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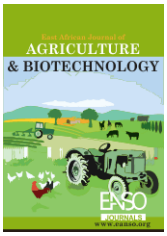

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Original Article

Effectiveness of Radio Agricultural Programs in Scaling up Farming Activities of Smallholder Farmers in Kasese District

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Agricultural Radio Programmes, Effectiveness, Smallholder farmers, Kasese.

ABSTRACT

Agricultural radio programs have long been recognised as a powerful tool for disseminating agricultural knowledge, especially among rural smallholder farmers. However, despite their potential, the effectiveness of these programs in scaling up farming activities has not been thoroughly examined in the context of Kasese District. The study addressed this gap by exploring the role of radio agricultural programs in enhancing the agricultural activities of smallholder farmers. The specific objectives were to: (i) assess the coverage, listenership, satisfaction, and implementation of acquired knowledge through agricultural extension radio programs; (ii) investigate the effectiveness of the programs on smallholder farming activities; and (iii) determine the factors associated with radio listenership and application of knowledge gained through agricultural radio messages. The study was a descriptive cross-sectional survey, utilising quantitative and qualitative approaches for data collection and analysis. Data was gathered from a sample of 360 respondents across 18 radio listener groups using questionnaires and interview guides. SPSS version 20.0 was used to analyse the data, generating descriptive and inferential statistics. The study established that coverage and listenership of agricultural radio programs were relatively high at 89.2% and 98.3% respectively, mostly in rural areas compared to urban settings. The Farmers' Corner Program (52.5%) was the most popular radio program listened to. Farmers are implementing the knowledge gained through radio programs in various areas, including crop husbandry 27.3%, soil and water conservation 17.1%, animal health management 15.2%, and enterprise selection 12.8%. The programs were effective in supporting smallholder farmers' decision-making processes as well as enhancing production practices. Evening hours were reported by 46.4% of the respondents as the most appropriate time for broadcasting radio programs, with farmers expressing a preference for interactive and participatory formats, which prioritised local languages 24.2% and indigenous knowledge 16.7%. Age (39-48 years) (p=0.002), radio ownership (p=0.000), place of residence (p=0.001), attitudes (p=0.003), limited agricultural spaces (p=0.032), media exposure (p=0.023), and investment capital (p=0.027) were the key factors influencing radio listenership and knowledge application. Despite the positive impact of the programs, certain barriers such as inappropriate airing

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times and limited access to radios hindered the full adoption of the information by farmers. The study concluded that agricultural extension radio programmes have a wider coverage and so pertinent to smallholder farmers' activities; however, listenership and application of the knowledge gained through agricultural radio messages is still hampered by certain impediments that call for urgent address. The study therefore recommends that Radio formats be designed to reinforce messages to bring change among farmers to adopt new farming techniques for improved productivity.

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INTRODUCTION

Globally, mass media are recognised as a vital tool of communication. It is instrumental in informing the masses about developments taking place across the world (Acker & Jenny, 2011). Radio agricultural programs are specialised broadcasts aimed at delivering crucial information on agriculture, farming, and rural development (Acker & Jenny, 2011). These programs are essential, especially in rural areas where smallholder farmers may lack access to other reliable sources of agricultural knowledge. Tailored to meet farmers' specific needs, these programs empower them to make informed decisions, enhance productivity, and adopt sustainable practices. Smallholder farmers typically operate on small plots with limited resources, making radio a practical and cost-effective medium for accessing timely agricultural advice and education (Sife et al., 2010).

Traditional mass media, particularly radio, remain highly relevant in developing nations where technological advancements have been slower to reach rural communities (Chiou & Tucker, 2011). Radio's broad accessibility, affordability, and ability to transmit across remote areas have made it indispensable for sharing farming tips, weather updates, market prices, and new agricultural technologies. This mode of communication is especially effective for smallholder farmers, offering localised and culturally appropriate content. The growth of rural radio stations is aligned with a participatory approach to knowledge transfer, shifting from top-down models to inclusive communication methods that prioritise farmers' needs (Kameshwari & Kishore, 2011).

In many African countries, including those in Sub-Saharan Africa, agriculture forms the backbone of household economies (Chiou & Tucker, 2011).

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Despite its importance, the agricultural sector suffers from inefficient extension systems characterised by inadequate personnel and poor infrastructure (Fu and Akter, 2010). Radio programs have increasingly filled this gap, serving as a low-cost alternative to reach rural populations. Their ability to use local languages, avoid literacy barriers, and provide portable and user-friendly access has made radio an essential platform for agricultural communication. These attributes are particularly vital in regions where the majority of the population relies on agriculture and lacks access to modern communication tools.

Uganda heavily depends on agriculture, with small-scale farmers comprising the majority of the rural workforce (Aker, 2010). However, the extension system in the country faces significant challenges, including poor transport networks, limited personnel, and logistical constraints leading to a high farmer-to-extension worker ratio (UFAAS, 2014). As a result, radio has become a key strategy for overcoming these barriers. In districts like Kasese, the emergence of multiple radio stations and increased radio ownership among farmers presents an opportunity to enhance agricultural communication (UFAAS, 2014). These local broadcasting services reduce pressure on the limited extension staff while effectively delivering relevant, real-time agricultural information to farmers across diverse communities.

Statement of the Problem

Quality and effectiveness of extension services are essential for maintaining sustainability and productivity in the agricultural sector. In Uganda, face-to-face communication by extension workers has traditionally been the primary source of agricultural information for farmers (UFAAS, 2014). However, a decline in the number of extension workers alongside a rising population of farming families has stretched these services thin, limiting the timely delivery of relevant agricultural information that is crucial for development. In response to these challenges, specific ICT services have emerged as promising solutions (UFAAS, 2014). The use of up-to-date technologies, such as agricultural radio programs, has been instrumental in providing farmers with the latest information on new agricultural techniques, crop varieties, and market access opportunities (UFAAS, 2014). In districts like Kasese, where there is approximately one extension agent for every 4,000 farmers, these radio programs play a vital role in delivering well-organised agricultural information to a broader audience at a minimal cost (Manyozo, 2009). Despite the widespread reach and affordability of agricultural radio programs, there is a significant gap in the literature regarding their overall effectiveness. Key aspects such as accessibility, coverage, farmer satisfaction, preferred program formats, and the timeliness and relevance of the information provided have not been fully explored. Moreover, the absence of any mechanism to gather feedback from farmers adds to the challenge of assessing these programs. The proposed study aims to address this knowledge gap, thereby enabling extension workers to design better programs that effectively meet farmers' needs.

Objectives of the Study

The study was specifically conducted to; determine the coverage, listenership, satisfaction and level of implementation of acquired knowledge through Agricultural Extension Radio Programmes, investigate the effectiveness of Agricultural Radio extension programmes on smallholder farming actives, time appropriateness and radio frequency formats preferred by smallholder farmers in acquiring knowledge, and determine the factors associated with radio listenership and application of the knowledge gained through agricultural radio messages.

Conceptual Framework

The study looked at agricultural radio extension programmes as the independent variable and smallholder farming agricultural activities as the dependent variable. The framework demonstrated a

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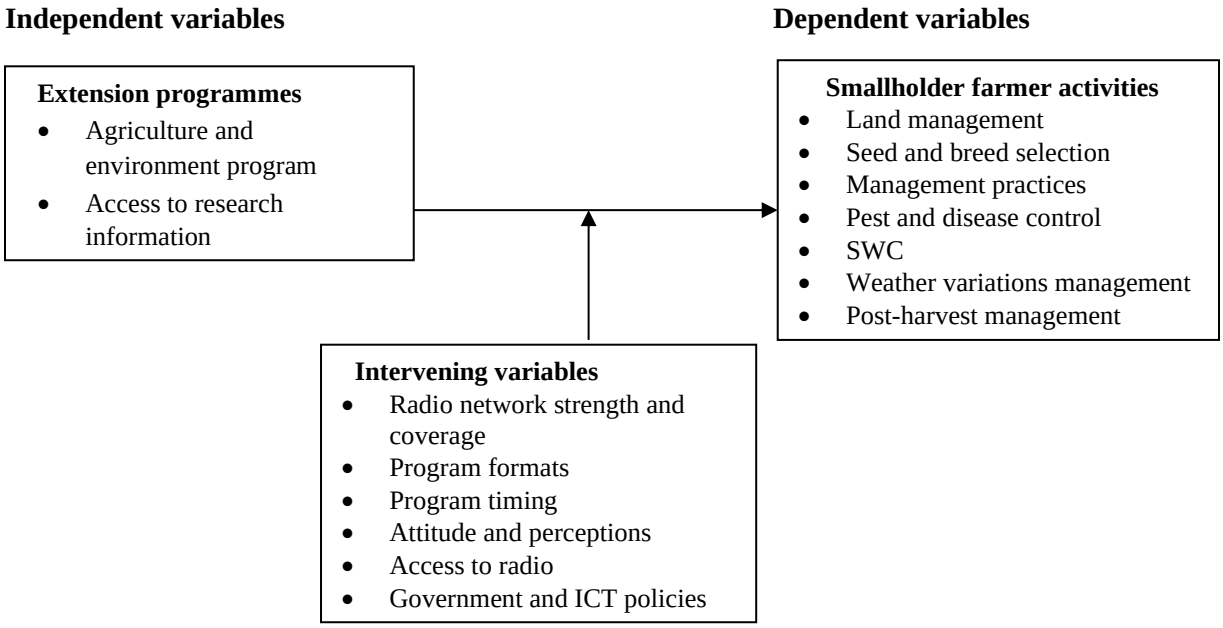
set of relationships among background variables, independent variables, and dependent variables.

Figure 1: A Conceptual Framework Describing the Relationship between Radio Extension Programmes and Smallholder Farming Activities.



(Source: *Wilson, 2025)*

From figure 1:1 above, local radio extension programmes have an impact on farming activities such as land management, seed and breed selection, pest and disease control, soil and water conservation, weather variations adoption and harvesting, and post-harvest management. All these activities boost production through enhanced knowledge and skills. Access and listenership to agricultural extension radio programmes are influenced by household characteristics like age of the household head, economic status, attitude and perceptions, and ownership of a hand radio.

MATERIALS AND METHODS

The study was conducted across radio listener groups of agricultural extension programs aired on different radio stations across the current Kasese district. Kasese District is bordered by Bunyangabu District to the north, Kamwenge District to the east, Rubirizi District to the south, and the Democratic Republic of Congo to the west. The district is known for its diverse landscapes, including plains, hills, and the presence of the Rwenzori Mountains. Smallholder farming is a predominant economic activity in the District. Due to the diverse topography, farmers engage in the cultivation of various crops at different altitudes. Access to agricultural information is influenced by factors such as literacy rates, infrastructure, and communication networks. While some farmers face challenges in accessing written information, radio serves as a vital medium for disseminating agricultural knowledge due to its widespread availability and oral nature, overcoming potential literacy barriers.

A descriptive-cross-sectional survey employing quantitative and qualitative approaches was adopted in the collection and analysis of data from different listenership groups across the district. The quantitative approach involved the use of quantifiable methods to capture and analyse

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quantifiable information generated using a questionnaire, whereas the qualitative method captured respondents' views, feelings, knowledge, and opinions using interviews and focus group discussions. The design helped the researcher in generating basic knowledge, clarifying issues, and studying in-depth the relationship between agricultural extension radio programmes and Smallholder farmer activities. Data was gathered from 360 respondents across targeted radio listener groups and group leaders.

A snowball sampling technique was adopted in the selection of respondents. Since potential respondents were difficult to find, given the sensitivity of the subject, the researcher identified potential respondents in the population. That is, the researcher initially identified 3 categories of respondents from each of the 18 listener groups. These included 4 group members and 1 group leader. These categories of respondents were asked to recruit other people (and then ask those people to recruit others). These steps were repeated until the needed sample size of 20 members was obtained from each group.

A semi-structured questionnaire with both closed-ended and open-ended questions was designed and used to elicit responses from the respondents. Questions were originally designed in English and later translated into local languages for respondents to read and respond in the languages they understood. The tool was checked for completeness, coded, and entered into SPSS version 27.0 software for cleaning and analysis. Data was analysed to generate descriptive and inferential statistics, which aided in the presentation and interpretation of findings. The generated findings were presented in statistical tables.

RESULTS

The demographic characteristics studied included: gender, age, education level, marital status, household size, total farm size, and source of livelihood.

Table 1: Respondents' Socio-demographic Characteristics

Household Characteristics	**Total (*n*=360)**
Sex of respondents (Freq. %)	
Female	236 (65.6%)
Male	124 (34.4%)
Age bracket (Freq. %)	
Below 15	23 (6.4%)
16 – 25	67 (18.6%)
26 – 35	134 (37.2%)
36 – 45	90 (25%)
46 and above	46 (12.8%)
Education level (Freq. %)	
Never been to school	13 (3.6%)
Primary	41 (11.4%)
Secondary	199 (55.3%)
Tertiary	77 (21.4%)
University	30 (8.3%)
Marital status (Freq. %)	
Never married	268 (74.4%)
Married	80 (22.2%)
Others	12 (3.3%)
Household size (mean ± Std. D.)	4.02 ± 2.135
Total farm size in acres (mean ± Std. D.)	3.25 ± 1.123

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Household Characteristics	**Total (*n*=360)**
Source of livelihood (Freq. %)	
Farming	272 (75.6%)
Business	52 (14.4%)
Formal Employment	36 (10%)

The analysis in Table 1 shows that the majority (65.6%) of the respondents were female and 34.4% were male, respectively. The participation of more females than males is a reflection of the smallholder agricultural sector in the area, which has attracted more females than men. The distribution of respondents by age bracket shows that the majority, 37.2%, fall within the 26–35 age group, the next largest group, 25%, was aged 36–45, a smaller portion, 18.6%, was aged 16–25, while 12.8% were aged 46 and above. Majority, (55.3%) of the respondents had attained secondary education, 21.4% tertiary education, 8.3% were university graduates, 11.4% had primary education whereas 3.6% had never been to school, representing a small segment of the population that may face challenges in accessing and applying agricultural knowledge due to illiteracy. 74.4% of the respondents were married, 22.2%% never married, whereas 3.3% were widowed and separated, respectively. The average members in a household was 4, with the largest family having 9 members and the smallest 3. Average land holdings were 3.25 ± 1.123 acres, with a minimum of half an acre and largest holding 45 acres. The majority, 75.6% sourced their livelihoods from farming, 14.4% small-scale petty businesses like shops and hardware, while 10% depended on a salary from formal employment.

Table 2: Coverage, Radio Listenership, and Satisfaction from Radio Programs

	Total (*n*=360)
Are you covered by any radio signal at your place of residence (Freq. %)	
Yes	321 (89.2)
No	39 (10.8)
Do you listen to any agriculture radio programme (Freq. %)	
Yes	354 (98.3)
No	6 (1.7)
Radio programmes listened to (multiple responses generated) (Freq. %)	
Farmers'Corner	189 (52.5)
Agriculture and environmental management	79 (21.9)
Integrated pest and disease management	92 (25.5)
Radio stations (Freq. %)	
Kasese Guide Radio	218 (60.5)
UBC Ngeya FM	30 (8.3)
Mesiah FM	45 (12.5)
AWR Light FM	67 (18.6)
How often do you listen to the programme (Freq. %)	
Very often	288 (80)
Seldom	59 (16.4)
Not all	14 (3.6)
How satisfied are you with the programme (Freq. %)	
Very satisfied	158 (43.9)
Somewhat satisfied	190 (52.8)
Unsatisfied	12 (3.3)

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Results in Table 2 indicate that the majority (89.2%) of the respondents revealed that they were covered with a radio signal at their places of residence, whereas 10.8% said no. 98.3% reported listening to agriculture radio programmes compared to 1.7%. Farmers' Corner was the dominant agriculture radio program listened to (52.5%), followed by the integrated pest and disease management program, and the agriculture and environmental management program at 25.5% and 21.9% respectively. 60.5% listened to agriculture radio programmes for Kasese Guide Radio, 18.6% AWR Light FM, 12.5% Mesiah FM, and 8.3% UBC Ngeya FM. Moreover, 80% listened to the programs daily, 16.4% seldom, and 3.6% not at all. 43.9% of the respondents were satisfied with the agriculture radio programmes they listened to, 52.8% somewhat satisfied, while 3.3% were unsatisfied.

Table 3: Implementation of Acquired Knowledge through Agricultural Extension Radio Programmes (Multiple Responses)

	Total (*n*=678)
Level of implementation of acquired knowledge (Freq. %)	
Soil and water conservation	116 (17.1)
Enterprise selection	87 (12.8)
Animal health and production management	103 (15.2)
Post-harvest management	91 (13.4)
Crop husbandry and management practices	185 (27.3)
Credit management	64 (9.4)
Group formation and management	32 (4.7)

As shown in table 3, most (27.3%) of the respondents had implemented the knowledge acquired through Agricultural Extension Radio Programmes in crop husbandry and management practices, 17.1% soil and water conservation practices, 15.2% animal health and production management, 13.4% post-harvest management, 12.8% crop and animal enterprise selection, 9.4% credit access and management and 4.7% group formation and management.

Table 4: Effectiveness of Agricultural Radio Extension Programmes, Time Appropriateness, and Radio Frequency Formats Preferred by Smallholder Farmers

	Total (*n*=581)
Effectiveness of AREPs on smallholder farming activities (multiple responses) (Freq. %)	
Improvement in the uptake and utilisation of SWC practices	79 (13.6)
Improved crop and animal enterprise choices	118 (20.3)
Increase in agricultural technology uptake and use	66 (11.4)
Improved animal health and production management practices	90 (15.5)
Improved post-harvest management practices	56 (9.6)
Enhanced crop husbandry and management practices	145 (24.9)
Proper credit utilisation and management	27 (4.6)
Preferred time appropriateness AREPs (Freq. %)	**Total (*n*=360)**
Morning hours	68 (18.9)
Afternoon hours	80 (22.2)
Evening hours	167 (46.4)
Late evening hours	45 (12.5)
Radio formats preferred by smallholder farmers in acquiring knowledge (Freq. %)	
Interactive and participatory talk show	99 (27.5)
Grassroots farmer-centered	43 (11.9)
Local language talk show	87 (24.2)
Repeated programme/talk show	71 (19.7)
Formats that involve indigenous knowledge	60 (16.7)

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The results on the effectiveness of Agricultural Radio extension programmes (AREPs) on smallholder farming activities were gathered and analyzed through multiple responses as in Table 4. 24.9% of the respondents revealed that agricultural radio extension programmes have enhanced the uptake of crop husbandry and management practices, 20.3% reported improvement in crop and animal enterprise choices, 15.5% enhanced animal health and production management practices, 13.6% improved the uptake and utilization of Soil and Water Conservation practices, 11.4% increase in agricultural technology uptake and use, 9.6% talked of enhanced post-harvest management practices and 4.6% talked of improved credit utilization and management. Regarding the time appropriateness of agricultural radio extension programmes in conveying agricultural information, 46.4% of the respondents preferred evening hours, 22.2% afternoon hours, 18.9% morning hours, whereas 12.5% proposed late evening hours. 27.5% preferred radio program formats that are interactive and participatory, 24.2% radio formats that prioritise local languages, 19.7% preferred programs that have repeats, 16.7% preferred formats that involve indigenous knowledge, and 11.9% radio formats that are grassroots farmer-centred.

Table 5: Parameter Estimates for the Factors Associated with Radio Listenership and Application of the Knowledge Acquired through Agricultural Radio Messages

Factors associated with radio listenership			
Variable	**Value**	**AOR (95% CI)**	**p-value**
Age bracket	18 - 28	.683 (.330 - 1.415)	0.306
	29 - 38	.572 (.275 - 1.188)	0.134
	39 - 48	1.493 (.437 - 4.614)	0.002
	49 and above	1	
Access to radio	Yes	0.636 (0.568 - 1.158)	0.195
	No	1	
Radio ownership	Own	3.060 (0.721 - 7.154)	0.000
	Do not own	1	
Place of residence	Town	2.953 (0.507 - 5.762)	0.001
	Village	1	
Attitudes and perceptions	Negative	0.441 (0.656 - 8.164)	0.003
	Positive	1	
Employment status	Employed	0.462 (0.813 - 2.553)	0.183
	Not employed		
Media exposure	Exposed	1.603 (0.290 - 3.953)	0.023
	Not exposed		
Factors for non-application of the knowledge gained through agricultural radio messages			
Lack of skills	Yes	1.441 (0.656 - 3.164)	0.363
	No	1	
Limited agricultural spaces	Yes	0.511 (0.239 - 0.827)	0.032
	No	1	
Economic status	High	0.956 (0.568 - 1.608)	0.864
	Low	1	
Investment capital	Yes	0.588 (0.367 - 0.940)	0.027
	No	1	
Labour availability	Yes	1.419 (.462 - 4.362)	0.541.
	No	1	

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Dependent variable: radio listenership and knowledge application

- AOR → Adjusted Odds Ratio
- CI → Confidence Interval

Results for the factors associated with radio listenership and application of the knowledge acquired through agricultural radio messages were presented in Table 5.

Age bracket (39 – 48) increased the log odds of the probability of listening to agricultural radio messages by 1.5 times. Those in the age group 39 – 48 years were 1.5 times more likely to listen to the radio compared to those aged 49 and above [AOR = 1.493; (95% CI: .437 - 4.614); p = 0.002]. There was no significant difference in listenership between those aged 18 - 28 and 39 – 48 years.

Likewise, radio ownership increased the log odds of the probability of listening to agricultural radio messages by 3 and was statistically significant at (p = 0.000). Households that owned radios were 3 times more likely to listen to agricultural radio messages compared to those that did not have [AOR = 3.060; (95% CI: 0.721 - 7.154); p = 0.000].

Place of residence increased the log odds of probability of listening to agricultural radio messages by 3. Those who resided in townships were 3 times more likely to listen to agricultural radio messages compared to those in the village [AOR = 2.953; (95% CI: 0.507 - 5.762); p = 0.001].

Attitudes and perceptions reduced the log odds of the probability of listening to agricultural radio messages by 0.4 and were significant at (p = 0.003). Compared to those with a positive mind, those with a negative attitude and perception were 0.4 times less likely to listen to agricultural radio programs [AOR = 0.441; (95% CI: 0.656 - 8.164); p = 0.003].

Exposure to media increased the log odds of the probability of listening to agricultural radio messages by 1.6 and was significant at 5%. Those with more media exposure were 1.6 times more likely to listen to agricultural radio messages compared to those with less exposure [AOR = 1.603; (95% CI: 0.290 - 3.953); p = 0.023].

Limited agricultural spaces reduced the log odds of farmers' application of knowledge gained through agricultural radio messages by 0.511 and was significant at 5%. Farmers with limited spaces for agriculture were 0.5 times less likely to apply knowledge gained through agricultural radio messages compared to those with bigger spaces [AOR = 0.511; (95% CI: 0.239 - 0.827); p = 0.032].

Furthermore, investment capital reduced the log odds of farmers' application of knowledge gained through agricultural radio messages by 0.588, significant at 5%. Farmers with limited capital for agricultural investment were 0.58 times less likely to apply knowledge gained through agricultural radio messages compared to those with capital [AOR = 0.588; (95% CI: 0.367 - 0.940); p = 0.027].

DISCUSSION OF FINDINGS

The study revealed that an overwhelming majority (89.2%) of respondents reported access to radio signals in their areas of residence. This high percentage underscored the significant infrastructural development of radio broadcasting in the district. Kasese, located in the western part of Uganda, is a mountainous region with some remote and hard-to-reach areas, especially around the Rwenzori ranges. Despite these geographical challenges, radio coverage remains impressively widespread. This accessibility has made radio a preferred medium for communication, particularly in agricultural communities. 10.8% of respondents who lacked radio signal access were situated in the more mountainous and isolated parts of the district, such as Kilembe, Nyakiyumbu, or Karusandara. Their exclusion indicates the need for further infrastructural improvements and potential investment in community radio systems or signal boosters. Comparatively, a study in Tanzania by Sife et al. (2010) showed that only 75% of rural farmers had access to agricultural radio programmes

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due to limited infrastructure and power availability, suggesting that Kasese is relatively better off in terms of radio signal reach.

A significant 98.3% of respondents reported listening to agricultural radio programmes, indicating strong interest and engagement among farmers in Kasese District. This high listenership could be attributed to the daily relevance of agriculture in the lives of the people, as the district is largely agrarian with a majority of the population engaged in smallholder farming. Crops such as coffee, bananas, maize, and beans dominate agricultural production, and access to timely and relevant information is crucial for improving yields and resilience against climatic and pest-related threats. The high listenership also reflected the trust and reliability placed in radio as a source of agricultural knowledge. Only 1.7% of respondents did not listen to these programmes, which included individuals without access to radios or those with limited interest in agriculture, possibly youth or urban dwellers in Kasese Municipality. This trend is consistent with a study conducted in Uganda by UFAAS (2014), which found that 96% of rural farmers listened to agricultural radio programmes regularly, citing ease of access and affordability.

Farmers' Corner emerged as the most listened-to agricultural programme, attracting 52.5% of listeners. This programme resonated with local farmers because of its relevance, practical focus, and potential for interactive engagement. Its dominance suggests that it offers actionable advice and context-specific guidance, possibly in the local languages such as Lhukonzo or Runyakitara, which are widely spoken in the district. The popularity of such programmes also points to their alignment with the local needs, particularly in addressing crop production, market prices, and seasonal farming tips. The second most popular programme was the "Integrated Pest and Disease Management Program" (25.5%), which was especially relevant considering recent challenges with fall armyworm infestations and banana bacterial wilt, both prevalent in the region. Farmers turned to this program for knowledge on timely pesticide application, organic pest management, and disease control. Similarly, the "Agriculture and Environmental Management Program" (21.9%) covered issues such as soil erosion, a major concern in the hilly terrain of Kasese, thereby fostering sustainable practices among local communities.

The study shows that Kasese Guide Radio (KGR) was the most preferred station, with 60.5% of respondents tuning in for agricultural content. KGR is well established in the district and known for broadcasting in local languages, which enhances understanding and relatability. The station's reputation for community-centred programming explains its dominance. Light FM, Messiah FM, and UBC Ngeya FM follow with 18.6%, 12.5%, and 8.3% respectively, indicating that while there is diversity in media options, KGR holds a clear lead. Stations like Light FM, associated with religious content, might also integrate agriculture into broader moral or development themes, which appeal to a segment of the community. This finding resonates with a study conducted in Iran by Sharma (2008), which found that local language broadcasting and community participation were key to high listenership rates in rural agricultural programming.

Frequency of Listening and Satisfaction Levels

The majority (80%) of respondents reported listening to agricultural radio programmes daily, highlighting the critical role of radio in the daily routines of Kasese farmers. This frequency of engagement suggests that radio was not only a source of learning but also a routine activity, possibly tied to scheduled farming tasks or market days. Seldom listeners (16.4%) and those who never listened (3.6%) reflected demographic or occupational variations. In terms of satisfaction, 43.9% were satisfied, while 52.8% were somewhat satisfied, and only 3.3% expressed dissatisfaction. The mixed satisfaction levels stemmed from varying degrees of content relevance, the need for

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more interactive formats, or limitations in program quality and depth. Some farmers desired more advanced content or locally tailored solutions. This mirrors findings from East Africa, where a study by Salami et al. (2010) reported that while radio programmes were popular, many listeners desired more region-specific content and opportunities for live question-and-answer sessions.

The implementation of knowledge gained through these programmes was one of the most telling indicators of impact. The study shows that 27.3% of respondents applied the knowledge in crop husbandry and management practices, an essential component of farming in Kasese, which is highly dependent on climate variability and soil fertility. Practices like spacing, mulching, and timely weeding are crucial in increasing productivity. Soil and water conservation (17.1%) was particularly important in Kasese due to the district's susceptibility to soil erosion and frequent floods, especially in low-lying areas like Bulembia and Nyamwamba. Adoption of terracing, contour ploughing, and tree planting demonstrates how farmers are translating radio knowledge into tangible actions. Animal health and production (15.2%), post-harvest management (13.4%), and enterprise selection (12.8%) reflect the holistic impact of these programs. Given that livestock like goats and cattle are integral to household incomes in places like Hima and Nyakatonzi, radio content that improves animal productivity is valuable. Credit access and group management recorded lower implementation rates (9.4% and 4.7% respectively), suggesting that these topics may be less emphasised or more difficult to act upon without institutional support. Forming farmer groups and accessing formal credit require social mobilisation and structural changes that radio alone might not fully address. This was similarly noted in a study in South East Asia by Retz and Hasbullah (2010), which showed that while radio increased awareness of group formation benefits, actual group establishment required external facilitation.

Agricultural radio extension programmes (AREPs) have emerged as a critical tool for disseminating agricultural knowledge, especially in rural areas where access to formal agricultural extension services may be limited. In the context of Kasese district, a predominantly rural area in western Uganda with a largely agrarian population, these programmes play a crucial role in equipping smallholder farmers with the knowledge and skills necessary to improve productivity and sustainability. The study findings revealed that AREPs have a multifaceted impact on farming activities, with 24.9% of respondents affirming enhanced uptake of crop husbandry and management practices. This is particularly relevant in Kasese district, where the majority of the population depends on crops like maize, beans, bananas, and coffee. Farmers often face challenges related to pests, soil fertility, and climate variability. AREPs that focus on timely land preparation, appropriate seed varieties, and pest control techniques have made a positive impact. Similar effects have been observed in Nigeria, where radio programmes led to a 30% increase in the adoption of improved seed and fertiliser use among smallholder farmers (Olaleye et al., 2009).

In addition, 20.3% of respondents cited improvements in crop and animal enterprise choices as a direct outcome of agricultural radio programming. This suggests that AREPs have enabled farmers in Kasese to diversify their farming ventures or select more profitable and resilient enterprises, an important adaptation strategy in a region frequently affected by climate shocks and market fluctuations. For instance, farmers have begun integrating poultry and piggery into their traditional crop systems, which not only spreads risk but also increases household income. A parallel can be drawn from Handeni, where a study by the International Food Policy Research Institute (IFPRI, 2013) found that farmers who regularly listened to agricultural radio programs were more likely to shift to high-value crops and livestock enterprises.

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Regarding animal health and production management, 15.5% of the respondents indicated a positive change. In Kasese, where livestock such as goats, cows, and poultry play a significant role in livelihoods and culture, access to accurate and timely animal health information via radio helps prevent diseases and boosts productivity. With limited veterinary services in many parts of the district, AREPs serve as a cost-effective alternative. For example, messages about common livestock diseases like Foot-and-Mouth Disease (FMD) or Newcastle disease in poultry helped farmers take preventive measures. This mirrors a study in Nigeria by Okwu and Daudu (2011), which emphasised that radio programs contributed significantly to livestock health knowledge and practices among rural communities.

Furthermore, 13.6% of farmers in the study attributed improvements in soil and water conservation (SWC) practices to AREPs. This was particularly critical for the study district, a region with steep terrains and heavy rainfall patterns that accelerate erosion and land degradation. Radio messages promoting terracing, agroforestry, and water harvesting techniques aligned well with the district's environmental challenges. This finding is in line with research conducted in Tanzania hill regions where radio programs effectively influenced the adoption of SWC technologies (Kimaro et al., 2010).

On the technological front, 11.4% of the respondents acknowledged increased agricultural technology uptake due to radio programs. This included the adoption of innovations such as improved seed varieties, organic pesticides, and mobile-based agricultural services. In Kasese, where physical access to agricultural extension officers is limited due to rugged terrain, radio served as a bridge between researchers and farmers, enabling quick dissemination of scientific advancements. Similarly, in India, research by Fu and Akter (2010) found that community radio increased awareness and adoption of mobile-based agricultural technologies among cocoa farmers.

Post-harvest management practices were cited by 9.6% of respondents, showing a moderate yet significant influence of AREPs. Kasese farmers often suffer losses due to poor storage, delayed harvesting, and lack of market information. Radio programmes addressing drying techniques, storage, pest control, and market trends helped reduce these losses, thereby improving food security. This mirrors findings in Tanzania, where a study by Farm Radio International (FRI, 2011) reported a reduction in post-harvest losses among maize farmers who had access to targeted radio content.

Lastly, improved credit utilisation and management (4.6%) was the least cited benefit, suggesting this was an area where AREPs in Kasese needed to strengthen their content. Access to and proper management of credit remains a challenge for many smallholder farmers due to low financial literacy and limited access to formal financial institutions. Yet, in countries like Manchester, community radio has been successfully used to improve farmers' understanding of credit schemes and loan repayment practices (Heeks and Molla, 2009).

When it comes to the timing of agricultural radio programmes, 46.4% of respondents preferred evening hours, followed by 22.2% in the afternoon, 18.9% in the morning, and 12.5% in the late evening. These preferences were closely tied to the daily routines of smallholder farmers in Kasese. Most farmers spend their mornings and early afternoons in the field, with evenings being a more relaxed time to listen to the radio while engaging in home activities. The high preference for evening broadcasts suggests that programme planners should align content dissemination with farmers' availability to maximise listenership and impact. This is consistent with findings from rural Tanzania, where farmers preferred agricultural radio broadcasts during evening hours when they were back from the fields and had more attention to spare (Churi et al., 2012).

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Regarding radio format preferences, 27.5% of respondents favoured interactive and participatory formats, such as call-in shows, listener feedback segments, and live interviews with local farmers and experts. This format not only promoted engagement but also built trust and relatability. Kasese farmers, who value communal decision-making and shared experiences, benefited from hearing directly from their peers and local leaders. Participatory radio has been shown to significantly enhance knowledge retention and behaviour change, as documented by a study in Mali where interactive radio increased the adoption of climate-smart agricultural practices (FRI, 2018). 24.2% of respondents preferred programs that prioritised local languages. Given the linguistic diversity in Kasese, where Lhukonzo, Rutooro, and Swahili are commonly spoken, radio programs that use familiar languages ensure inclusivity and better comprehension. This is in line with findings from Mozambique, where the use of local languages in radio programming dramatically improved agricultural knowledge uptake (Aker, 2010).

Programs with repeats (19.7%) were also highly appreciated, allowing farmers to catch up on missed content or revisit complex topics. Formats that incorporate indigenous knowledge (16.7%) and grassroots farmer-centred approaches (11.9%) also received notable support, reflecting the value of culturally relevant and community-driven content. In rural Uganda, the integration of indigenous knowledge has been shown to enhance the credibility and effectiveness of agricultural messages, particularly among elderly farmers and those with low literacy levels (Nabulo, 2014).

The study findings highlighted several critical socio-demographic, economic, and attitudinal factors that influence both the reach and the utility of agricultural broadcasting. Individuals in the age bracket of 39 – 48 years were 1.5 times more likely to listen to agricultural radio messages compared to those aged 49 and above, and this reflects a trend in Kasese where middle-aged adults are more active in agricultural production and are increasingly tech-savvy. This age group is often more adaptable and open to innovation, and also holds leadership positions in farming groups or cooperatives, making them more invested in seeking agricultural knowledge. The older age group (49 and above), though still engaged in agriculture, relied more on traditional knowledge or did not prioritise radio as a key source of information. A similar pattern was observed in a study conducted in Nigeria by Agwu et al. (2010), where middle-aged farmers were more responsive to radio extension programs than the older cohort. This suggests that radio agricultural programs may need to design content that also resonates with the older generation, possibly through the inclusion of cultural references or local idioms that appeal to their worldview.

Radio ownership emerged as a strong determinant of listenership, with households owning radios being three times more likely to tune in to agricultural programs. This is unsurprising in the Kasese context, where many rural households rely on basic technology like battery-powered radios due to limited electricity access, especially in mountainous and remote areas such as those around Kilembe and Karusandara. Without personal radio sets, many farmers depend on communal listening points, which are not always accessible. This finding is consistent with research from Developing Countries by Aker (2010), which concluded that radio ownership significantly enhanced access to agricultural knowledge and technology uptake.

Place of residence also played a significant role, with township dwellers being three times more likely to listen to agricultural messages compared to their rural counterparts. Townships in Kasese, such as Hima and Bwera, are more urbanised, with better access to stable electricity, stronger radio signal reception, and more structured daily routines that allow for scheduled radio program listening. In contrast, rural residents often juggled multiple subsistence activities, making it harder for them to follow scheduled programs. These rural areas also

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face infrastructural limitations, such as poor radio network coverage and a lack of electricity, which affects regular listenership. A study in Malawi by Chhachhar et al. (2012) similarly found that urban and semi-urban farmers had higher radio access and were more likely to engage with extension content delivered through the medium.

Attitudes and perceptions toward agricultural radio programs were also found to significantly influence listenership. Those with negative attitudes were 0.4 times less likely to listen, underscoring the importance of trust in content and its perceived relevance. In Kasese, where scepticism may exist due to prior unfulfilled agricultural promises or misinformation, building credibility is key. Programs that feature local success stories, such as farmers from Kyarumba or Maliba who have implemented and benefited from radio-advised techniques, could help shift negative perceptions. This is echoed by the work of Aker (2010) in Niger, which emphasized that trust and local relevance significantly affect the impact of ICT-based agricultural interventions.

Media exposure increased the likelihood of agricultural radio listenership by 1.6 times. In Kasese, individuals who consume other forms of media, such as mobile phone apps, newspapers, or even social media, are more likely to tune into agricultural radio as well. This group is more attuned to information flow and likely sees radio as a complementary source. For instance, farmers who follow the Uganda National Farmers Federation (UNFFE) updates on WhatsApp may also schedule time to listen to related radio content. This supports findings by Munyua et al. (2009) in East Africa, which revealed that cross-platform exposure enhances agricultural knowledge acquisition.

On the application side, two major constraints stood out: limited agricultural space and lack of investment capital. Limited space reduced the likelihood of applying knowledge by 0.5 times. This was a significant challenge in densely populated areas of Kasese, like Nyamwamba Division and Kilembe, where land sizes are shrinking due to inheritance customs and urban encroachment. Even when farmers acquired new skills, such as spacing, intercropping, or orchard establishment through radio, their land sizes did not allow them to implement these practices effectively. This aligns with findings from Bangladesh by FAO (2010), where land fragmentation was found to inhibit the application of new agricultural practices disseminated via ICTs.

Lack of capital similarly reduced the odds of applying radio-acquired agricultural knowledge by 0.58 times. In many sub-counties in Kasese, such as Kitswamba and Bugoye, farmers had limited access to formal financial services, and many operated at a subsistence level. As a result, even when they learned about improved seed varieties or pest management methods, they lacked the capital to purchase the inputs required. This situation mirrors observations from Ghana, where FRI (2011) found that access to credit and inputs was critical in enabling farmers to translate knowledge into practice.

CONCLUSIONS

In conclusion, the study confirmed that agricultural radio programmes in Kasese District are widely accessible, well-listened to, and moderately effective in influencing positive changes in farming practices. Farmers not only rely on these programmes for daily guidance but also implement the knowledge, especially in areas like crop husbandry and soil conservation. However, satisfaction levels suggest room for improvement in content delivery and relevance, particularly for advanced topics or areas requiring institutional support. The study also confirmed that agricultural radio extension programmes play a critical role in improving farming practices, decision-making, and technology uptake among smallholder farmers in Kasese district. While the programmes have successfully influenced crop management, enterprise diversification, and soil conservation, there is still room for strengthening areas like post-

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harvest management and financial literacy. Timing and format are crucial for impact, with evening hours and participatory, local-language programming being the most effective. By aligning content delivery with farmers' daily routines and communication preferences, AREPs can significantly contribute to rural agricultural transformation. The study further demonstrated that radio listenership and the application of agricultural knowledge in Kasese District are influenced by a complex interplay of demographic, economic, and psychosocial factors. Middle-aged adults, radio ownership, township residence, media exposure, and positive attitudes enhance radio engagement, while limited land and capital pose significant barriers to implementation.

RECOMMENDATIONS

Radio programmes should be designed with greater farmer participation through call-ins, live discussions, and feedback mechanisms. Content should address specific challenges faced in sub-counties, such as mountainous erosion in Maliba or flooding in Bulembia, using local success stories and demonstrations to foster relatability and motivation.

To increase the implementation of complex practices like credit management and group formation, radio programmes should be linked with agricultural extension workers and NGOs operating in the district. Joint campaigns and follow-up activities could ensure practical support and deeper learning among farmers.

Agricultural radio programmes should integrate regular segments on credit access, savings, and loan management, possibly in collaboration with local SACCOs and microfinance institutions, to bridge the knowledge gap on financial services.

To increase engagement and comprehension, broadcasters should prioritise participatory formats that include local farmer voices and ensure consistent use of regional languages, catering to the linguistic diversity in Kasese.

To bridge the gap in radio ownership and poor signal reception in remote parts of Kasese, local authorities and NGOs should set up solar-powered community radio centres in villages. This would enhance access for older adults and those without personal radios, increasing listenership and knowledge acquisition.

To address the challenges of limited capital and land, radio programs should be integrated with information on accessible agricultural loans, cooperative funding schemes, and techniques such as vertical gardening or sack farming, which are suitable for small spaces and low capital investment.

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