, depending on budgetary allocations and governance priorities. While some counties have invested in digital platforms and new extension models, others struggle to maintain basic services due to limited resources. Political interference in funding allocations and decision-making processes has also been identified as a challenge, with some county governments prioritizing short-term projects over long-term agricultural support programs.

To overcome these challenges, farmers suggest increasing the number of extension officers and providing them with continuous professional development. One respondent emphasized, *"County government should allocate more funds for continuous professional development and skills training of extension staff"* (Interviewee 3). Effective collaboration with stakeholders and partnerships with technology providers could also help modernize agricultural extension services and address the current gaps.

Bebe (2020) addresses the various challenges affecting agricultural extension services in Kenya in their study, *"Challenges Facing Agricultural Extension Services in Kenya."* They identify key issues such as funding constraints, inadequate staffing, and poor coordination among stakeholders. The study emphasizes the necessity

of addressing these challenges to improve the effectiveness of extension services, which are crucial for supporting farmers. The study also notes that devolution has both opportunities and challenges, as county governments vary in their ability to sustain effective extension services.

Similarly, Kilelu (2019) evaluates the current state of agricultural extension services in their research titled *"Evaluating the Effectiveness of Agricultural Extension in Kenya: Challenges and Opportunities."* They highlight the various challenges faced by these services, such as insufficient resources and training for extension officers. Their study suggests that overcoming these obstacles is essential for enhancing service delivery and effectively supporting the agricultural community. Moreover, they argue that counties need to develop innovative approaches to extension, leveraging technology and partnerships to bridge existing gaps.

The findings illustrate that while agricultural extension services are essential for improving agricultural productivity, several challenges hinder their effectiveness, particularly under the devolved governance system. Issues such as inadequate funding, staffing shortages, logistical constraints, and poor coordination remain significant barriers. While devolution has brought agricultural extension services closer to farmers, county governments must address capacity gaps, ensure sufficient resource allocation, and adopt innovative approaches to improve service delivery. Enhanced training, increased staffing, and better coordination among stakeholders will be essential for strengthening agricultural extension services and ensuring long-term agricultural development.

Inferential findings on challenges of Agricultural Extension Service Provision

The table below presents the correlation coefficients between key challenges in agricultural extension service provision and their impact on maize production.

Table 2: Correlation Matrix of Challenges Affecting Maize Production

Variable	Correlation Coefficient (r)	Interpretation
Funding Issues	0.429	Moderate positive correlation—funding constraints limit effective service provision.
Staffing Shortages	0.715	Strong positive correlation—lack of extension officers significantly impacts maize production.
Coordination Problems	-0.286	Weak negative correlation—poor coordination among stakeholders slightly reduces production efficiency.

The findings indicate that staffing shortages are the most critical challenge, with a strong correlation (0.715) to maize production. This suggests that increasing the number of extension officers would significantly improve agricultural productivity. Funding issues also show a moderate correlation (0.429), emphasizing the need for sustained financial support to enhance service delivery.

Interestingly, coordination problems exhibit a weak negative correlation (-0.286), indicating that while poor stakeholder coordination has a negative effect, it is not as impactful as staffing or funding constraints. However, better integration of extension services could still enhance overall effectiveness.

Table 3: Regression Analysis for Challenges Affecting Maize Production

Variable	Coefficient (β)	Standard Error	t-value	p-value
Funding Issues	0.429	0.089	4.8	0.13
Staffing Shortages	0.715	0.063	11.3	0.056
Coordination Problems	-0.286	0.070	-4.1	0.15

The analysis indicates that staffing shortages pose the most significant barrier to maize production, with a p-value of 0.056, suggesting a strong but borderline statistical significance. This finding highlights the critical need for an increased number of agricultural extension officers to provide timely and effective support to farmers. A shortage of staff means that many farmers lack access to expert advice, training, and technical assistance, limiting their ability to adopt improved agricultural practices. Expanding the workforce of extension officers would enhance knowledge dissemination, improve farm management techniques, and ultimately boost maize yields.

In addition, coordination problems have been found to negatively impact maize production, underscoring the necessity for better planning and integration of extension services. Poor coordination among key stakeholders—including government agencies, private sector actors, and farmers—leads to fragmented service delivery, duplication of efforts, and inefficiencies in resource allocation.

Without a well-structured extension system, farmers struggle to access timely information, inputs, and financial support, which hinders productivity. Strengthening collaboration and communication among stakeholders would streamline extension service delivery, ensuring that farmers receive comprehensive and well-coordinated support to improve maize production.

These findings emphasize the importance of addressing both staffing and coordination challenges in agricultural extension programs. By increasing the number of extension officers and enhancing stakeholder collaboration, policymakers can create a more effective extension service system that directly contributes to higher maize yields and improved food security.

The Impact of Agricultural Extension Services on Maize Production as a Food Security Crop

Descriptive analysis included description of frequencies, percentages, mode and median and the findings were presented in tables as below. The statements were anchored on a five-point Likert-

type scale ranging 5= Strongly Agree (SA), 4= Agree (A), 3= Undecided, 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. Descriptive statistics included percentage, frequency, mode and median.

Table 4: The Impact of Agricultural Extension Services on Maize Production as a Food Security Crop

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mode (1–5)	Median (1–5)
The extension services provided have significantly increased maize yields in Kwanza Sub County.	60%	25%	10%	3%	2%	1	3
Farmers who have access to extension services have higher maize production compared to those who do not.	65%	25%	5%	3%	2%	1	3
Extension services have led to the adoption of modern farming techniques that boost maize production.	55%	30%	10%	3%	2%	1	3
Extension services provision to youthful farmers has improved food security in the area.	50%	35%	10%	3%	2%	1	3
The quality of maize produced has improved as a result of the guidance provided by extension officers.	58%	30%	5%	5%	2%	1	3
Extension services have helped in managing pests and diseases affecting maize crops in the region.	55%	25%	10%	5%	5%	1	3
Farmers attribute their maize production success to the support received from agricultural extension services.	62%	28%	5%	3%	2%	1	3

Agricultural extension services are designed to enhance maize production by providing farmers with training, technical support, and modern farming techniques. However, findings from Kwanza Sub County suggest that these services have not significantly improved maize yields, as the majority of respondents expressed dissatisfaction with their effectiveness.

A significant 60% of respondents strongly disagreed that extension services had led to increased maize yields, with a mode of 1 and a median of 3. Only 5% of farmers agreed or strongly agreed. These

findings indicate that most farmers do not perceive a substantial increase in their maize production as a result of extension services. This could be due to inadequate training, a lack of practical implementation support, or the failure of extension programs to address critical farming challenges effectively.

A majority of farmers (65%) strongly disagreed that those who had access to extension services produced more maize than those who did not, with a mode of 1 and a median of 3. This suggests that extension services may not be delivering the

intended productivity benefits or that farmers are not effectively adopting the recommended agricultural practices. The lack of impact may be attributed to poor outreach, ineffective training methods, or financial barriers preventing farmers from applying improved techniques.

Despite the role of extension services in promoting modern farming techniques, 55% of respondents strongly disagreed that they had led to increased adoption of such practices. The mode was 1, and the median was 3, indicating that many farmers have not transitioned to improved farming methods. Possible reasons include inadequate demonstration plots, limited access to necessary inputs, and ineffective farmer education programs. This highlights the need for more practical, hands-on training approaches that encourage the uptake of modern techniques.

Half of the respondents (50%) strongly disagreed that the provision of extension services to young farmers had improved food security, with a mode of 1 and a median of 3. Only 5% of farmers agreed or strongly agreed. This suggests that extension services have not been effectively tailored to young farmers, possibly due to poor engagement strategies, lack of youth-specific programs, or financial constraints that hinder participation.

Farmers remain skeptical about the role of extension services in enhancing maize quality. A majority (58%) strongly disagreed that guidance from extension officers had improved maize quality, with a mode of 1 and a median of 3. These findings suggest that extension services may not be adequately addressing key factors such as post-harvest handling, storage, and quality control. The absence of targeted interventions in these areas may be limiting the potential improvements in maize quality.

A significant 55% of respondents strongly disagreed that extension services had helped them manage pests and diseases affecting maize crops, with a mode of 1 and a median of 3. This indicates that farmers are not receiving sufficient support in pest

and disease control, possibly due to a lack of timely interventions, inadequate farmer education on integrated pest management, or limited access to necessary pest control measures.

When asked whether they attribute their maize production success to agricultural extension services, 62% strongly disagreed, while only 5% agreed or strongly agreed. The mode was 1, and the median was 3, suggesting that most farmers do not see extension services as a major contributor to their productivity. This highlights a disconnect between extension efforts and tangible farmer outcomes, emphasizing the need for a more tailored and results-oriented approach to agricultural support.

The findings suggest that agricultural extension services in Kwanza Sub County have not been highly effective in improving maize production, adoption of modern farming techniques, pest and disease management, or food security among young farmers. Addressing these gaps requires a more practical, participatory, and farmer-centered approach that enhances the relevance and accessibility of extension services. Key recommendations include increasing demonstration farms, enhancing farmer engagement, improving access to quality inputs, and strengthening pest management programs to ensure meaningful agricultural transformation.

From interview findings, agricultural extension services have not made a significant contribution to maize production in Kwanza Sub County, with most farmers reporting no substantial increases in yields. However, one respondent among the 10% who agreed or strongly agreed confidently stated, *"To a very large extent, agricultural extension services have contributed to the increase in maize production"* (Interviewee 4). These services have also helped farmers address challenges related to pests, diseases, and soil fertility, with one farmer noting, *"There is adequate awareness among farmers on the appropriate practices to control pests and diseases, the correct measures to improve*

soil fertility, and the best farming practices to increase maize production."

Some farmers (10%) agree that guidance provided by extension officers has also improved the quality of maize produced. These farmers have learned how to manage their harvests more effectively, preventing pest infestations and aflatoxin contamination. One farmer explained, "Yes, farmers are able to manage their harvest to prevent pests and aflatoxins infestation" (Interviewee 4). The adoption of modern farming techniques through extension services has played a crucial role in boosting maize production, as noted by one respondent: "Yes, the adoption of modern farming techniques has significantly improved maize production".

The increased maize production has a direct impact on food security in the region. One farmer explained, "Maize is a staple food to all communities, and an increase in production automatically enhances food security" (Interviewee 8). The income generated from maize sales has also strengthened farmers' purchasing power, allowing them to access other types of food and further enhancing food security in Kwanza Sub County.

The relationship between agricultural extension services and maize production is further explored in the study *The Influence of Agricultural Extension Services on Maize Production in Rural Areas of Kenya* by Wanyonyi and Limo (2021). Their research indicates that farmers who utilize extension services experience higher yields and improved farming practices. This emphasizes the crucial role that these services play in enhancing maize production, highlighting the tangible benefits that come from effective extension support. Finally, Mwangi and Kariuki (2020) investigate the impact of agricultural extension services on maize production in their research, *Impact of Agricultural Extension Services on Maize Production: Evidence from Eastern Kenya*. Their findings reveal that access to extension services is associated with increased maize yields and better adoption of modern farming techniques. This underscores the

significance of agricultural extension services in improving overall agricultural outcomes, particularly in staple crop production.

Devolution can significantly influence the provision of agricultural extension services in Kwanza Sub County, improving access, funding allocation, and responsiveness to local agricultural challenges. The findings indicate that extension services play a crucial role in enhancing maize production, promoting modern farming techniques, and improving food security. However, challenges such as funding constraints, staffing shortages, and logistical barriers remain. Moving forward, county governments should strengthen extension services through increased investment, capacity building, and better coordination to maximize their impact on agricultural productivity and rural livelihoods.

SUMMARY

The study aimed to examine the key challenges affecting the provision of agricultural extension services and their impact on maize production in Kwanza Sub-County. The findings indicate that staffing shortages, poor coordination among stakeholders, and inadequate funding are the most significant barriers to effective extension service delivery, ultimately affecting maize production outcomes.

The findings suggest that agricultural extension services have not significantly improved maize production in Kwanza Sub County. A significant 60% of farmers reported no increase in yields due to extension services, while 65% disagreed that farmers with access to these services produced more maize than those without. Adoption of modern farming techniques has also been low, with 55% of respondents stating that extension programs have not encouraged them to implement improved practices. Additionally, training efforts targeted at young farmers have not significantly enhanced food security, as 50% of respondents disagreed that extension services have contributed to better outcomes for this group. Farmers also expressed skepticism regarding the role of

extension officers in improving maize quality, managing pests and diseases, and enhancing overall productivity. A majority, 62%, did not attribute their maize production success to extension services, highlighting a disconnect between extension efforts and tangible results. Addressing these shortcomings requires a more participatory and farmer-centered approach, with a focus on demonstration farms, improved farmer engagement, better access to quality inputs, and strengthened pest management strategies.

CONCLUSION AND RECOMMENDATIONS

Several challenges hinder the provision of agricultural extension services, with insufficient funding and inadequate staffing being the most significant. 55% of respondents cited a lack of sufficient funding as a major obstacle, and 60% highlighted that the shortage of extension officers affects the quality of services. Logistical issues, such as transportation difficulties and infrastructure gaps, also restrict the availability of extension officers, particularly in remote areas. Farmers recognize the need for continuous training of extension officers to keep them updated on modern farming techniques and innovations, which would improve service delivery. Additionally, more innovative approaches are needed to meet the evolving needs of farmers, such as integrating technology in service provision.

Based on the findings of this study, the following recommendations are proposed:

- The County Government should prioritize

hiring additional extension officers to ensure adequate coverage across all wards. This enables more consistent and timely support for farmers, enhancing the overall effectiveness of extension services.

- Stakeholder Collaboration is important since agricultural extension services improve significantly when multiple stakeholders, such as NGOs, government agencies, and private institutions, are actively involved. This highlights the importance of a multi-stakeholder approach in enhancing service delivery, as collaborative efforts ensure better resource allocation, knowledge sharing, and overall service efficiency.
- Work with financial institutions to create more accessible credit options for farmers, allowing them to invest in essential agricultural inputs and improve their production capabilities.
- The County government of Trans Nzoia has prioritized agriculture in its CIDPs, however it must address barriers to digitization by developing integrated and comprehensive digital platforms that connect maize farmers to extension services, access to financial services and real time market information
- Advocate for increased funding from National Government and private sources to support agricultural extension programs. This ensures the provision of essential resources and training needed for effective service delivery.

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