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The Role of Gender-Sensitive Participatory Communication in Disseminating Climate Messages in Machakos County, Kenya

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Abstract

Globally, effective communication is acknowledged as main tool in promoting adaptation of agricultural practices amidst climate variability. This is because communication and more so, participatory communication and lay knowledge approaches are key in promoting meaningful engagement and empowering farmers to social change. Despite the proliferation of information on climate-adaptive agricultural innovations, the uptake among farmers remains inadequate. This study examines the communication strategies employed in disseminating climate change adaptation technologies to rural farmers in Kenya, focusing particularly on smallholder farmers. This study specifically examined how climate change technology messages are designed and communicated to small holder farmers. The study adopted the relativist constructivist paradigm, qualitative research approach and case study method while utilizing an inductive thematic approach to analyze the data. A purposive sampling method was chosen to identify the area of study, Katumani, Machakos location and consequently, to select specific farmer groups and farming households to participate in the focus group discussions The qualitative approaches included observations during farmer meetings, conversations with farmers in focus groups, one-on-one interviews with experts and document analysis of the seasonal weather based advisory flier. Findings reveal a prevalent assumption among climate message designers that mere information provision suffices for technology adoption, overlooking significant barriers faced by women farmers, who constitute substantial farming demographic. Effective adaptation strategies necessitate equitable access to information, particularly through channels accessible to marginalized groups, like women. This illustrates the importance of using participatory communication and lay knowledge approaches when designing and communicating climate-resilient technologies for smallholder farmers who are confronted with climate related challenges.

Keywords: Adaptation communication, climate change communication, adaptation messaging, gender, participatory communication

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Introduction

Globally, adaptation to climate change is recognized as a big challenge. This was emphasised at the recent 2023 COP28 summit by Saber Hossain Chowdhury stressed that *"adaptation is really a life and death issue, we cannot compromise on adaptation, we cannot compromise on lives and livelihoods,"* (Jessop, Stanway & Abnett, 2023). This statement reflects the urgency to address the growing impacts of climate change. The United Nations Development Programme (UNDP, 2024) defines climate change adaptation as the implementation of strategies to reduce vulnerability to climate impacts such as extreme weather events, sea-level rise, and food and water insecurity. These strategies, including drought-resistant crops, improved water management, and land management, are essential at both grassroots and urban levels.

Therefore, the need for adaptation is becoming increasingly urgent as climate change impacts worsen with rising temperatures, making adaptation more challenging and costly (UNDP, 2024). Developing countries, already vulnerable due to geographical and socio-economic factors, are particularly affected. Grigorieva et al. (2023) highlight that local agricultural communities face significant threats, including reduced food security, water scarcity, and infrastructure damage, all exacerbated by climate change. Africa, heavily reliant on rainfall, is notably vulnerable, with climate change severely impacting agricultural productivity (Ray, 2021; Gebre et al., 2023). Farmers in East and Southern Africa face increasing threats from pests, diseases, and extreme weather, leading to severe food shortages and economic losses (One Acre Fund, 2020; Farm Africa, 2023).

The ND-GAIN Index indicates that Africa houses many of the most vulnerable countries globally, with a 34% decline in agricultural productivity since 1961, a decline more severe than any other region

(UNDDR, 2023). Eastern Africa's vulnerability is compounded by a heavy reliance on agriculture and limited adaptation capacity (Lorez & ICPAC Climate Change Technical Working Group, 2020). Effective climate change communication is crucial for successful adaptation and mitigation, as noted by Ensor & Harvey (2012) and Okaka (2022). However, communicating climate change remains a challenge because of the complex nature of the information (Otieno, Pauker & Maina, 2010). Research by CCAFS shows that farmers in East Africa have struggled to adopt new practices, highlighting a need for improved communication tools and strategies (IRIN, 2012).

This study focused on communication-related challenges and strategies in disseminating climate change adaptation messages to smallholder farmers in Kenya. It aimed to understand how these messages are designed, disseminated and perceived by the small holder farmers. The study revealed that there is gender inequality arising from how communication of adaptation options is carried out among small holder farmers. This significant finding highlights the need for targeted communication strategies that address the specific challenges and needs faced by women farmers in adapting to climate change. It demonstrates the need to integrate gender considerations in climate change communication. This is in sync with other studies that emphasise the need for gender consideration and targeted communication strategies that address specific challenges faced by women and other marginalized groups (UNDP, 2016; Leeuwis & Hall, 2013; Adeola, Evans, & Ngare, 2024).

Literature Review

The literature reviewed includes brief background of the climate change phenomenon and its effects on agriculture, approaches and theories in climate change communication and, communicating adaptation to women farmers. A lot has been done by governments and other stakeholders to address the issues of climate through improved technologies and advanced approaches to farming, however, this alone cannot solve the problem: effective communication is needed to help farmers understand and adapt to this challenging phenomenon.

Why the urgency to adapt to climate change?

There's a global consensus on the paramount importance of Adaptation as the primary challenge facing nations, for a multitude of reasons. This significance was underscored during the 2023 COP28 summit by Saber Hossain Chowdhury, who emphasized the critical nature of adaptation, stating, "adaptation is really a life and death issue, we cannot compromise on adaptation, we cannot compromise on lives and livelihoods." This highlights the urgent need to address the impacts of climate change, a topic that was evidently at the forefront of discussions during the U.N. climate summit in Dubai in 2023 (Jessop, Stanway, & Abnett, 2023).

According to the United Nations Development Programme (UNDP, 2024), climate change adaptation is the implementation of strategies to reduce vulnerability to existing or anticipated climate change impacts such as extreme weather events, sea-level rise, biodiversity loss, and food and water insecurity. A large portion of adaptation efforts must take place at the grassroots level, requiring significant participation from rural

communities and urban centres. These initiatives include the cultivation of drought-resistant crop varieties and the adoption of regenerative agricultural practices, improvements in water storage and utilization techniques, the implementation of land management strategies to reduce wildfire risks, and the construction of strong defences against extreme weather events such as floods and heatwaves.

Why the urgency to adapt? The need for climate adaptation becomes increasingly urgent as the impacts of climate change worsen with each rise in temperature. The United Nations Development Programme (UNDP, 2024) emphasizes that higher temperatures lead to more frequent and severe climate-related events, making adaptation more challenging and expensive for both people and ecosystems. This urgency is particularly critical in developing countries, which are already suffering from the effects of climate change and face heightened vulnerability due to factors such as geographical conditions, reliance on natural resources, and limited adaptive capacity. Food inaccessibility is most affected.

Grigorieva et al. (2023) further emphasize that local agricultural communities bear the brunt of these changes, affecting employment, income, and agricultural output. Their reliance on agriculture makes them particularly susceptible. The main adverse effects include reduced food security (availability, accessibility, stability, and utilization). Consider that since 1961, the continent's agricultural productivity has declined significantly by an estimated 34%, owing primarily to rising temperatures. This reduction is more significant than in any other region worldwide (UNDDR, 2023). Other effects include water scarcity, infrastructure damage, droughts and increased poverty.

Unfortunately, one of those most affected regions is Africa and its people, since they rely on agriculture which is vulnerable to the effects of climate change because it relies heavily on rainfall (Ray, 2021). Lorez and the ICPAC Climate Change Technical Working Group (2020) discussing the same issue note that Eastern Africa faces increased vulnerability owing to communities' heavy reliance on agriculture. In this region, the most severe drought in decades was experienced in 2016, but the latest prolonged drought occurred from 2020 to 2023, causing the driest conditions seen in decades and widespread food shortages (One Acre Fund, 2020; Farm Africa, 2023).

Here in Kenya, the extreme weather conditions like floods and droughts make it increasingly difficult for people to access essential supplies like food, firewood, and clean water, placing additional burdens on women, who must search for these essential items for their households. Indeed, Adeola, Evans, & Ngare (2024) note that consequently the impacts of climate change disproportionately burden the poorest and most marginalized segments of society, including women, children, and indigenous peoples. They say these vulnerable groups rely on rain. The significant effect on women is due to their different social responsibilities and access to economic resources.

Communication a tool in adaptation

There is a growing consensus that farmers are not adapting to climate change at the rate they are expected to and that they do not fail to adapt due to lack of information. Ledwell et al., (2023) note that despite the importance of public engagement for action on climate change, it is not happening at either the scale or

pace at which it is needed. It is now clear that it is much more complicated, and this research sought to find out those communication-related complications hinder or encourage adaptation. Where innovations are available, for example in Machakos County, this study investigated the strategies used to communicate climate change adaptation messages to smallholder farmers in Kenya. Specifically, it aimed to understand the content of the messages, the methods of communication, and the perceptions of smallholder farmers and agricultural experts towards these messages.

Communicating climate change adaptation

Ensor & Harvey (2012) noted that a critical element in promoting effective and successful adaptation and mitigation strategies is communication. Okaka (2022) makes the same point noting that effective climate change and disaster policy communication services are essential for boosting the adaptive capacity for resilience of the vulnerable local communities in developing countries like Uganda and, dare I say it, Kenya.

Indeed, a lot has been done by scientists, governments, and development partners in the agricultural field, which has been most affected by climate variabilities. These actors have devoted substantial resources to improve environmental conditions and increase agricultural productivity - particularly the use of modern farm technology such as soil and water conservation technologies and fertilizer—that would enable farmers to increase their productivity. According to (Ackerl et al., (2023) ultimately, the adoption of proper adaptation measures to climate change has become inevitable for people who depend on agricultural production and subsistence farming. They cite Haile et al., (2020) who say that climate extremes resulting from climate change have made many African rural farmers more vulnerable as many of them have insufficient adaptation strategies and limited access – and they say that the situation is unlikely to become better. Yet according to Percy (2013), farmers all over the world need to adopt improved agricultural practices if they are to adapt to changing climate. They need to adapt to strategies aimed at reducing potential risks, for example by using drought tolerant seeds, cereal banks, diversification to non-climate dependent income sources, weather-based insurance products, or early warning systems. Hall (2021) also sees adaptation as the concrete part of the response to climate change, for example where farmers take steps and adopt innovative crop varieties that support entire communities.

Unfortunately, practitioners in the field of Climate Change assume that the ultimate solutions to climate change for agricultural development are workable, cost-effective technologies and approaches which permit society to improve living standards while limiting and adapting to changes in the climate, according to Shome & Marx, (2009). They quote Jeffrey Sachs of the Earth Institute who says that scientific, engineering, and organizational solutions are not enough to bring change. He argues that societies must be motivated and empowered to adapt to change. For this to happen, he says, the public must be able to interpret and respond to often bewildering scientific, technological, and economic information. Sachs says that social psychologists are aware, through their painstaking scientific research, of the difficulties that individuals and groups have in processing and responding effectively to the information surrounding complex challenges like climate change and the new technologies. This is because how that information is framed

and communicated can significantly influence the public's knowledge, attitude and perception and desired behavior (Sachs cited by Shome and Marx, 2009; Weingart et al., cited by Van Der Linden 2013). Waaswa, et al., (2021) add their voice and say that due to inappropriate communication of Climate Smart Agricultural Programs (CSAPs), which are strategies to modify agricultural systems, most farmers still see no escape from the frightening effects of climate change.

It is unfortunate that historically, climate change was framed as an abstract scientific issue, but the role of communication in adaptation is now gaining attention across disciplines. Moser (2017) argues for a shift in climate communication, advocating for tailored strategies that inspire meaningful action, moving beyond conventional public relations approaches. Indeed, Jelagat (2023), with input from the IGAD Climate Change Technical Working Group, highlights the growing importance of effective communication in weather and climate services, especially as climate change impacts become pronounced. Effective communication ensures that communities receive accurate, timely, and relevant climate information, enabling them to make informed decisions and take protective actions. As noted by Filho (2009), Moser (2014), and Moser and Ekstrom (2010), all cited by McGahey and Lumosi (2018), appropriate communication is increasingly recognized as a critical factor influencing climate change adaptation. (Moser & Dilling, 2012; Nerlich et al., 2010, cited by McGahey & Lumosi, 2018) also say that successful communication bridges the gap between scientific knowledge and action, raising awareness, facilitating dialogue, and encouraging behavioral change. Scholars like Moser emphasize the need for messaging that drives tangible responses and adapts to the specific needs of different audiences (cited by Hall, 2021).

The Climate Change Communication Advisory group (2010) was of the same opinion as Hall. The group contended that public communication campaigns, as orchestrated by government, business and non-governmental organizations, are not achieving changes. The group Noted that climate change adaptation has been presented as a complex and abstract scientific problem. The group also acknowledges the growing consensus that for any adaptation to take place, climate change needs to be framed and communicated in a way that will bring about change amongst all stakeholders, including farmers. And among farmers, the communication should target men and women differently to align to their needs since they are the final consumers of the information in rural communities.

Communicating adaptation of agricultural technologies to women

It is well-documented that women make up nearly half of the world's smallholder farmers and are responsible for 70% of Africa's food production (Abass, 2018). Based on their heavy impact as food providers, there is no justification for communication marginalization of rural women or any group in the fight against climate change. Yet as Ngigi et al., (2017) say, enough evidence reveals that gender discrimination exists in access to information. Yet messaging must be tailored towards this population, because they are highly vulnerable to the impacts of climate change and this marginalization in the decision-making process is exacerbating vulnerability, as noted by UNFCCC (2024).

Moreover, communication strategies often fail to consider the specific needs and perspectives of women, exacerbating their vulnerability. What are the unique challenges faced by women in climate change communication? Women who constitute a substantial portion of the agricultural workforce, often face unique challenges and barriers in accessing and utilizing climate information. According to Ngigi et al. (2017), barriers to effective communication for women include exclusion from the message design process, limited access to communication channels, underrepresentation in capacity-building initiatives, and educational inequalities. They further say that gender-defined roles in society and sociocultural constraints further restrict women's access to information and their involvement in decision-making processes. Additionally, cultural norms may contribute to denying women equal opportunities and rights to adaptation knowledge. Inadequate communication often results in the exclusion of women's voices from the dialogue on climate adaptation, leading to solutions that do not fully address their unique challenges and needs.

Ngugi (2015) emphasizes that addressing these communication gaps is essential to ensure that adaptation strategies are effective and equitable, ultimately empowering women to contribute to and benefit from climate-related planning and implementation. He notes that it is also important to design strategies, including communication strategies, that account for women's perspectives and are aimed at women's needs. He says that some of the questions communicators should ask are: How do women prefer to self-organize? How do they like to receive information and through what channels of dissemination? What kinds of information would they make most use of? Ngugi et al. (2015). These questions lead to the conclusion that the participation of women in communication is critical if there is to be any substantial adaptation. UNFCCC (2024) also emphasis that gender-specific considerations are crucial in climate change adaptation communication, particularly among smallholder farmers. The organization notes that women, who constitute a substantial portion of the agricultural workforce, face higher risks and greater burdens from climate impacts, yet often have less capacity to respond due to systemic inequalities and limited participation in decision-making processes.

In summary, University of Leeds, (2020) say that women are often on the frontline of climate change, as subsistence farmers trying to feed their families and as lynchpins holding rural communities together. It is therefore important to understand how these women on the ground receive information about climate change and how they interact with it. New information on new technologies come from governments and scientists on how to adapt to the impacts of climate change, but how are these messages designed, by who and what are the perceptions farmers, especially women have of these messages? And how easily can the information be used; alongside the knowledge they already have from the day-to-day reality of dealing with these challenges?

Participatory Communication Theory

Communication strategies that fail to consider gender-specific challenges can exacerbate women's vulnerability and hinder effective adaptation. Therefore, it is essential to develop communication strategies that are inclusive and tailored to the needs of women, ensuring they are

active participants in climate-related planning and implementation. The participatory communication theory offers a valuable framework for addressing these challenges because it advocates for inclusivity, participation and empowering marginalized groups. The theory also seeks to engage the beneficiaries of development projects in the planning, design, implementation, and evaluation of a development intervention that is met for improving their living condition. According to Tufte and Mefalupolus (2009), the participatory communication theory emerged from the 1970s, with Paulo Freire widely regarded as the father of the theory. He laid the foundation for participatory approaches in communication in his book "Pedagogy of the Oppressed," emphasizing dialogue, empowerment, and the active involvement of people in the communication process. Ibuot, et al., (2021) say that over the years, his ideas have greatly influenced the development of participatory communication, especially in the context of education, social change, and development.

Similarly, the lay expertise model, which was also used in this study, highlights the importance of collaborating with farmers and valuing their local knowledge. Both models reject top-down, linear approaches to message design, advocating instead for communication activities that acknowledge the expertise that communities already possess (Lewenstein, 2003). This model allows communities to express their perspectives, identify shared concerns, and collaboratively seek solutions. Both approaches are particularly relevant for smallholder farmers, more so women, who have historically been marginalized in development processes. Recognizing and incorporating their knowledge ensures greater ownership of adaptation strategies and more effective outcomes.

In summary, effective climate change adaptation communication requires inclusive and participatory approaches, with a particular focus on women. Both participatory communication theory and the lay knowledge model are essential for sustainable climate change adaptation as they valuable frameworks for engaging communities and ensuring that adaptation efforts are both effective and contextually appropriate.

Methodology

Philosophy/Paradigm

The choice of philosophical paradigms, namely relativism ontology and constructivist worldview, underpinned the selection of a qualitative research design. The relativist paradigm aligns with the belief that reality is shaped by individual perceptions and experiences, and that multiple viewpoints exist regarding climate change adaptation and messaging in Machakos County. This researcher sought to understand the reasoning behind farmers' perceptions of climate change adaptation messaging how messages were crafted, disseminated, and interpreted by farmers. Recognizing the subjective nature of reality, the researcher explored of the climate change phenomena in Machakos county by immersing in the lives of farmers and message designers through a qualitative research approach which is guided by the constructivist/interpretive and relativist epistemology paradigm. In this research, it was about gathering farmers' experiences, perceptions, and behavior. The approach provided insight into the communication barriers hindering adaptation and how small-scale farmers respond to climate adaptation messaging.

Population

The research was conducted in Machakos County, which shares borders with Nairobi and Kiambu counties to the west, Embu to the north, Kitui to the east, Makueni to the South, Kajiado to the southwest, and Murang'a and Kirinyaga to the northwest. According to Eunice & Mwangi (2019), the County stretches from 0º 45' South to 1º 31' South and longitudes 36° 45' East to 37° 45' East. The County has an altitude of 1000 – 1600 meters above sea level. It has a total population of 1,098,584 people, 264,500 households, and covers an area of 6,208 SQ. Kilometres. The population density is 177 persons per SQ. Kilometres. The Akamba people are the dominant inhabitants of Machakos County.

Drought and semi-drought conditions are a chronic problem in Machakos District. Despite the large proportion of cultivated area given to food crops, whenever drought or semi-drought conditions hit Machakos District, the district has depended on food imports, especially maize grain and maize meal, to feed its population. Such food imports have sometimes come as famine relief; on other occasions, the sale of livestock, sisal, and other cash crops and labor remittances have enabled people to buy food.

Study area and population

In terms of sampling, the researcher employed a purposive sampling method and selected cases that offered the opportunity to learn most (Stake 2005). The logic of purposive sampling lay in selecting an information-rich case, with the objective of yielding insight and understanding of the phenomenon. The Katumani, Machakos location selected in this research is information rich in climate change communication issues. Kenya Agricultural Research and Livestock Organisation (KARLO) Katumani is located here with the primary goal of producing approaches and technologies suited to the region, which is semi-arid and has faced considerable challenges associated with climate change. In addition, several NGOs have set up camp here to deliver agricultural solutions to help small holder farmers who face the vagaries of climate change.

Furthermore, a case study approach was used as the researcher purposively sampled and selected households in Machakos County, intensely examining small farmer groups comprising 7-15 members to participate in the focus group discussions. This focused approach enabled the researcher to draw meaningful conclusions about that group within their unique context. The criteria for selection were that the farmers own 1-3 acres and are either using or not using new agricultural approaches, shared a common interest in addressing the challenges posed by climate change and regularly come together to exchange knowledge on new agricultural techniques. The study worked with four pre-existing farmer groups that KARLO and other organizations work with around Katumani.

Data instruments

Focus Group Discussions using semi-structured interviews were used to gather data from the farmer groups. Additionally, the study used key informant interviews because of the qualitative nature of my research which aimed to gather rich and detailed information. Both methods were valuable in exploring complex research topics, climate change adaptation messaging and capturing diverse perspectives on the subject.

In total, four were contacted for FGDs, engaging a total of 40 farmers.

It was during the FGD that the researcher received the farmers' responses to the messaging of the seasonal weather focus flier. The flier was presented to the farmers who were requested to give feedback on how it is designed and communicated and their perception of the messages. The seasonal weather advisory is a short-term climate information tool meant to help farmers make decisions in their daily farming activities, in the face of climate change. In the area under study, it is communicated through various formats, mainly through a pamphlet which is a one-page flier. The information is also communicated to farmers and through vernacular radio stations. It gives the seasonal forecast and appropriate farming technologies to use in response to an upcoming rainy season. The forecast is meant to help farmers decide when to sow, how to sow, what to sow and other appropriate farm management techniques to adapt during a season

Observations

Observation was used as a technique of data gathering, where the researcher was present during innovation /technology transfer meetings to observe and record the communication process between innovation actors and farmers. The selected groups were those that utilize demonstrations to communicate farming innovations. The group gathers in one of the farms which is set apart as a demonstration. This is where they interact with the innovation transfer actors and with each other, observing and asking questions.

Data analysis

The findings were analyzed through inductive thematic approach due to the massive qualitative data since it offered a structured means of handling the sizable volumes of data and given the richly descriptive nature of the data.

Results

The groups consisted of men and women of different age groups and educational levels illustrated below:

Table 1: Number of Focus Group discussion respondents

Composition	Male	Female
Kinatwa	7	3
Ichanda	8	4
Muua	6	2
Mwania	6	4
Total	**27**	**13**

Majority of the respondents were male (27) and (13) were female.

Table 2 summarizes the ages of the respondents:

Table 2: Age of Focus Group Discussion respondents

	18-20	21-25	26-30	31-45	45-66
Male	0	1	3	3	20
Female	0	0	1	3	9
TOTAL		**1**	**4**	**7**	**28**

Out of 40 respondents, majority of the farmer respondents were old. Indeed, a significant majority of were over 45 years old.

Table 3: Educational Level

Class/Form	0-8	1-4	College	TOTAL
Male	5	20	2	27
Female	8	4	1	13
TOTAL	13	24	3	40

According to education level of the respondents, majority of them (24) had attended secondary school level, 13 of them had attended primary while only 3 had attended college.

Findings on the role of gender-sensitive participatory communication in disseminating climate messages

The data is presented in narrative form with quotations, summaries and paraphrases from the data sources presented in table 4 below.

Table 4: Sources of data

WA1 –	KII – with Seasonal Weather Advisory 1.
FGD 1 –	Focus Group Discussion in Kinutwa Sub-location
FGD 2-	Focus Group Discussions in Mua.
FGD 3-	Focus Group Discussion in Ichanda Sub-location with Farmers
FGD 4 –	Focus Group Discussion in Mwania
AO 1 –	KII - Agricultural Officers 1
AO 2 –	KII - Agricultural Officer 2
RO –	KII- Message Designer 1
MO –	KII- Meteorology Officer
FFI –	KII -Female farmer 1
FF2 –	KII - Female farmer 2
FF3 –	KII - Farmer 3
PSE 1 –	KII - Private Sector Extensionist 1

Top-Down nature of messaging

All participants, including farmers, message designers, and extension actors, agree that the messaging process is top-down. Messages are typically created and disseminated in a hierarchical order, beginning at the regional level, progressing to the national level, and ending at the county level. At the national level, the Kenya Meteorological Department issues a forecast that is then tailored to different locations. Therefore, according to message designers, climate adaptation messages are developed by technical professionals and scientists, starting at the top and cascading down to the farming community. One of the message designers said,

> "*the conversation starts from the regional level, that is the Great Horn of Africa. In this season already the technical people are in Kampala doing the regional forecast - we call it the Great Horn of Africa*" (MO).

In addition, many farmers expressed difficulties in comprehending the contents of the seasonal advisory flier where the information on new technologies is communicated. This is due to the use of English language and, more significantly, the inclusion of technical terms to describe crops. Some other farmers who are unable to understand the language, share it with their family members to assist them to comprehend the information. For instance, during the session where FGD3:5, a 65-year-old woman, was shown the flier and asked about her understanding of its contents, she responded by stating,

> "*I do not possess formal education, hence I am unable to comprehend the contents.*"

Social cultural norms barriers to adaptation

The study found that despite women's active involvement in agricultural

activities, the deeply ingrained socio-economic and cultural norms in the community already created formidable barriers, limiting their access to crucial climate change adaptation messages. To expound on the cultural norms, both men and women in the FGDs and KII said that traditionally, a woman's role was to take care of the household chores, like caring for the family by cooking, fetching water from the river, and small subsistent farming.

> "*Women are in charge of domestic chores, collecting water and firewood, cooking, and looking after children and the elderly, we are engaged in small agricultural activities, including planting and harvesting crops, as well as tending to small livestock*" (FGD:2:3).

For the socio-economic role, participants in the FGD's said that women are expected to hold roles that are primarily related to subsistent farming, while men are expected to be in income generating activities, that is why they leave the rural areas in search of wage-based employment – leaving women who are mostly less educated- to take care of the small farms. Men also frequently take on leadership roles in their communities, participating in decision-making roles. Indeed, they participate in infrastructure development initiatives – e.g., when the community needs infrastructure like road or irrigation as noted by one of the farmers:

> *"Sisi wanaume ndio tunashugulikia mambo ya development, uwa tunakutana mara kwa mara kuzungumzia maswala you uendeleshaji…*" It is us men who take the role of ensuring development is happening, we meet regularly" (FGD:3:4).

Women left out of the capacity building forum

As a result of these traditional norms, men predominantly attend the agricultural forums and leave the women at home to tend to the home related chores. The study observed that training and capacity building forums where farmers are exposed to messages on new technologies are not sensitive to the realities of farming communities in the study area. While most farmer outreach meetings like demonstrations are attended by either one of the spouses, men attend most of the group meetings while the women are left at home tending the farm. Interviewees explained as well that women are unable to attend the capacity building meetings because the men think they will not understand the technical issues– leaving such meetings to men who are better educated. In other words, women are the ones working on the farms while the men attend the agricultural meetings.

This becomes even a bigger challenge when the men attend a demonstration meeting where sight, smell and touch are used to build the capacity for using new technologies, yet the women who practice the farming are not present at these forums. It is not even possible to go back home and give the same training to the woman – since she won't have the experiential learning opportunity of interacting with the facilitator. In addition, men do not share the information or lessons they learn at the agricultural meetings with the women.

The AO 2 noted that in cases where the women attend the training without their husbands, they may share the information with their husbands to receive financial support to try out new technologies. However, this is still a hurdle since the men are the resource controllers and decision makers and will most times

be unwilling to support an idea they do not understand. Hence, the female farmer is not able to implement the new technologies.

Women's low literacy levels hindering understanding of adaptation options

Another finding was that the low rate of adaptation to climate change was attributed to the fact that most of the people who work on the land are women, many of whom are over 50 and have very little formal education. As a result, these women may not understand the weather advisory flyers or other messages related to adaptation. Those interviewed said that younger people must translate the information for them because of the English (and technical) language used in the weather advisory. They still cannot use the weather advisory flier on their own, even though it is intended to provide information and guidance on new agricultural techniques to combat challenges emanating from weather variabilities. For example, it is meant to guide on drought-resistant varieties and control of pests, among other climate adaptation messages.

Message dissemination tools not accessible to women farmers

Apparently, the same traditional norms assigning women roles contribute to women's limited exposure to pertinent climate adaptation messages aired on radio and TV broadcasts. Female farmers emphasized that they have limitation when it comes to watching or listening to both radio and TV compared to their husbands. A notable challenge is the timing of the programs. They noted that most of the agricultural programs are broadcast in the evening. Saying the scheduling of agricultural programs on both radio and TV does not harmonize with their daily routines, leading to a failure in effectively reaching them. A female farmer put it this way:

> "*when I come home from the farm, I must cook for the family, fetch water and firewood, take of the children's homework so many other tasks, I do not even have time to listen to the radio*" (FGD 2: 6).

This, in spite of the fact that they are the ones working on the farms.

In addition to the timing of the broadcasts, the farmers noted that although climate adaptation messages are broadcast on radio and TV, women have little access to these gadgets because of the ownership dynamics surrounding these devices. Women disclosed that radios and televisions are typically owned and controlled by their husbands, who choose the programs to watch and listen to. During an FGD session, a female farmer from Group FGD:2 shared that her husband exclusively operates the radio, determining which programs to listen to, as he is the one who purchased it. This sentiment was echoed by other female farmers across all the discussion groups. Consequently, the ownership phenomenon hinders women's ability to engage with radio and TV broadcasts, as they have limited control and influence over the usage and programming choices of these devices.

Discussion

These research findings confirm Elfanne (2023, April 20) assertion that although women supply around 60 to 80 percent of the labor input, they face gender-specific barriers in Africa and are isolated in multiple ways. In this study, the majority are illiterate and older, left out from decision-making platforms and overlooked by capacity-building initiatives. Communication processes take place without their involvement. How, then, can we expect transformational change or

adaptation to climate change and improvement of food security when they are excluded from these processes of finding solutions?

The study confirms Ngigi et. al (2017) statement that options for adapting to climate change closely interplay with husbands' and wives' roles and responsibilities, social norms, risk perceptions and access to resources and to add to this list – access to education. The authors assert that the impacts of climate change are gendered because the poor and the marginalized are the most vulnerable to climate change – and women constitute the great majority of this group.

According to the UN Climate Change News (2023), there are compelling reasons why climate action needs women. Confirming that half of the world's population is comprised of women and girls, yet they are often left out of the conversation when it comes to climate change, the article notes that if there is going to be any change in climate change adaptation or limiting global temperatures, everyone, including more women and girls need to be empowered and involved. They must be in the climate negotiations to boardrooms to forests and fields, especially in sectors and regions hit hard by the ravages of climate change, like agriculture.

The study advocates for the integration of theoretical frameworks such as participatory communication and lay knowledge into communication strategies, as suggested by FAO (2009). To implement this approach successfully, message designers must conduct thorough situational analyses, acknowledging the socio-cultural context, communication channels, and must involve both men and women in writing the messages and pre-testing messages. The language and overall design should be friendly to both men and women farmers, taking cognizance of their literacy levels.

As a first step in devising a Development Communication or Participatory Communication strategy in a community, it is crucial to acknowledge the prevailing sociocultural norms that influence gender roles and responsibilities, while incorporating the voice of the women in the identification of challenges and solutions of climate change. A good example of participatory provided by Lore (2021, March 9), is Linah Mwamachi and Linda Akoth two award winning journalists who have since 2019 worked extensively on matters of weather and climate communication in Taita Taveta County. They have championed the importance of co-production of weather and climate information. This process has brought together, the media, the Kenya Meteorological Department, civil society organizations, FAO and farmer representatives participate in co-production. The efforts of co-production have led to the co-development of solutions and thus need to be streamlined and amplified.

Secondly, there is need to explore communication channels that favor women, especially social platforms where they feel comfortable – these could be community-based and female-dominated groups and networks. Such alternative channels where they can interact with women e.g. prayer meetings, water boreholes or 'merry-go-round', can be used to interact with women on issues of weather and climate information.

FAO which has worked in rural development proposes Participatory Radio Programs, as a tool that can amplify the female farmer's voice. The organization proposes that radio programs be broadcast during women's meetings since they frequently attend merry-go round meetings. This will ensure that the climate

scientists are finding the women where they are and they allow them to share their stories, their fears and their experiences. FAO (2011) also suggests the use of participatory theatre and video cameras. The idea is to intentionally provide a platform for women's voices to be heard.

Message developers can partner with local organizations who are already engaged in social change processes to identify approaches that work with gender here and those that do not work – even those organizations that are engaged in other social development programs e.g. nutrition and health, among others. FAO (2011) recommends that scientist partner with women civil society groups, for example, to communicate directly to women and enhance their learning capacities. The FAO recommends that such institutions can serve as intermediaries between formal institutions (extension services, NGOs) and local women. For example, female led Community Based Organizations can provide a familiar platform which is not male dominated. The same document recommends that training schedules could be planned to accommodate women's mobility and family responsibilities and farm commitments – schedules that almost guarantee their attendance and participation.

Overall, the study's implications suggest a shift towards co-creation and participatory messaging, centered on the farmer's perspective and community mobilization, to drive effective climate communication strategies. The findings also provide the message designers with a basis to improve and invest in more farmer focused messaging, including farmer focused dissemination tools.

Conclusion and Recommendations

In conclusion, this study demonstrates the critical role of communication in climate change adaptation among smallholder farmers, particularly women. Despite the availability of technological innovations, adaptation efforts have often failed due to the absence of communication strategies tailored to their unique needs and perspectives. This study advocates for the integration of participatory communication and lay knowledge approaches, to ensure that climate change messages resonate with farmers' lived experiences and knowledge systems. (Alam et. Al (2015) says it is important to ensure that the plight of women is firmly on the agenda of concerns, and that women from different backgrounds can lead in negotiations and participate in the design and implementation of programs, including communication programs. Their engagement is needed so as to improve the adoption of adaptation practices, as their active participation in the design and dissemination of adaptation technologies can lead to more resilient agricultural practices.

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