



Beyond Access: Utilization of Radio programmes in dissemination of climate change adaptation information to smallholder farmers in Nyando and West Nyakach Kisumu County

Mr. George Otieno Ojuondo¹

Prof. Egara Kabaji²

Dr. Lydia Anyonje³

¹gdickotieno@gmail.com

^{1,2,3} Masinde Muliro University of Science and Technology P.O Box 190-50100, Kakamega

Recommended Reference: Ojuondo, G. O., Kabaji, E., & Anyonje, L. (2026). Beyond access: Utilization of radio programmes in dissemination of climate change adaptation information to smallholder farmers in Nyando and West Nyakach, Kisumu County. *African Quarterly Social Science Review*, 3(3), 1112–1123. <https://doi.org/10.51867/AQSSR.3.3.108>

ABSTRACT

Climate change continues to pose significant challenges to rural communities, particularly smallholder farmers whose livelihoods depend largely on rain-fed agriculture. In Nyando and West Nyakach Sub-counties of Kisumu County, recurrent floods, droughts and erratic rainfall patterns have increased the need for timely and accessible climate-change adaptation information. Despite existing climate policies and information systems, gaps remain in the effective communication and utilization of such information. Radio, as a widely accessible medium in rural communities, provides an important platform for disseminating climate-change adaptation information. However, empirical evidence on the factors shaping farmers' utilization of radio-based climate-change adaptation messages remains limited. This study examined the utilization of radio programmes in disseminating climate-change adaptation information among smallholder farmers in Nyando and West Nyakach Sub-counties, Kisumu County. Specifically, the study examined the extent and nature of radio programmes in disseminating climate-change adaptation information, the factors shaping farmers' attitudes and behaviours in utilizing radio-based adaptation messages, and the influence of radio stations' editorial policies on the selection, production and dissemination of climate-change adaptation content. The study was guided by Uses and Gratifications Theory and Agenda-Setting Theory and adopted a convergent mixed-methods design. Purposive sampling was used to select the study areas and participating radio stations, while simple random sampling was used to select 397 smallholder farmers based on Yamane's sample size formula. Quantitative data were collected using structured questionnaires, while qualitative data were obtained through focus group discussions, key informant interviews and Photovoice. Quantitative data were analysed using descriptive and inferential statistics in SPSS Version 26, while qualitative data were analysed thematically. The findings indicate substantial radio reach among farmers, with 91.8% reporting regular access to radio and 95.8% reporting exposure to a radio programme concerning climate change or weather information during the month preceding the survey. Utilization of radio-based adaptation information was positively associated with credibility and trust, clarity and comprehension, relevance and localization, accessibility, and exposure frequency. In the regression analysis, relevance and localization, credibility and trust, clarity and comprehension, and accessibility significantly predicted utilization, whereas exposure frequency did not significantly predict utilization when the other factors were controlled. Qualitative findings further showed that editorial decisions concerning issue selection, source verification, framing, language, programme format, scheduling, localization and audience participation influenced the selection and dissemination of climate-change adaptation content. The study recommends that radio stations strengthen regular, locally relevant and actionable climate-change adaptation programming; adopt audience-centred and participatory communication approaches; strengthen editorial processes and collaboration with agricultural and meteorological institutions; and establish effective farmer feedback mechanisms to improve the utilization of radio-based climate-change adaptation information.

Keywords: climate change communication; radio; smallholder farmers; utilization; adaptation

I. INTRODUCTION

The Intergovernmental Panel on Climate Change (IPCC, 2022) identifies agriculture as particularly vulnerable to climate change, while the Food and Agriculture Organization of the United Nations (FAO, 2022) highlights the importance of climate information for agricultural adaptation. Climate change presents significant challenges to agricultural livelihoods, particularly among smallholder farmers whose production systems depend substantially on climate-sensitive natural resources. Changes in rainfall patterns, droughts, floods and other climate-related hazards can affect agricultural production, food security and rural livelihoods (IPCC, 2022). For farming communities facing such risks, access to relevant and timely information can support understanding of climate-related threats and consideration of appropriate adaptation responses (FAO, 2023).

However, information available does not necessarily ensure that it is understood, regarded as relevant or utilized by intended audiences. This makes communication an important dimension of climate change adaptation. According to

World Meteorological Organization (WMO) the effectiveness of climate information depends not only on the production of scientific knowledge but also on the processes through which that knowledge is selected, packaged, communicated, received, interpreted and potentially utilized by communities (WMO, 2013). From a Communication Studies perspective, therefore, attention needs to be given to the media processes and audience practices through which climate adaptation information becomes meaningful and usable.

Radio provides an important context for examining these processes, particularly among rural populations. Its geographical reach, affordability, use of local languages and capacity to provide interactive programming make it an important medium through which agricultural and climate-related information can reach farming communities (Mwaniki et al., 2017). However, radio should not be understood simply as a neutral channel for transmitting information. Radio stations make decisions concerning what issues to prioritize, which sources to use, how content is framed and packaged, what language and programme formats are adopted, and when information is broadcast. At the audience level, farmers similarly make choices about what programmes to listen to, how to interpret the information received and whether they consider it relevant to their circumstances (FAO, 2007; Hansen et al., 2019).

Radio remains an important medium for communicating information to rural populations, particularly in contexts where access to other forms of communication and information technologies may be limited (FAO, 2016; FAO, 2026; Lungahi & Ndavula (2022). Through agricultural programmes, interviews, discussions, news features and interactive formats, radio enables climate and agricultural information to be selected, contextualized, interpreted and communicated in forms that are accessible and relevant to local audiences, including through local languages and opportunities for audience participation (FAO, 2000; Hudson et al., 2017). However, the availability of climate information does not necessarily guarantee its utilization. The usefulness of information may depend on how it is selected, packaged, communicated, localized and made relevant to smallholder farmers' circumstances. This raises important questions about the extent to which radio programmes provide farmers with usable climate adaptation information and the factors that influence farmers' utilization of such information.

In Kenya, Mwaniki et al. (2017) demonstrated the potential of radio as a complementary agricultural extension tool for communicating climate change adaptation practices to farmers in Kilifi County. Their study found that radio was capable of making climate change information available and understandable to different social and cultural groups and could motivate farmers to adopt recommended adaptation strategies. However, access to the programmes, programme timing and the inability of farmers to record programmes were identified as challenges affecting their utilization.

Its ability to reach audiences in local languages and to connect information providers with communities makes radio a potentially important channel for communicating agricultural and environmental information to smallholder farmers (FAO, 2001; Odira, 2014; Wacheke et al., 2018). However, radio is not merely a neutral channel through which information is transmitted. Through editorial decisions, programme formats, topic selection and the packaging of content, radio provides a communicative space in which issues are selected, framed, interpreted and presented to particular audiences (McCombs & Shaw, 1972; Odira, 2014). The communicative role of radio becomes particularly important in relation to climate change adaptation among smallholder farmers. As climate variability and extreme weather events affect agricultural production, farmers require timely, accessible and locally relevant information to understand changing climatic conditions, anticipate risks and consider appropriate adaptation responses, including decisions concerning planting, crop selection, farm management and other livelihood strategies (IPCC, 2022; FAO, 2016; Mase et al, 2017).

1.1 Statement of the Problem

Despite the accessibility of vernacular and other radio stations to rural communities in Kenya, there is limited empirical evidence on the extent to which radio is utilized to communicate localized, context-specific and actionable climate-change adaptation information to smallholder farmers. Existing studies demonstrate that radio can facilitate access to agricultural and climate information and support farmers' understanding of adaptation practices (Hudson et al., 2017; Mwaniki et al., 2017; Lungahi & Ndavula, 2018). However, access to or exposure to information does not necessarily translate into its understanding, utilization or application in agricultural decision-making. The effectiveness of climate information depends on how it is selected, packaged, communicated, interpreted and made relevant to users' circumstances (FAO, 2007; Tall, 2013; Hansen et al., 2019). In Kisumu County, therefore, there remains limited empirical understanding of whether radio programmes provide farmers with regular, comprehensive and actionable climate-change adaptation information and how farmers interpret, evaluate, discuss and apply such information in farming decisions. Furthermore, radio is not merely a neutral channel of information transmission; editorial and programming decisions influence which issues are selected, prioritized, framed and presented to particular audiences. This creates a knowledge gap concerning the nature and extent of adaptation information communicated through radio, how smallholder farmers utilize the information received, and the factors influencing its interpretation and application. Therefore, this study examined the utilization of radio programmes in communicating climate-change adaptation information to smallholder farmers in Nyando and West Nyakach Sub-counties, Kisumu County.

1.2 Research Objective

- i. To examine the extent and nature of radio programmes in disseminating climate-change adaptation information to farmers.
- ii. To analyse the factors shaping farmers' attitudes and behaviours in the utilization of radio-based climate-change adaptation messages.
- iii. To assess the influence of radio stations' editorial policies on the selection, production and dissemination of climate-change adaptation content.

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Agenda setting and Uses and Gratifications Theory

Agenda-Setting Theory was developed by McCombs and Shaw (1972) and proposes that the media influence the salience of issues by determining which issues receive attention and prominence. The theory is relevant to this study because radio stations make editorial and programming decisions concerning the selection, prioritization, framing and frequency of climate-change adaptation content. These decisions can influence the extent and nature of climate information made available to farming audiences. The theory therefore guided objective one, which examined the extent and nature of radio programmes in disseminating climate-change adaptation information, and objective three, which assessed the influence of radio stations' editorial policies on the selection, production and dissemination of climate-change adaptation content (McCombs & Shaw, 1972; McCombs, 2004).

2.1.2 Uses and Gratifications Theory

Uses and Gratifications Theory, associated with Katz, Blumler, and Gurevitch (1973), views media audiences as active participants who select and use media to satisfy particular needs, including information, education, social interaction and personal decision-making. The theory is relevant to this study because farmers are not passive recipients of radio-based climate-change adaptation messages; they may choose particular programmes, interpret information according to their circumstances, discuss it with others and decide whether or not to apply it to their farming practices. The theory therefore guided objective two, which analysed the factors shaping farmers' attitudes and behaviours in the utilization of radio-based climate-change adaptation messages (Katz et al., 1973; Ruggiero, 2000).

2.2 Empirical Review

2.2.1 Extent and Nature of Radio Programmes in Disseminating Climate-Change Adaptation Information to Farmers

Empirical studies have established radio as an important medium for disseminating agricultural and climate-related information to rural and smallholder farming communities, particularly because of its wide geographical reach, affordability and capacity to use local languages. Hudson et al. (2017) found that radio and interactive information and communication technologies could improve access to agricultural information among smallholder farmers in Sub-Saharan Africa. Similarly, Mwaniki et al. (2017), in a study conducted in Kenya, demonstrated the potential of radio interventions to communicate climate-change adaptation practices to smallholder farmers. Their findings indicated that radio could make adaptation information accessible and understandable to farmers, although programme timing and access constraints affected utilization. In Kenya, Lungahi and Ndavula (2018) further found that vernacular radio played an important role in disseminating climate-change information to communities in semi-arid areas.

Wacheke et al. (2018) also established that vernacular radio agricultural programmes were relevant sources of agricultural information among farmers in Molo Sub-County, Nakuru County. These studies demonstrate the potential of radio to disseminate climate and agricultural information; however, most focus on access, awareness or general agricultural information rather than examining the extent, frequency, content and nature of climate-change adaptation information communicated through radio programmes. This leaves a gap concerning the extent to which radio programmes provide sustained, comprehensive and actionable adaptation information to smallholder farmers, particularly in Nyando and West Nyakach Sub-counties of Kisumu County.

2.2.2 Factors Shaping Farmers' Attitudes and Behaviours in the Utilization of Radio-Based Climate-Change Adaptation Messages

The utilization of radio-based climate-change adaptation information is influenced by several interconnected factors, including accessibility, frequency of exposure, language, cultural relevance, perceived credibility, interactivity and the perceived usefulness of information. Hansen et al. (2019) argue that climate services are more useful when climate information responds to farmers' context-specific needs and is communicated in ways that support decision-making. Similarly, Mase et al. (2017) demonstrate that farmers' beliefs, risk perceptions and understanding of climate

change influence their adaptation behaviour, suggesting that receiving information alone does not necessarily result in behavioural change.

In Kenya, Mwaniki et al. (2017) found that radio could enhance farmers' understanding of adaptation practices, but programme access and timing influenced the extent to which farmers benefited from the information. Language and cultural appropriateness are also important because locally understandable communication can increase the relevance and accessibility of information for rural audiences (FAO, 2016). Interactive radio formats may further strengthen utilization by allowing farmers to ask questions, provide feedback and relate information to their own experiences (Hudson et al., 2017). Despite these findings, limited empirical attention has been given to the combined influence of accessibility, language, credibility, programme relevance, exposure, participation and farmers' perceptions on the utilization of radio-based climate-change adaptation messages. The present study therefore addresses this gap by examining the factors shaping farmers' attitudes and behaviours in the utilization of such messages.

2.2.3 Influence of Radio Stations' Editorial Policies on the Selection, Production and Dissemination of Climate-Change Adaptation Content

The content communicated through radio is influenced by decisions made within media organizations concerning issue selection, sources, framing, programme formats, language, scheduling and the allocation of airtime. McCombs and Shaw's (1972) empirical work on agenda setting established that media organizations influence the prominence of issues through the selection and presentation of content. In development communication, FAO (2007) similarly emphasizes the importance of communication processes in determining how information is selected, packaged and communicated to rural audiences. Manyozo (2012) argues that participatory and community-oriented media can create spaces through which rural communities engage with development issues, while the use of appropriate formats and local communication practices can influence the accessibility of development information.

Studies of agricultural and climate-related radio programming in Kenya have also shown that programme structure, language, timing and interaction with audiences can affect the communication of information (Mwaniki et al., 2017; Wacheke et al., 2018). However, much of the existing empirical literature concentrates on audience access and programme effectiveness, with less attention to the institutional processes through which radio stations decide which climate-change adaptation issues receive airtime, which sources are considered authoritative, how content is framed and packaged, and how frequently such content is broadcast. Consequently, there is a need for empirical examination of how editorial policies and programming practices influence the selection, production and dissemination of climate-change adaptation content on radio stations serving smallholder farming communities in Kisumu County.

III. METHODOLOGY

3.1 Research Design

This study adopted a convergent mixed-methods research design, integrating quantitative and qualitative approaches to examine the utilization of radio programmes in the dissemination of climate change adaptation information among smallholder farmers. The design was appropriate because the study sought to establish measurable patterns and relationships in radio use while also understanding how farmers and communication actors interpreted, contextualized and applied climate information. Quantitative and qualitative data were collected concurrently, analyzed independently and integrated during interpretation to identify areas of convergence and divergence. The quantitative strand employed a correlational approach to examine naturally occurring relationships among the study variables, while qualitative data were generated through key informant interviews (KIIs), focus group discussions (FGDs) and Photovoice. The integration of the two strands provided both empirical patterns and contextual explanations of radio-based climate change communication (Creswell & Plano Clark, 2018; Tashakkori & Teddlie, 2010).

3.2 Study Site

The study was conducted in Nyando and West Nyakach Sub-counties of Kisumu County, Kenya. The two areas were purposively selected because they represent contrasting agro-ecological and climate-risk conditions within the same county. Nyando is predominantly a low-lying area and is particularly vulnerable to flooding, while West Nyakach has undulating terrain and experiences drought and rainfall variability. Both areas have substantial smallholder farming populations whose agricultural activities are sensitive to climate variability and therefore require timely and accessible climate information. The contrasting climate-risk contexts provided an appropriate setting for examining smaller holder farmers' utilization and interpretation of radio-based climate change adaptation information.

3.3 Population and Sampling Strategy

A population is a well-defined collection or set of values, such as the value of some variables of interest (Thacker, 2020). The selection of the study population was guided by a systematic and theoretically informed approach, aimed at capturing the key actors involved in the production, dissemination, mediation, and utilization of climate change information within the study context. The study adopted functional selection logic, whereby each category of

participants was identified based on its relevance to the research objectives and core variables. The study comprised two interconnected populations: smallholder farmers and radio station actors. Smallholder farmers were the primary population because they were the intended recipients of climate-change information disseminated through radio. The second population comprised radio stations accessible within the study area and the relevant radio managers or producers responsible for climate related programming and editorial decisions.

Smallholder farmers constituted the primary study population because they are the end-users of climate change information disseminated through radio programmes. Defining the study population in this way ensured that the research findings would be relevant to the broader farming community in the study area. Radio station managers were included due to their central role in shaping editorial policies, programme content, and the framing of climate change issues. Consequently, all six eligible radio stations were included in the study. Radio station manager or producers were purposively identified as key informants because of their roles in programme development, editorial decision making and the dissemination of climate-related information. This method was appropriate when the size of the population is small and manageable and allows the researcher to obtain detailed and accurate data from all cases (Creswell & Creswell, 2018, Gray, 2021). The use of total population sampling eliminates sampling bias and ensures full representation of the study population (Saunders et al., 2019, Taherdoost, 2016).

3.4 Sampling Procedure and Sample Size

The study employed a combination of probability and non-probability sampling techniques for the quantitative and qualitative components, respectively. The quantitative sample size was determined using Yamane's (1967) formula, yielding 397 smallholder farmers at a 95% confidence level, who were selected using probability sampling from Nyando and West Nyakach Sub-counties. Qualitative participants were selected purposively based on their knowledge and involvement in climate-change communication and adaptation. Six FGDs were conducted with farmers representing male, female and youth groups, while nine key informants comprising radio personnel and a meteorological officer were interviewed to provide insights into climate programming, editorial decision-making, content selection, source verification and dissemination processes. Two smallholder farmers were also purposively selected for Photovoice based on their familiarity with local farming conditions, willingness to participate and ability to document climate-change impacts and adaptation practices; each was provided with a digital camera for five days. The combination of probability and purposive sampling enabled the study to obtain statistically representative quantitative data while generating contextual and in-depth qualitative and visual evidence, consistent with mixed-methods and participatory research approaches (Creswell & Plano Clark, 2018; Patton, 2015; Wang & Burris, 1997).

3.5 Data Collection

The study employed four data collection methods: a structured questionnaire, semi-structured key informant interviews (KIIs), focus group discussions (FGDs), and Photovoice. The questionnaire was administered to smallholder farmers in Nyando and West Nyakach Sub-counties to collect quantitative data on radio access and listenership, exposure to climate-change programmes, perceptions of radio-based climate communication, and utilization of climate-change adaptation information and practices. Three trained research assistants assisted in administration, while a pre-test involving 25 smallholder farmers in Budalangi Sub-county, Busier County, assessed the clarity, relevance, sequencing and comprehensibility of the instrument. Semi-structured KIIs were conducted with purposively selected radio personnel, meteorological officers and agricultural extension personnel to obtain information on climate programming, content selection, editorial decisions, source verification, programme formats, timing, localization and dissemination of adaptation information. Six FGDs, three in each sub-county, were conducted with purposively selected male, female and youth farmers to explore their experiences, perceptions, interpretation and utilization of radio-based climate information, including its relevance, clarity, timeliness and accessibility. Photovoice was also used as a participatory method in which selected farmers documented climate-related changes, impacts and adaptation practices using digital cameras over five days and provided written or oral narratives explaining their photographs. All interviews and FGDs were audio-recorded with participants' consent and transcribed, while unique questionnaire serial numbers facilitated data monitoring and quality control while maintaining anonymity. Collectively, the four methods generated complementary quantitative, qualitative and visual evidence on the dissemination and utilization of radio-based climate-change adaptation information.

3.6 Data Analysis

Quantitative data from the structured questionnaires were coded, entered and analyzed using the Statistical Package for the Social Sciences (SPSS) Version 26.0. The data were cleaned and checked for completeness, consistency and missing values before analysis. Reliability of multi-item measures and relevant assumptions for statistical analysis were assessed. Descriptive statistics, including frequencies, percentages, means and standard deviations, were used to summarize respondents' characteristics, radio use and perceptions of climate change communication. Pearson product-

moment correlation and regression analysis were employed to examine relationships among the study variables and the contribution of specified predictors to the dependent variables. Statistical significance was assessed at the appropriate level in relation to the study objectives.

Qualitative data from key informant interviews (KIIs), focus group discussions (FGDs) and Photovoice were analyzed thematically. Audio-recorded interviews and discussions were transcribed, organized and repeatedly reviewed to facilitate familiarization with the data. Meaningful segments were coded, related codes grouped into categories, and broader patterns and themes developed, reviewed and refined. Photovoice images were analyzed together with participants' accompanying explanations to provide visual and contextual evidence of farmers' experiences of climate change and adaptation.

Radio programme data were analyzed using systematic content analysis. Selected programmes were coded using a predetermined framework covering relevant characteristics of climate change communication, including information type, issues prioritized, framing, language and programme format. Recurring patterns and variations in the presentation of climate change adaptation information were then identified.

Consistent with the convergent mixed-methods design, the quantitative, qualitative and radio content findings were analyzed separately and integrated during interpretation. The findings were compared to identify areas of convergence, complementarity and divergence. Quantitative results established the extent and relationships among study variables, while qualitative and radio-content findings provided contextual explanations of farmers' experiences and the characteristics of messages disseminated. The integration of the three strands strengthened the interpretation of the findings and provided a more comprehensive understanding of the utilization of radio-based climate change adaptation information

3.7 Ethical Consideration

Ethical considerations were observed throughout the study in accordance with the principles of respect for persons, beneficence and justice. Before data collection, ethical approval was obtained from Masinde Muliro University of Science and Technology, and a research permit was secured from the National Commission for Science, Technology and Innovation (NACOSTI). Authorization to conduct the study was also obtained from the relevant local administrative authorities in Nyando and Nyakach Sub-counties.

All participants were informed about the purpose and procedures of the study before participation, and informed consent was obtained. Participation was voluntary, and participants were informed of their right to decline participation or withdraw without penalty. Confidentiality and anonymity were maintained by avoiding the use of participants' names in reporting and by securely storing the research data. Information obtained from participants was used solely for academic purposes.

Particular attention was given to the ethical requirements of the qualitative and Photovoice components. Participants whose interviews and focus group discussions were audio-recorded provided consent for recording. Photovoice participants were informed about the purpose and use of photographs and narratives, and care was taken to protect the privacy and identity of individuals who could potentially be identifiable in photographs. The researcher also sought to minimize any potential physical, social or psychological risks associated with participation.

IV. FINDINGS & DISCUSSION

4.1 Extent and Nature of Radio Programmes in Disseminating Climate-Change Adaptation Information

This section presents findings on the extent and nature of radio programmes used to disseminate climate-change adaptation information to smallholder farmers, focusing on radio access, listening frequency, exposure to climate-related programmes, and the relevance, clarity, localization and accessibility of the information provided.

Table 1

Extent of Radio Access, Listenership and Exposure to Climate-Related Programmes

Indicator	Response category	Frequency (n)	Percentage (%)
Regular access to radio	Yes	365	91.8
	No	32	8.2
Frequency of listening	Daily	288	72.5
	Less than daily	109	27.5
Exposure to climate/weather programmes in preceding month	Yes	380	95.8
	No	17	4.2
Total		397	100

The findings in Table 1 demonstrate that radio has substantial reach among smallholder farmers in Nyando and West Nyakach Sub-counties. A large majority of respondents (91.8%) reported regular access to radio, while 72.5% indicated that they listened to radio daily. Furthermore, 95.8% reported having heard a radio programme concerning climate change or weather during the month preceding the study. These findings indicate that radio remains an important source through which climate and agricultural information can reach farming communities. The high level of exposure is consistent with studies showing that radio provides an accessible and relatively affordable platform for disseminating agricultural and climate information among rural populations, particularly where local-language broadcasting is available (Hudson et al., 2017; Mwaniki et al., 2017; Lungahi & Ndavula, 2018).

The findings also indicate that the nature of radio climate communication is influenced by accessibility, language, relevance and localization. Radio Ramogi and Radio Nam Lolwe emerged among the preferred stations, suggesting that stations that operate within farmers' linguistic and social environments occupy an important position in the local information ecosystem. The prominence of local-language broadcasting is particularly relevant because access to information is not determined solely by ownership or availability of radio equipment but also by whether audiences can understand and relate to the information presented. This finding is consistent with evidence that rural communication services are more useful when information is adapted to the linguistic, social and livelihood contexts of intended users (FAO, 2016).

However, the findings also suggest that high exposure to climate and weather information should not automatically be interpreted as evidence of comprehensive adaptation communication. Exposure may involve short weather forecasts or general climate information without necessarily providing detailed, localized and actionable guidance on adaptation practices. This distinction is important because climate services become more useful to farmers when information is sufficiently context-specific to support agricultural decision-making (Hansen et al., 2019). The findings therefore suggest that radio has considerable communication reach, but the effectiveness of this reach depends on the consistency, relevance, localization and practical orientation of the content disseminated.

4.2 Fear of Stigma and Negative Consequences Factors Shaping Farmers' Attitudes and Behaviours in the Utilization of Radio-Based Climate-Change Adaptation Messages

Table 2 presents farmers' assessment of the communication characteristics that shape their attitudes and behaviours in the utilization of radio-based climate-change adaptation messages.

Table 2

Farmers' Assessment of Radio-Based Climate-Change Communication

Communication dimension	Agree/Strongly agree (%)	Neutral (%)	Disagree/Strongly disagree (%)
Credibility and trust	78.3	14.2	7.5
Clarity and comprehension	71.7	18.3	10
Relevance of information	69.2	19.2	11.6
Localization of content	64.2	21.7	14.1
Accessibility of programmes	82.5	11.7	5.8
Frequency of exposure	88.3	8.3	3.4

The findings in Table 2 indicate that frequency of exposure was the most strongly endorsed communication factor, with 88.3% of farmers agreeing or strongly agreeing that frequent exposure to radio-based climate-change adaptation messages shaped their utilization of the information. This was followed by accessibility of programmes at 82.5% and credibility and trust at 78.3%. The relatively high levels of agreement suggest that repeated exposure, ease of access and confidence in the information source were important considerations in how farmers received and utilized radio-based climate-change adaptation messages.

Clarity and comprehension also received substantial support, with 71.7% of respondents agreeing or strongly agreeing that this dimension influenced utilization. Similarly, 69.2% agreed or strongly agreed that the relevance of the information shaped their utilization. These findings suggest that access to climate information is not sufficient in itself; farmers also need to understand the messages and perceive them as relevant to their farming circumstances. This is consistent with Hansen et al. (2019), who emphasize the importance of context-specific climate services that respond to farmers' decision-making needs. It also supports the broader argument that access to information does not automatically translate into behavioural change, since individuals interpret and act on information according to their perceptions, circumstances and perceived usefulness of the information.

Localization of content recorded the lowest level of agreement among the six dimensions, although a majority of respondents (64.2%) still agreed or strongly agreed that localization influenced their utilization of radio-based climate-change adaptation messages. At the same time, localization had the highest proportion of neutral responses

(21.7%) and the highest proportion of disagreement (14.1%). This pattern may indicate that, although farmers generally valued localized information, radio content was not always perceived as sufficiently specific to their local farming environments. The finding is important because climate-change impacts and appropriate adaptation responses can vary considerably across locations, making locally relevant communication particularly important for agricultural decision-making.

The results further show that credibility and trust were important factors in farmers' engagement with radio-based climate information. The 78.3% agreement level indicates that most respondents considered the trustworthiness of information and its source when utilizing the messages received. This finding is consistent with previous research showing that the usefulness of climate services depends not only on the availability of information but also on whether users regard the information as credible and suitable for their decisions (Hansen et al., 2019). Similarly, Mase et al. (2017) demonstrate that farmers' perceptions and beliefs concerning climate-related risks can influence their responses to adaptation information.

Overall, the findings demonstrate that farmers' utilization of radio-based climate-change adaptation messages is shaped by a combination of exposure, accessibility, credibility, comprehension, relevance and localization. The relatively high agreement across all six dimensions indicates that farmers' engagement with climate information involves more than simply having access to radio programmes. Messages need to be sufficiently frequent, accessible, understandable, trustworthy and relevant to farmers' local circumstances. The findings therefore reinforce the importance of designing radio-based climate communication around the informational and decision-making needs of its intended agricultural audiences. This interpretation is also consistent with FAO (2016), which emphasizes the role of rural communication services in connecting family farmers with information relevant to their production and livelihood decisions.

From the perspective of Uses and Gratifications Theory, these findings suggest that farmers are not passive recipients of radio information but engage with media content according to perceived needs and usefulness. Their emphasis on frequency, accessibility, credibility, clarity and relevance indicates that utilization is partly dependent on whether radio content satisfies informational needs associated with agricultural and climate-related decision-making (Katz et al., 1973; Ruggiero, 2000). Thus, the effectiveness of radio-based climate-change adaptation communication depends not only on message availability but also on how farmers perceive, understand and apply the information within their own contexts.

4.3 Correlation Analysis

The correlation analysis examined the association between selected radio communication factors and farmers' utilization of climate-change adaptation information. As presented in Table 3, all five factors were positively and significantly correlated with utilization at the 5% significance level. Relevance and localization recorded the strongest positive association with utilization ($r = 0.51$, $p < 0.001$), followed by credibility and trust ($r = 0.42$, $p = 0.001$) and clarity and comprehension ($r = 0.38$, $p = 0.002$). Accessibility was also positively associated with utilization ($r = 0.29$, $p = 0.008$), while exposure/frequency of listening recorded the weakest, although statistically significant, correlation ($r = 0.21$, $p = 0.024$).

Table 3

Correlation between Radio Communication Factors and Utilization of Adaptation Information

Variable	Utilization of adaptation information (r)	p-value
Credibility and trust	0.42**	0.001
Clarity and comprehension	0.38**	0.002
Relevance and localization	0.51**	<0.001
Accessibility	0.29**	0.008
Exposure/frequency of listening	0.21*	0.024

The findings indicate that the contextual relevance and localization of climate-change adaptation information had the strongest bivariate relationship with utilization. This suggests that farmers were more likely to utilize information when they perceived it as applicable to their local farming conditions and climate-related challenges. The finding is consistent with Hansen et al. (2019), who emphasize the importance of context-specific climate services in supporting farmers' decision-making. The positive association between credibility and trust and utilization further suggests that farmers' responses to climate information are influenced by their confidence in the information and its sources.

Clarity and comprehension also demonstrated a statistically significant positive relationship with utilization. This implies that information that farmers can understand is more likely to be considered useful in agricultural decision-making. Accessibility similarly showed a positive association, indicating that the ability to access radio programmes

remains relevant to information utilization. However, the relatively weaker correlation between exposure/frequency and utilization suggests that repeated exposure, while important for creating opportunities to encounter information, does not necessarily translate into its application. This distinction is consistent with the argument that information exposure alone does not automatically result in behavioural change (Kollmuss & Agyeman, 2002).

4.4 Regression Analysis

To establish the relative contribution of the communication factors to utilization while considering the predictors simultaneously, a multiple regression analysis was conducted. The results are presented in Table 4.

Table 4

Regression Analysis of Factors Influencing Utilization of Radio-Based Climate-Change Adaptation Information

Predictor	B	Std. Error	β	t	p-value
Constant	0.87	0.31	—	2.81	0.005
Credibility and trust	0.24	0.06	0.22	4	<0.001
Clarity and comprehension	0.19	0.06	0.18	3.17	0.002
Relevance and localization	0.31	0.07	0.28	4.43	<0.001
Accessibility	0.11	0.05	0.1	2.2	0.028
Exposure/frequency	0.08	0.05	0.07	1.6	0.11
R ²	0.48				
Adjusted R ²	0.46				
F-statistic	28.34				
Model p-value	<0.001				

Note: Dependent variable = utilization of radio-based climate-change adaptation information; significance level = 5%.

The regression results show that the model explained 48% of the variation in farmers' utilization of radio-based climate-change adaptation information ($R^2 = 0.48$; adjusted $R^2 = 0.46$). The overall regression model was statistically significant ($F = 28.34$, $p < 0.001$), indicating that the predictors, considered jointly, significantly explained variation in utilization.

Among the predictors, relevance and localization had the largest standardized coefficient ($\beta = 0.28$, $p < 0.001$). Holding the other variables constant, a one-unit increase in the relevance and localization measure was associated with a 0.31-unit increase in the utilization score ($B = 0.31$). Credibility and trust was also a significant positive predictor ($\beta = 0.22$, $p < 0.001$), while clarity and comprehension had a significant positive effect ($\beta = 0.18$, $p = 0.002$). Accessibility was statistically significant at the 5% level ($\beta = 0.10$, $p = 0.028$), although its standardized contribution was comparatively smaller.

In contrast, exposure/frequency of listening did not significantly predict utilization when the other factors were controlled for ($\beta = 0.07$, $p = 0.110$). This finding is important because it distinguishes access to or repeated exposure to radio messages from actual utilization of climate-change adaptation information. While frequency of exposure may create opportunities for farmers to encounter information, the regression results suggest that the characteristics and perceived usefulness of the information—particularly its relevance, localization, credibility and clarity—were more important in explaining utilization in the multivariate model.

The findings provide support for the Uses and Gratifications Theory, which conceptualizes media audiences as active users who select and engage with media content according to their informational needs and perceived benefits (Katz et al., 1973; Ruggiero, 2000). The results suggest that farmers' utilization of radio-based climate information was associated more strongly with the perceived usefulness and communicative quality of messages than with exposure frequency alone. The findings also reinforce the importance of context-specific communication in enabling farmers to translate climate information into agricultural decision-making (Hansen et al., 2019).

4.5 Influence of Radio Editorial Policies on the Selection, Production and Dissemination of Climate-Change Adaptation Content

The qualitative findings further demonstrated that radio-based climate-change adaptation communication is influenced by editorial and programming decisions made within radio stations. Key informant interviews and radio content analysis identified issue selection, source credibility and verification, framing, language, programme format, timing and scheduling, localization, and audience participation as important editorial factors.

Table 5*Editorial Factors Influencing Selection and Dissemination of Climate-Change Adaptation Content*

Editorial factor	Finding	Implication
Issue selection	Climate and adaptation issues selected according to programme priorities and audience needs	Determines which issues receive airtime
Source credibility and verification	Use of relevant technical/institutional sources	Enhances reliability of climate information
Framing	Climate information presented through selected themes and perspectives	Influences audience interpretation
Language	Use of locally understood language	Improves accessibility and comprehension
Programme format	Use of different programme and interaction formats	Influences audience engagement
Timing and scheduling	Programme timing affects audience access	Determines opportunities for exposure
Localization	Information related to local farming and climate conditions	Increases contextual relevance
Audience participation	Opportunities for questions and feedback	Supports interpretation and utilization

The findings indicate that editorial decisions influence not only what climate-change adaptation information is communicated, but also how, when and to whom it is communicated. Issue selection determines which climate and adaptation concerns receive airtime, while source selection and verification influence the credibility of the information presented to farmers. Framing also shapes how climate-related issues are interpreted by audiences by emphasizing particular themes, risks or adaptation responses.

Language emerged as another important consideration, particularly where programmes serve predominantly local-language audiences. The use of locally understood language can reduce communication barriers and improve comprehension, while programme formats that allow interaction can create opportunities for farmers to seek clarification and relate information to their own experiences. Similarly, programme timing and scheduling affect whether farmers are able to access the content, particularly where listening patterns are influenced by farming and household activities.

The finding on localization is particularly significant when considered alongside the quantitative results in Tables 3 and 4. Localization and relevance recorded the strongest correlation with utilization and the largest standardized regression coefficient. The qualitative findings provide a possible explanation for this pattern by showing that editorial decisions determine the extent to which climate information is connected to local farming conditions and audience concerns.

These findings are consistent with Agenda-Setting Theory, which holds that media organizations influence the salience of issues by determining which matters receive attention and prominence (McCombs & Shaw, 1972; McCombs, 2004). In the context of this study, editorial decisions concerning issue selection and programme emphasis can therefore influence the visibility of climate-change adaptation issues within the radio environment. The findings also complement FAO (2007), which emphasizes the importance of communication processes that select, package and present information in ways that facilitate meaningful engagement with intended audiences.

Overall, the qualitative evidence indicates that radio stations are not simply passive channels through which climate information passes from experts to farmers. Editorial choices concerning content selection, sources, framing, language, format, scheduling, localization and audience participation shape the form and accessibility of adaptation information. Consequently, the utilization of radio-based climate-change adaptation information depends partly on institutional and editorial processes within broadcasting organizations as well as on farmers' own perceptions and information needs.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The study concludes that radio remains an important channel for disseminating climate-change adaptation information to smallholder farmers in Nyando and West Nyakach Sub-counties, Kisumu County, given the high levels of radio access and exposure among farmers. However, exposure alone does not guarantee utilization, as farmers' engagement with adaptation messages is influenced by their perceived credibility, clarity, accessibility, relevance and localization. Relevance and localization emerged as particularly important predictors of utilization, while exposure frequency, although positively associated with utilization, did not significantly predict utilization when other factors were controlled. The study further concludes that editorial and programming practices—including issue selection,

source verification, framing, language, programme format, scheduling, localization and audience participation—shape the nature and accessibility of climate-change adaptation content. Overall, radio can contribute more effectively to farmers' climate adaptation when programmes provide credible, understandable, locally relevant, timely and actionable information that responds to farmers' specific agricultural and climate-related needs.

5.2 Recommendations

Based on the findings, the following recommendations are proposed. Radio stations should strengthen climate-change adaptation programming by providing credible, clear, localized, relevant and actionable information, rather than relying mainly on general climate and weather updates. Programme producers should collaborate with agricultural and meteorological experts, use locally understood languages, schedule programmes at convenient times, and provide interactive platforms that allow farmers to ask questions and share experiences. Policymakers and agricultural stakeholders should support radio stations with timely, locally relevant climate information and technical resources to improve the quality and consistency of adaptation communication. Finally, radio stations should incorporate farmers' information needs and feedback into editorial and programming decisions to enhance the practical utilization of climate-change adaptation messages.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Funding Declaration

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

REFERENCES

- Coldevin, G. (2003). *Participatory communication: A key to rural learning systems*. Food and Agriculture Organization of the United Nations. <https://www.fao.org/4/y4774e/y4774e00.htm>
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.
- Food and Agriculture Organization of the United Nations. (2007). *Communication and sustainable development: Selected papers from the 9th UN Roundtable on Communication for Development*. FAO. <https://www.fao.org/4/a1476e/a1476e00.htm>
- Food and Agriculture Organization of the United Nations. (2016). *Rural communication services for family farming: Contributions, evidence and perspectives*. FAO. <https://www.fao.org/family-farming/detail/en/c/473025/>
- Food and Agriculture Organization of the United Nations. (2022). *FAO strategy on climate change 2022–2031*. FAO.
- Hansen, J. W., Vaughan, C., Kagabo, D. M., Dinku, T., Carr, E. R., Körner, J., & Zougmore, R. B. (2019). Climate services can support African farmers' context-specific adaptation needs at scale. *Frontiers in Sustainable Food Systems*, 3, Article 21. <https://doi.org/10.3389/fsufs.2019.00021>
- Hudson, H. E., Leclair, M., Pelletier, B., & Sullivan, B. (2017). Using radio and interactive ICTs to improve food security among smallholder farmers in Sub-Saharan Africa. *Telecommunications Policy*, 41(7–8), 670–684. <https://doi.org/10.1016/j.telpol.2017.05.010>
- Ilboudo, J.-P. (2001). Rural radio: Role and use over the past three decades. In *Information and communication technologies servicing farm radio: New contents, new partnerships*. Food and Agriculture Organization of the United Nations.
- Intergovernmental Panel on Climate Change. (2022). *Climate change 2022: Impacts, adaptation and vulnerability*. Cambridge University Press. <https://doi.org/10.1017/9781009325844>
- Katz, E., Blumler, J. G., & Gurevitch, M. (1973). Uses and gratifications research. *Public Opinion Quarterly*, 37(4), 509–523. <https://doi.org/10.1086/268109>
- Lungahi, E. G., & Ndavula, J. O. (2018). The role of vernacular radio in climate change information dissemination in semi-arid areas in Kenya. *African Multidisciplinary Journal of Research*, 3(1). <https://doi.org/10.71064/spu.amjr.3.1.41>
- Mase, A. S., Gramig, B. M., & Prokopy, L. S. (2017). Climate change beliefs, risk perceptions, and adaptation behavior among Midwestern U.S. crop farmers. *Climate Risk Management*, 15, 8–17. <https://doi.org/10.1016/j.crm.2016.11.004>
- McCombs, M. E. (2004). *Setting the agenda: The mass media and public opinion*. Polity.



- McCombs, M. E., & Shaw, D. L. (1972). The agenda-setting function of mass media. *Public Opinion Quarterly*, 36(2), 176–187. <https://doi.org/10.1086/267990>
- Mwaniki, F. N., Gichuki, C., Mwangi, M., Mburia, P., & Wandago, B. (2017). Addressing challenges in communicating adaptation practices to smallholder farmers in Kenya through a radio intervention. *Journal of Agriculture and Environment for International Development*, 111(2). <https://doi.org/10.12895/jaeid.20172.589>
- Odira, R. A. (2014). *The role of radio broadcasting in enhancing farm production in rural Kenya: A case of Radio Nam Lolwe in Kakelo location, Homa Bay County* [Master's thesis, University of Nairobi].
- Ruggiero, T. E. (2000). Uses and gratifications theory in the 21st century. *Mass Communication & Society*, 3(1), 3–37. https://doi.org/10.1207/S15327825MCS0301_02
- Tall, A. (2013). What do we mean by climate services? *WMO Bulletin*, 62(Special Issue). World Meteorological Organization.
- Tashakkori, A., & Teddlie, C. (2010). *SAGE handbook of mixed methods in social & behavioral research* (2nd ed.). SAGE Publications.
- Wacheke, T., Ndavula, J., & Koome, P. (2018). Relevance of vernacular radio stations' agricultural programs in utilization of agricultural information among farmers in Molo Sub County, Nakuru Kenya. *Scholars Bulletin*, 4(7), 628–635. <https://doi.org/10.36348/sb.2018.v04i07.012>