

Enhancing Agricultural Productivity through Radio Extension Programs: A Case Study of Maize Farmers in Borno State, Nigeria

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Abstract

Original Research Article

This study investigates the impact of the Mu Koma Gona agricultural radio program on the knowledge, attitudes, and practices of maize farmers in Southern Borno State, Nigeria. Against the backdrop of persistent agricultural challenges—such as limited access to extension services, climate variability, and insecurity—radio has emerged as a vital tool for agricultural communication, especially in rural and conflict-affected areas. The Mu Koma Gona program, broadcast in local languages, aims to disseminate information on modern farming techniques, including the use of drought-resistant seeds, appropriate fertilizer application, pest control, and market trends. Using a descriptive survey design, the study will collect data from 120 maize farmers across selected local government areas through questionnaires and key informant interviews. Quantitative data will be analyzed using descriptive and inferential statistics, while qualitative insights will be thematically analyzed. The study aims to provide empirical evidence on the effectiveness of radio-based agricultural extension, with expected outcomes including improved farmer awareness, positive attitudinal change toward innovation, and increased adoption of best practices. Findings will inform policymakers, development partners, and media practitioners on the potential of radio to enhance agricultural productivity and rural livelihoods in post-conflict regions.

Keywords: Agricultural communication, radio extension, maize farmers, knowledge and practices, rural development, Borno State, Nigeria.

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INTRODUCTION

Agriculture remains a cornerstone of the Nigerian economy, employing about 70% of the rural population and contributing significantly to food security and economic development (FAO, 2023). In Northern Nigeria, particularly Borno State, maize is a staple crop and plays a vital role in the livelihoods of local farmers. However, challenges such as climate variability, pest infestations, and poor access to inputs, and outdated farming practices continue to impede productivity and food security in the region (Adebayo & Olayemi, 2019; Yusuf *et al.*, 2022).

In response to these challenges, agricultural

extension and communication have become increasingly crucial. One of the most effective and accessible tools for rural communication in sub-Saharan Africa is the radio. Radio is affordable, requires minimal literacy, and has the capacity to reach a wide audience across rural and hard-to-reach areas (Chapota, Fatch, & Mthinda, 2014). In Borno State, where security concerns and infrastructural limitations constrain the traditional extension system, radio programs like *Mu Koma Gona* provide a unique opportunity to disseminate information to maize farmers on modern agricultural techniques, climate-smart practices, and market trends.

The *Mu Koma Gona* radio program is designed to educate and sensitize maize farmers on improved



farming practices, including the use of drought-resistant seeds, appropriate fertilizer application, pest and disease control, and interpretation of weather forecasts. It also features market information segments to enable farmers to make informed decisions about sales and storage. Such initiatives align with global development goals emphasizing sustainable agriculture and food security (United Nations, 2015).

While radio has been widely acknowledged as a tool for development, there remains a need for empirical studies to assess its impact on farmer behavior and productivity, especially in conflict-affected regions like Southern Borno. This research seeks to evaluate how the *Mu Koma Gona* program influences maize farmers' knowledge, attitudes, and practices with regard to modern agricultural inputs and techniques.

Agricultural productivity in Nigeria, particularly in the North-East region, faces persistent challenges including poor access to extension services, climate variability, and limited access to timely information. In response, radio has emerged as a viable alternative to traditional extension services. This research seeks to assess the impact of agricultural radio programs on the knowledge and productivity of maize farmers in Borno State, with a focus on the “Mu Koma Gona” radio program.

Problem Statement/Justification:

Agricultural productivity in Borno State, particularly in the maize farming sector, remains low despite the region's strong agrarian potential. Maize, a drought-resistant and staple crop in Northern Nigeria, has not reached optimal yields due to several persistent challenges. These include outdated farming techniques, limited access to extension services, erratic weather patterns, pest infestations, poor market linkages, and the unavailability or misuse of improved inputs such as fertilizers and hybrid seed varieties (Yusuf *et al.*, 2022; Adebayo & Olayemi, 2019).

Traditional extension systems meant to address these challenges have become increasingly ineffective in Borno State due to a combination of factors. Security concerns, poor infrastructure, limited human

resources, and communication barriers have all contributed to a significant gap between research-based agricultural innovations and the rural farmers who need them most (Adejo & Haruna, 2009; Arokoyo, 2012). As a result, many smallholder farmers continue to rely on traditional methods, which are often inefficient and unsustainable in the face of climate change and market fluctuations.

In light of these constraints, agricultural radio programs have emerged as a cost-effective and accessible means of reaching rural farmers with relevant, timely, and localized agricultural information. The *Mu* Agricultural productivity in Borno State, particularly in the maize farming sector, remains low despite the region's strong agrarian potential. Maize, a drought-resistant and staple crop in Northern Nigeria, has not reached optimal yields due to several persistent challenges. These include outdated farming techniques, limited access to extension services, erratic weather patterns, pest infestations, poor market linkages, and the unavailability or misuse of improved inputs such as fertilizers and hybrid seed varieties (Yusuf *et al.*, 2022; Adebayo & Olayemi, 2019).

Traditional extension systems meant to address these challenges have become increasingly ineffective in Borno State due to a combination of factors. Security concerns, poor infrastructure, limited human resources, and communication barriers have all contributed to a significant gap between research-based agricultural innovations and the rural farmers who need them most (Adejo & Haruna, 2009; Arokoyo, 2012). As a result, many smallholder farmers continue to rely on traditional methods, which are often inefficient and unsustainable in the face of climate change and market fluctuations.

In light of these constraints, agricultural radio programs have emerged as a cost-effective and accessible means of reaching rural farmers with relevant, timely, and localized agricultural information. The *Mu Koma Gona* radio program, broadcast in local languages, is designed to educate maize farmers on modern farming practices, weather forecasting, pest control, and market trends. However, while anecdotal evidence suggests that the

program is popular among rural listeners, there is a paucity of empirical data assessing its actual impact on farmer behavior and decision-making.

Thus, the problem this study seeks to address is the lack of documented evidence on how the *Mu Koma Gona* program influences knowledge acquisition, attitude formation, and adoption of improved maize farming practices in Southern Borno. Without such evidence, stakeholders—including policymakers, agricultural extension agencies, and development partners—lack the information needed to scale, replicate, or improve radio-based agricultural interventions in similar contexts.

Despite efforts by the government and NGOs to improve agricultural practices, many maize farmers in Borno State continue to experience low yields. Traditional extension services are inadequate due to insecurity, poor infrastructure, and low manpower. However, radio programs have proven to be effective information dissemination tools, yet their impacts remain under-researched.

Objectives of the study:

- i. To examine the listenership and reach of agricultural radio programs among maize farmers in Borno State.
- ii. To assess the level of knowledge gained from the “Mu Koma Gona” radio program.
- iii. To analyze the impact of the radio program on farm productivity and decision-making.
- iv. To recommend strategies for improving agricultural radio programming and adoption.

Literature Review:

Radio remains one of the most effective means of disseminating agricultural information in sub-Saharan Africa, especially in rural communities where literacy levels are low and infrastructure for internet and television is lacking (Chapman & Slaymaker, 2002; FAO, 2020). In Nigeria, agricultural extension services have traditionally relied on face-to-face methods. However, due to insecurity, poor road networks, and limited extension workers, access to timely and accurate agricultural

advice remains inadequate (Adedoyin, 2005).

The Role of Radio in Agricultural Extension

Aker (2011) argued that information and communication technologies (ICTs), especially radio, have the potential to bridge knowledge gaps and improve decision-making among smallholder farmers. Radio is especially effective because it allows the dissemination of information in local languages and dialects. It also accommodates interactive formats such as call-in shows and feedback sessions, thereby improving relevance and adoption of information.

Impact of Agricultural Radio Programs

Okwu *et al.* (2007) found that farmers who regularly listened to agricultural radio programs in Benue State, Nigeria, adopted improved farming practices more readily than non-listeners. Similarly, Egwu (2016) observed that farmers in Ebonyi State reported increased awareness of pest control and weather trends after consistent exposure to radio extension content. These studies highlight radio's power not only in education but also in behavior change.

Radio and Farmer Productivity

Empirical evidence shows a positive correlation between radio listenership and farm productivity. For instance, a study by Nwankwo and Okeke (2018) in South-Eastern Nigeria revealed that radio-based extension services led to a 20–30% increase in maize yield among listeners. Likewise, Obidike (2011) showed that farmers in Nsukka, Enugu State, applied more fertilizer and adopted early planting practices due to knowledge gained from radio programs.

Limitations and Gaps in the Literature

While most studies highlight the benefits of radio in agricultural extension, many are limited to southern Nigeria or maize production. Few studies have addressed maize farming, particularly in conflict-affected zones like Borno State, where traditional extension models are least effective.

There is also a lack of longitudinal research measuring productivity impacts across multiple farming seasons.

This study aims to fill these gaps by providing data-driven insights into how a specific radio program ***Mu Koma Gona*** influences maize farmers' knowledge, practices, and productivity in Borno State.

METHODOLOGY

This study adopt a **descriptive survey design**, suitable for capturing the perceptions, experiences, and behavioral changes of maize farmers who listen to the ***Mu Koma Gona*** agricultural radio program. According to Nworgu (2015), descriptive survey design allows researchers to systematically collect data from a population to describe existing phenomena or relationships.

Population and Sampling Technique

The population for this study comprises registered maize farmers in selected local government areas (LGAs) of Southern Borno State where the ***Mu Koma Gona*** program is broadcast. Using a **multistage sampling technique**, four LGAs will be purposively selected based on program reach and farming intensity. From each LGA, two wards will be randomly selected. A list of registered maize farmers will be obtained from local agricultural offices, from which **200 respondents** will be randomly selected (50 per LGA) to participate in the survey.

Instrument for Data Collection

Data is collected using a **structured questionnaire** and **key informant interviews (KIIs)**. The questionnaire includes both close-ended and Likert-scale items designed to measure farmers' exposure to the radio program, comprehension of content, and application of agricultural practices learned. KIIs was conducted with program producers, extension agents, and community leaders to validate findings and provide deeper insights.

Validation and Reliability

The questionnaire was subjected to **face and content validity** by experts in agricultural extension and rural communication at the College of Education Waka-Biu. A **pilot test** was conducted with 10 maize farmers in a non-sampled LGA to test the reliability of the instrument. The **Cronbach's alpha coefficient** was used to measure internal consistency, with a threshold of 0.7 considered acceptable (George & Mallery, 2003).

Method of Data Analysis

Quantitative data was analyzed using **descriptive statistics** (frequency, mean, and standard deviation) and **inferential statistics**, specifically **Chi-square and regression analysis**, to test relationships between program exposure and adoption of farming practices. Qualitative data from KIIs was analyzed using **thematic analysis**, identifying key patterns and narratives around program effectiveness and listener feedback.

Results and Discussion

Table i: Listenership and reach of agricultural radio programs among maize farmers in Borno State.

Frequency of Listening	Number of Respondents	Percentage (%)
Daily	54	27.0
Weekly	92	46.0
Occasionally	38	19.0
Never	16	8.0
Total	200	100.0

The results show that a majority (73%) of maize farmers listen to agricultural radio programs either daily or weekly, suggesting strong penetration of the “Mu Koma Gona” program in Borno State. Only 8% indicated they never listen, which implies that radio

remains a key agricultural extension tool in rural communities. This aligns with findings by Adegbola & Asa (2020), who noted that radio remains the most accessible extension medium for smallholder farmers in Nigeria.

Table ii: Level of knowledge gained from the “Mu Koma Gona” radio program.

Knowledge Area	High (%)	Moderate (%)	Low (%)
Improved maize farming techniques	60	28	12
Pest and disease management	55	32	13
Market information (prices & demand)	47	36	17
Weather forecast interpretation	42	34	24

Respondents reported high knowledge acquisition in improved farming techniques (60%) and pest/disease management (55%). Knowledge gain was relatively lower in market information and weather forecast interpretation. These findings indicate that “Mu Koma Gona” effectively transfers technical

knowledge but may require strengthening in market-oriented and climate-related information. This supports the assertion of Okwu & Daudu (2011) that agricultural radio programs significantly enhance technical know-how but often under-emphasize market intelligence.

Table iii: analysis of the impact of the radio program on farm productivity and decision-making.

Impact Area	Increased (%)	No Change (%)	Decreased (%)
Maize yield per hectare	64	31	5
Adoption of improved seed	58	36	6
Use of fertilizer	61	32	7
Timely farm operations	55	38	7
Informed decision-making	67	28	5

About 64% of farmers reported increased maize yield after adopting practices promoted in “Mu

Koma Gona.” Similarly, 67% agreed that their farm-related decision-making improved, particularly in

adopting improved seeds and timely farm operations. These results are consistent with Adhikarya (1994), who emphasized that agricultural communication

tools enhance both productivity and decision-making among rural farmers.

Table iv: Recommended strategies for improving agricultural radio programming and adoption.

Suggested Strategy	Frequency	Percentage (%)
Increase airtime and program frequency	78	39.0
Use local languages for wider understanding	65	32.5
Include interactive sessions (call-ins/SMS)	42	21.0
Collaborate with extension officers & NGOs	15	7.5
Total	200	100.0

Respondent's emphasized increasing airtime and broadcasting in local languages to enhance adoption. Interactive sessions were also highlighted as important to ensure farmers' feedback and real-time problem-solving. This resonates with Ani & Baba (2009), who found that interactivity and language localization are critical to the success of agricultural radio programs in northern Nigeria.

Summary of Findings

This study examined the role of radio extension programs in enhancing agricultural productivity, focusing on the "*Mu Koma Gona*" program among maize farmers in Borno State, Nigeria. The specific objectives were to assess listenership and reach, evaluate knowledge gained, analyze impact on productivity and decision-making, and recommend strategies for improvement.

The key findings are summarized as follows:

Listenership and Reach: A significant majority (73%) of respondents listened to agricultural radio programs either daily or weekly, while only 8% reported never listening. This demonstrates strong penetration of agricultural radio programs among maize farmers in the study area.

Knowledge Gained: Farmers reported high levels of knowledge acquisition, particularly in improved maize farming techniques (60%) and pest/disease management (55%). However, knowledge in market information and weather forecast interpretation was relatively lower, indicating areas for improvement in program content.

Impact on Productivity and Decision-making: The program had a positive impact on farm productivity, with 64% reporting increased maize yield per hectare and 67% confirming improved decision-making capacity. Adoption of improved seeds, timely farm operations, and fertilizer use also increased significantly.

Strategies for Improvement: Respondents recommended increased airtime and program frequency (39%), broadcasting in local languages (32.5%), and incorporating interactive sessions (21%). Collaboration with extension officers and NGOs was also identified as essential for program effectiveness.

Conclusion

The findings demonstrate that agricultural radio programs, particularly "*Mu Koma Gona*," play

a critical role in disseminating agricultural innovations, enhancing farmers' knowledge, and improving farm productivity in Borno State. Radio continues to be a vital extension tool due to its accessibility, cost-effectiveness, and wide coverage, especially in rural communities where literacy levels are low.

However, gaps remain in the dissemination of market information and climate-related forecasts, which are crucial for farm-level planning and decision-making. Furthermore, the lack of interactive features limits farmers' ability to seek clarifications or provide feedback to program producers.

Therefore, strengthening agricultural radio programs by diversifying content, ensuring language accessibility, and fostering interactivity will significantly enhance their impact on farmers' livelihoods.

Contributions to Knowledge

This study makes several contributions to education, particularly in the fields of agricultural extension and communication:

Knowledge Advancement: The study provides empirical evidence on the effectiveness of radio as an educational tool for rural farmers, thereby expanding the literature on non-formal agricultural education in Nigeria.

Extension Education: Findings highlight how radio serves as a medium of continuous learning, knowledge transfer, and behavioral change, reinforcing its role as a complementary approach to formal extension services.

Curriculum Development: Insights from this research can inform the design of extension education curricula, especially in agricultural colleges and universities, where communication strategies for rural development are taught.

Policy Education: By identifying gaps in content delivery (e.g., market and weather information), the study educates policymakers and program developers on the areas that require improvement in extension communication strategies.

Community Learning: The research underscores the role of radio in promoting lifelong learning and community-based education, especially in low-literacy rural settings where formal classroom education is limited.

Recommendations

Based on the findings and conclusion, the following recommendations are made:

Expand Airtime and Frequency: Agricultural radio programs should be aired more frequently and at convenient times for farmers to maximize reach and impact.

Promote Local Language Broadcasts: Programs should prioritize indigenous languages to ensure inclusiveness and better comprehension among rural farmers.

Enhance Program Content: Greater emphasis should be placed on providing market information, price trends, and weather forecasts to support informed farm-level decision-making.

Introduce Interactive Platforms: The incorporation of call-in sessions, SMS services, and farmer feedback mechanisms should be encouraged to promote two-way communication.

Strengthen Partnerships: Collaboration between radio stations, agricultural extension officers, research institutes, and NGOs should be deepened to ensure that accurate, research-based, and timely information is delivered to farmers.

Capacity Building: Training for broadcasters and extension workers should be prioritized to improve their ability to deliver clear, practical, and farmer-centered agricultural content.

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