



Trust and Usability of Climate-Resilience Messages Among Smallholder Farmers: A Protection Motivation Theory-Informed Qualitative Study in Adansi North, Ghana

**Enoch Kwame Tham-Agyekum¹, John-Eudes Andivi Bakang²,
James Adjei-Mensah³, Edward Afum Banahene⁴, Eva Nuako⁵,
and Emmanuel Tabiri Oppong⁶**

^{1,2,3,4,5,6} KNUST, Faculty of Agriculture, College of Agriculture and Natural Resources, Department of Agricultural Economics, Agribusiness and Extension, Kumasi, Ghana.

ektagyekum@knust.edu.gh, alhajjab@yahoo.com, iastsaint10@gmail.com,
afumbanaheneedward@gmail.com, evanuako@ymail.com, etoppong@gmail.com

Received: 27 August 2025

Accepted: 30 September 2025

Published: 08 October 2025

Abstract:

In Ghana, recurrent droughts threaten staple and vegetable crop production, making effective communication of Climate Resilience Messages (CRM) vital for strengthening farmers' adaptive capacity. This study explored farmers' perceptions of CRM sources, trustworthiness, and usability in drought-prone communities of Adansi North District, Ghana. A qualitative research design was employed, using three focus group discussions with 15 farmers and 20 key informants selected through purposive and snowball sampling. Data were analysed thematically to capture farmers' perceptions regarding CRM. Results showed that farmers were skeptical of modern forecasting systems. Traditional leaders and indigenous methods remain the most credible and trusted sources of climate information. The overly technical presentation of CRMs alienates many farmers. Agricultural extension officers are not viewed as sufficiently knowledgeable in delivering CRMs. The usability of CRM is constrained by four key issues: technical language, reliance on educated intermediaries, late delivery of forecasts, and poorly adapted formats. To be effective, CRMs must be delivered through trusted channels, simplified in language, aligned with agricultural decision-making cycles, and adapted to local contexts. The study underscores the importance of participatory, culturally sensitive communication strategies in building resilience among drought-affected communities.

Keywords: Climate Resilience Messages, Drought-Prone, Perception, Trustworthiness, Usability.

1. Introduction

Climate change continues to present one of the most pressing development challenges of the 21st century, with Africa disproportionately affected due to its dependence on rain-fed agriculture and limited adaptive capacity. Across the continent, climate change manifests in the form of recurrent droughts, flooding, unpredictable rainfall patterns, soil erosion, and declining agricultural productivity (Coulibaly et al., 2020). These consequences undermine rural livelihoods, exacerbate poverty, and threaten food security, particularly among smallholder farmers who rely heavily on climate-sensitive resources for survival (Atiah et al., 2022).

Drought-affected communities are among the most vulnerable to climate change, as prolonged dry spells destroy crops, reduce water availability, and heighten household food insecurity (Graves & Kuleshov, 2020; Ebhuoma, 2022; Kondal et al., 2024). In Ghana, the agricultural sector remains the backbone of the economy, providing livelihoods for nearly half of the population and contributing significantly to the National Gross Domestic Product (GDP). However, recurrent droughts are posing serious threats to productivity, incomes, and food supply stability. In such communities, farmers are experiencing substantial yield losses, with reports indicating reductions of up to 25% below average for key crops such as maize, millet, rice, and vegetables (Sorgho et al., 2020). These losses have far-reaching implications for both household welfare and national economic resilience.

To mitigate these risks, effective communication of climate resilience messages (CRM) has emerged as a vital tool for enhancing farmers' adaptive capacity (Allart et al., 2024). Climate resilience messages are designed to inform communities about impending risks, promote proactive adaptation, and provide practical strategies for reducing vulnerability (Adu-Boahen, 2023). Such messages may include disaster preparedness plans, water conservation practices, crop diversification techniques, and ecosystem restoration approaches. When communicated with clarity, cultural sensitivity, and community participation, CRMs can empower smallholder farmers with the knowledge and confidence to make informed decisions during climate shocks (Tahernejad et al., 2024).

Despite their potential, the effectiveness of climate resilience messages in African rural contexts

remains contested. Anecdotal evidence from drought-affected communities in Ghana suggests that farmers often perceive CRMs as unreliable, poorly contextualized, or inconsistent with their traditional knowledge systems (Kondal et al., 2024). Farmers hold adverse perceptions regarding the sources, trustworthiness, and usability of CRMs. These negative perceptions are particularly concerning given that farmers have historically relied on indigenous indicators of drought (Kom et al., 2023). This mistrust and misalignment between modern climate communication and farmers' lived realities can have serious consequences. Farmers may disregard them entirely, continuing to rely on outdated practices that reduce productivity and exacerbate vulnerability (Ebhuoma, 2022). Given the urgency of addressing drought impacts and safeguarding food security, it is critical to investigate how farmers perceive CRMs and whether these messages are viewed as trustworthy, usable, and contextually relevant.

A growing body of literature highlights the importance of communication strategies in building farmers' resilience to climate change (Zongho et al., 2023; Adaawen, 2021). Tunget al. (2024) emphasize that participatory communication approaches tailored to community social structures enhance climate adaptation efforts. Tahernejad et al. (2024) further demonstrate that farmers' resilience depends not only on environmental conditions but also on individual perceptions and psychological coping mechanisms. In Ghana, Adeboa and Anang (2024) found that socio-economic factors such as education, farm size, and radio access significantly influence the adoption of climate adaptation strategies. Similarly, Adu-Boahen (2023) observed that smallholder farmers employ a wide range of adaptive tactics, such as crop diversification and irrigation, when provided with accurate and timely climate information.

Yet, despite these insights, very few studies have focused explicitly on farmers' perceptions of climate resilience messages as a communication innovation. This gap is particularly evident in Ghana, where recurrent droughts threaten national food systems, but little is known about how farmers interpret, evaluate, and act upon CRMs. The main aim of this study, therefore, is to understand farmers' perceptions of Climate Resilience Messages (CRM) in drought-affected communities in Ghana. The specific objectives are to examine farmers' perception of CRM sources

and their trustworthiness and to ascertain farmers' perception of CRM usability.

Given the devastating socio-economic impacts of droughts in Ghana and the reliance of rural households on agriculture, this study is both timely and significant. Findings from this research will contribute to both policy and practice. Understanding farmers' perceptions is essential not only for improving communication design but also for ensuring that CRMs achieve their intended goal of fostering resilience in drought-prone communities. At the policy level, evidence will guide the design of targeted, farmer-centred communication strategies that are participatory, culturally relevant, and responsive to local realities. At the practice level, the study will inform extension agents, NGOs, and government agencies on how best to package and deliver CRMs in ways that resonate with farmers. More broadly, this research advances scholarly debates on climate communication in the Global South, filling an important knowledge gap in the literature on resilience, adaptation, and communication effectiveness.

2. Theoretical framework

Protection Motivation Theory (PMT) was introduced by Rogers (1975) and further revised in 1983 (Rogers, 1983) to explain the impact of persuasive communication on behaviour, with an emphasis on cognitive mechanisms underpinning the rationale to follow or not to follow a recommended behaviour. The theory was originally conceptualised for utilisation in the healthcare context (Conner & Norman, 2015). In terms of practical importance, PMT was one of the first theories focusing on the psychological conditions explaining the tendency of people to protect themselves. Due to the robustness of PMT, it has been used in different disciplines, such as psychology/health, sport science, tourism, environmental science, and marketing. In our present study, PMT provides a useful framework for understanding how farmers perceive and respond to climate resilience messages. The farmers' interpretation of climate change resilience messages is shaped by their perception of climate change and their vulnerability to its impacts on crop yields and livelihoods. If farmers view climate change as a severe and recurring challenge, they may pay closer attention to resilience messages. On the other hand, if they perceive climate change as a normal change or believe they are not highly

vulnerable, their motivation to act may be lower. How farmers react after the messages are received is also very important. Farmers are more likely to adopt climate resilience practices if they perceive the recommended strategies are effective in reducing risks (response efficacy). Furthermore, their willingness to implement such practices depends on their confidence in their ability to carry them out (self-efficacy) and whether the costs, such as financial resources, labour, or time, are manageable. If messages do not address these concerns, farmers may reject or ignore them.

3. Research methodology

3.1. Study area

Adansi North District is one of the administrative districts in the Ashanti Region of Ghana, with its capital at Fomena, located along the Kumasi–Cape Coast main road. The district lies within a longitude of 1.5°W and a latitude of 6.3°N. It is bounded to the south by Adansi South District, to the north-east by Amansie East District, to the south-west by Obuasi Municipality, and to the west by Amansie Central District. The district covers a total land area of 1,140 square kilometres, representing 4.67% of the total land area of the Ashanti Region. It is composed of 94 communities, 35 electoral areas, seven area councils, and two constituencies (Fomena and Asokwa). The total population of the district is estimated at 76,000, comprising 36,936 males and 39,064 females (2000 census). The natural vegetation of the district falls within the semi-deciduous forest zone, and soils are dominated by forest ochrosols, which are generally fertile and suitable for diverse agricultural production. The climate is semi-equatorial, with an annual average temperature of between 26°C and 30°C. Rainfall is bimodal, with two distinct wet seasons, and the annual total ranges between 1,250 mm and 1,750 mm. Agriculture remains the dominant economic activity in the district, with most farmers engaged in mixed cropping, mono-cropping, and mixed farming. Major staple crops include maize, cassava, plantain, cocoyam, yam, and rice, while vegetables such as cabbage, pepper, tomato, okra, and garden eggs are also widely cultivated. Cocoa and oil palm serve as the leading cash crops. In terms of performance, maize, cassava, yams, cocoyams, and plantains remain the backbone of crop production. Between 2009 and 2010, maize cultivation declined from 10,800 hectares to 4,014

hectares, with corresponding production dropping from 20,520 metric tonnes to 7,626.6 metric tonnes. Cassava production also fell sharply from 132,122 metric tonnes in 2009 to 81,254.8 metric tonnes in 2010. Conversely, yam production improved within the same period, increasing from 6,365 metric tonnes to 10,100.1 metric tonnes, reflecting both

expansion in cultivated area and increased yields. Plantain and cocoyam, however, showed a decline in both area and output. These trends indicate fluctuating production levels shaped by climatic and agronomic challenges (Ghana Statistical Service, 2012).

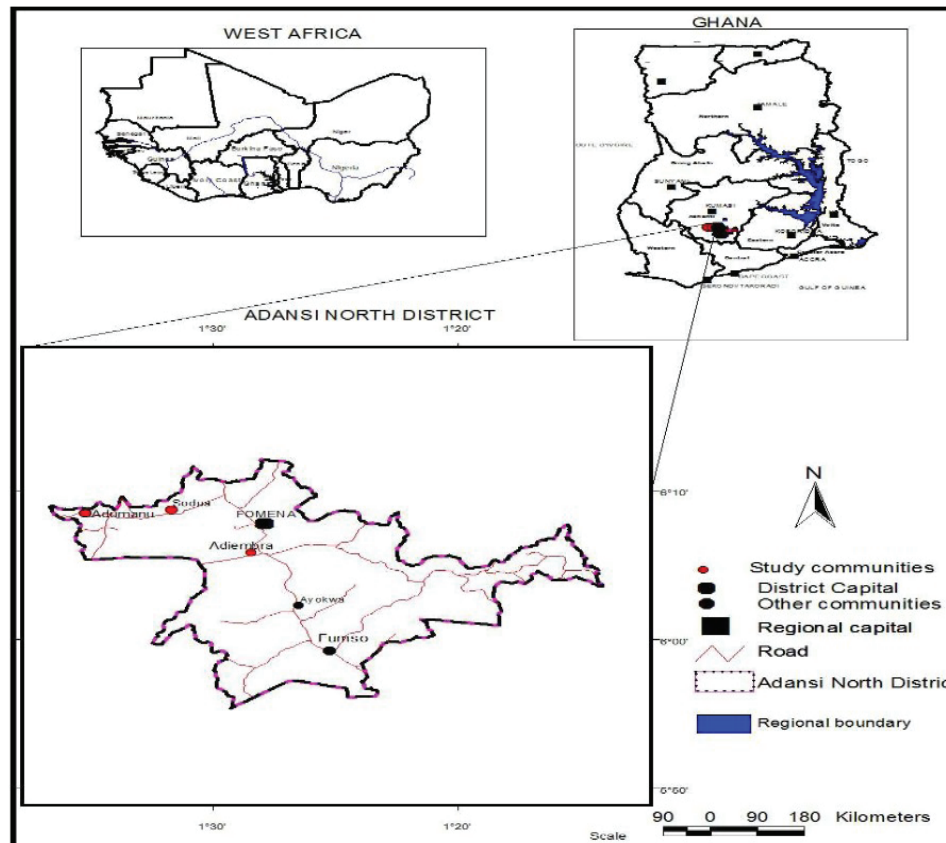


Figure 1: Map of Adansi North District

3.2. Study population and design

The study population comprised smallholder farmers residing in the Adansi North District of Ghana, a location that has in recent years experienced recurrent droughts and rainfall variability. The district was selected because agriculture remains the main source of livelihood for its population, and the effects of drought have been widely reported to undermine both productivity and household food security. Given the exploratory nature of the research questions, which sought to understand farmers' perceptions of Climate Resilience Messages (CRMs), a qualitative research design was adopted. Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) were used to generate rich, detailed insights into farmers' experiences, perceptions, and attitudes towards CRMs. This design was considered

most appropriate since it allows for the exploration of meanings and lived experiences that cannot easily be captured through quantitative surveys.

3.3. Sampling procedure

Due to the dispersed nature of farming households in Adansi North and the fact that not all farmers have directly experienced drought or exposure to CRMs, it was not feasible to access the entire population. Instead, the study employed purposive and snowball sampling techniques to identify participants. Purposive sampling ensured that only individuals with relevant experience, such as smallholder farmers who had lived in the district for at least five years and who had encountered drought impacts, were included. Additional selection criteria considered farmers' involvement in decision-

making within their households, as well as variation in gender, age, and crop types cultivated. This was intended to capture a breadth of perspectives while ensuring that participants possessed adequate knowledge of the subject matter. To complement purposive selection, snowball sampling was used to reach farmers who might otherwise be difficult to locate due to their dispersed settlements. Three independent community “seeds” were used to begin referral chains, thereby reducing the risk of homogeneity that can arise when snowballing relies on a single network. This integrated approach was adopted to improve both the precision of the sample and the richness of the data collected.

A total of three FGDs were organised with 15 farmers in all, alongside 20 key informant interviews conducted with extension officers, community leaders, and household heads. They were selected from three communities within the District: Apomposo, Bura, and Aboabo. Each FGD comprised five participants to ensure manageable group sizes that allowed for deeper discussion and more balanced participation. Although the numerical size of the sample appears small, the qualitative research was guided by the principle of information power rather than statistical representativeness. Farmers recruited for this study had rich experiential knowledge of drought impacts and interactions with CRMs, which ensured that each participant contributed high-value insights. Data saturation was closely monitored during the analysis. It was reached after the third focus group discussions and final set of key informant interviews (KIs), when no new information appeared in the transcripts. This demonstrates that the sample size was adequate to achieve the study’s objectives.

3.4. Data collection procedures

Data were collected within the month of June 2025. The research team first consulted with district agricultural officers and local leaders to introduce the study and gain access to participants. Informed consent was obtained from all participants prior to data collection, with assurances of confidentiality, anonymity, and voluntary participation.

FGDs lasted not more than 45 minutes, while KIs lasted not more than 60 minutes. All sessions were conducted in the local language (Twi), recorded with permission, and supported with note-taking. The FGD guide was semi-structured and explored themes including farmers’ experiences

with drought, sources of climate information, perceptions of the credibility and usefulness of CRMs, and barriers to adoption. The KI guide was tailored for key informants, with emphasis on their role in communication processes and their perceptions of how farmers receive and use CRMs. Both instruments were piloted in a nearby community outside the study area, after which minor refinements were made to ensure clarity and cultural appropriateness.

3.5. Data analysis

Audio recordings were transcribed verbatim in the local language before being translated into English by the research team members. To ensure accuracy, a random selection of transcripts was back-translated into the original language and compared against the recordings. All transcripts were anonymised and assigned unique codes to protect participant identity. The transcripts, field notes, and reflective memos were organised manually for systematic analysis and secure storage.

Thematic analysis was employed to identify and interpret recurring patterns within the data. The analytic process followed Braun and Clarke’s six-step framework. First, two researchers independently read and re-read the transcripts to become familiar with the data. Second, initial codes were generated both inductively from the data and deductively based on the research objectives (e.g., codes such as “trust in source,” “usability,” and “message clarity”). Third, codes were collated into broader categories to form candidate themes. Fourth, themes were reviewed and refined to ensure they accurately represented the data and were supported by sufficient evidence. Fifth, themes were defined and labelled with clear boundaries. Finally, analytic narratives were developed to connect the themes to the study objectives and the broader literature on climate communication.

Inter-coder reliability was tested by having two coders independently code 20% of the transcripts. Cohen’s Kappa values indicated acceptable agreement (≥ 0.70). Any discrepancies were resolved through discussion and consensus, which led to the refinement of the codebook. Triangulation across FGDs, KIs, and field notes enhanced the robustness of the findings. Data was analysed with the assistance of Allyze (a qualitative data analysis software).

Table 1: Farmers' perceptions of Climate Resilience Messages (CRMs): Key Themes, Sub-Themes, Illustrative Quotes, and Literature Link

Theme	Farmer Perception / Finding	Linked PMT Construct	Interpretation	Representative Quote
The Crisis of Authority: Trust and Mistrust in Forecasting Systems	Forecasts were inconsistent, often failing to materialise, leading to frustration and mistrust.	Threat Appraisal (Severity & Vulnerability)	Inaccurate forecasts reduce farmers' perception of drought severity and vulnerability, weakening their motivation to act.	<i>"In fact, I consider the climate resilience message sources I receive not trustworthy. They sometimes predict a higher precipitation rate, but it would never come to pass, and report different figures in the evening."</i>
Traditional Wisdom vs. Modern Channels: Competing Sources of Authority	Farmers prefer traditional leaders' predictions over modern channels (radio, social media, TV).	Coping Appraisal (Response Efficacy)	Trust in indigenous knowledge increases perceived effectiveness of advice, while mistrust in institutional forecasts reduces adoption of CRM.	<i>"Personally, whilst I think that relying on these messages from social media handles is okay, I think these modern channels are not the best as compared to our traditional leaders. These leaders have never failed in their predictions."</i>
The Practicality Paradox: When Climate Information Becomes Too Technical	Messages are overly technical (e.g., "precipitation rate") and disconnected from farmers' realities.	Self-Efficacy	Farmers feel unable to act on technical advice, reducing confidence in their capacity to apply resilience measures.	<i>"If the message presents a precipitation rate of 40 inches, I would find it difficult to understand what that really means. I mostly ask my child, who is educated, to translate that for me."</i>
Fragile Expertise: The Knowledge Gap in Extension Services	Extension officers are seen as insufficiently knowledgeable on drought issues.	Response Efficacy & Self-Efficacy	Lack of credible intermediaries lowers confidence in both the advice and farmers' ability to implement it effectively.	<i>"I do not perceive agric extension officers to be that well-informed to give us reliable messages on drought resilience. It requires someone with greater expertise."</i>
Reliability in Question: Inconsistency Across CRM Sources	Farmers find CRMs inconsistent and inaccurate; they prefer indigenous signs as more reliable.	Response Costs	Acting on unreliable information risks wasting labour, inputs, and time, making farmers less likely to adopt adaptive practices.	<i>"The indigenous means of receiving climate resilience messages are invariably accurate... our great fathers never knew modern sources, yet they harvested greater crops."</i>
The Comprehension Gap: When Technical Language Alienates Farmers	Farmers with limited education struggle to understand CRMs and depend on relatives for translation.	Self-Efficacy	Low confidence in understanding technical content reduces motivation to follow recommendations.	<i>"I sometimes struggle to understand what information the message is trying to send across... I would find it difficult to understand what that really means."</i>
Lost in Translation: Usability Barriers and the Risk of Exclusion	Reliance on educated family members to interpret CRMs creates dependency.	Response Costs	Extra effort and reliance on others increase perceived costs, discouraging engagement with CRMs.	<i>"The technique I mostly adopt is to ask my child, who is educated, to translate that for me, who might not always be available."</i>
The Tyranny of Timing: When Forecasts Arrive Too Late	CRMs often arrive during or after drought events, reducing their usefulness for planning.	Response Efficacy	Messages perceived as ineffective when untimely, leading farmers to ignore them in decision-making.	<i>"The message mostly comes after or exactly when the drought is already in place, making it difficult to decide."</i>
Form vs. Function: The Disconnect in Message Presentation	Messages delivered in clumsy formats (radio/verbally) without practical demonstrations.	Response Efficacy & Self-Efficacy	Poor formats limit farmers' ability to understand and apply advice, undermining both confidence and belief in CRM effectiveness.	<i>"I'm not happy with the manner in which the message is sent at all. The message is presented in a clumsy manner, and I mostly do not even know what was actually presented."</i>

Source: Authors' Construct, 2025

Table 1 presents the thematic analysis of farmers' perceptions of climate resilience messages (CRMs). The themes capture both the trust dimension, where issues of authority, inconsistency, and knowledge gaps undermine confidence in formal CRM sources, and the usability dimension, where technical language, poor timing, and inadequate formats restrict farmers' ability to act on the information provided. Each theme is linked to the key constructs of the Protection Motivation Theory (PMT), highlighting how perceptions of severity, vulnerability, response efficacy, self-efficacy, and response costs shape farmers' engagement with CRMs. Representative quotes from farmers are included to illustrate how these perceptions manifest in practice, ensuring that the analytical categories remain grounded in lived experiences.

4. Results and discussion

4.1. Farmers' perception of CRM sources and trustworthiness

Table 2: Farmers' perception of CRM sources and trustworthiness

Theme	Frequency	Percent (%)
The Crisis of Authority: Trust and Mistrust in Forecasting Systems	22	62.9
Traditional Wisdom vs. Modern Channels: Competing Sources of Authority	20	57.1
The Practicality Paradox: When Climate Information Becomes Too Technical	16	45.7
Fragile Expertise: The Knowledge Gap in Extension Services	18	51.4
Reliability in Question: Inconsistency Across CRM Sources	23	65.7

Source: Field Data, 2025

Table 2 presents the descriptive results on farmers' perceptions of climate resilience message (CRM) sources and their trustworthiness. The findings are based on responses from 35 participants across focus group discussions and key informant interviews. The results show that mistrust in forecasting systems (62.9%) and inconsistency across CRM sources (62.9%) were the most frequently expressed concerns. Farmers also highlighted the preference for traditional leaders (54.3%) over modern channels, reflecting the perceived authority and contextual relevance of indigenous knowledge. In addition, a significant

proportion of participants (51.4%) raised concerns about the limited knowledge and credibility of agricultural extension officers. Meanwhile, 40% of farmers pointed out the technicality of CRM packaging, which made the messages difficult to interpret.

1. The Crisis of Authority: Trust and Mistrust in Forecasting Systems

The discussions on perception of CRM sources and trustworthiness revealed the lack of trust in the information received by farmers. This is because most of the farmers mentioned that they do not believe the source of the climate resilience messages they receive for their farming decisions. They noted that predicted rainfall patterns often failed to materialise or were contradicted by later updates. Such inconsistencies created frustration, particularly for those who relied on forecasts to plan daily farming activities. The erosion of trust appears strongly linked to past experiences with failed drought forecasts, which tend to diminish confidence in subsequent messages. This observation is consistent with findings by Adebo and Anang (2024), who demonstrated that farmers' adoption of climate adaptation strategies is shaped by prior drought experiences and contextual location effects. One of the farmers had this to say: *"In fact, I consider the climate resilience message sources I receive not trustworthy. They sometimes predict a higher precipitation rate, but it would never come to pass, and they report different figures in the evening. This can be very worrying in most cases because I plan my farming activities after I check in the morning"*. Farmers' doubts about CRM sources, shaped by failed or contradictory forecasts, reflect a breakdown in threat appraisal under Protection Motivation Theory (PMT). When forecasts are inaccurate, the *perceived severity* of drought risks is blurred, and farmers' *perceived vulnerability* weakens, reducing their motivation to adopt protective measures (Rogers, 1975; Rogers, 1983).

2. Traditional Wisdom vs. Modern Channels: Competing Sources of Authority

After ascertaining the perceptions of farmers on the trust in the source, we sought to inquire about whether farmers prefer to receive the

message from local leaders rather than from modern channels like television, radio, social media apps, etc. It became evident from the discussion that local farmers prefer to receive CRM from traditional leaders. Another farmer confirmed this by stating that: *“Personally, whilst I think that relying on these messages from social media handles is okay, I think these modern channels are not the best as compared to our traditional leaders. These leaders have got the necessary experience in studying the terrain and predicting whether there may be a drought or not, and truth be told, they have never failed in their predictions”*. This suggests that farmers prefer to receive the CRM from traditional sources rather than modern ones. This could be attributed to a disconnect between CRM sources and local realities. Climate resilience messages are usually produced at the regional level, which are less tailored to local farming systems. The finding is similar to Zongho et al. (2023), who concluded that the indigenous peoples’ perceptions of climate change were based on signs like an increase in temperature, heatwaves, prolonged drought spells, and reductions in rainfall. The preference for traditional leaders over modern media channels illustrates the central role of source credibility in influencing response efficacy within PMT. Farmers perceive traditional knowledge systems as more effective in managing risk than institutional forecasts. According to PMT, if people doubt the efficacy of the recommended action or its source, their protective motivation declines (Conner & Norman, 2015).

3. The Practicality Paradox: When Climate Information Becomes Too Technical

Another important theme relates to how CRM is packaged and communicated. Farmers described the format of messages as overly technical, clumsy, or difficult to interpret, particularly for those with limited formal education. Technical terms like “precipitation rate” were seen as confusing and disconnected from practical farming contexts. Some farmers indicated that they relied on younger, educated relatives to interpret the content for them, which created dependency and further highlighted accessibility barriers. Others argued that the

format appeared to have been designed without sufficient consideration of farmers’ needs. The lack of farmer-centred packaging undermined not only comprehension but also the perception that CRM was tailored to their realities (Calvel et al., 2020). Farmers, therefore, suggested that messages should be simplified, contextualised, and communicated through more practical, farmer-friendly formats, such as local language radio broadcasts or demonstrations. Overly technical CRMs reduce self-efficacy under PMT, as farmers lack confidence in their ability to interpret or act on complex information. Unless individuals feel capable of performing the recommended behaviour, they are unlikely to adopt it, even if they accept the risk.

4. Fragile Expertise: The Knowledge Gap in Extension Services

The study sought to explore whether present extension officers who proffer climate resilience messages are deemed knowledgeable and reliable. It seems that farmers consider the extension officers to be knowledgeable enough. This is the response from one of the farmers: *“I do not perceive agricultural extension officers to be that well-informed to give us reliable messages on drought resilience. This is because predicting drought situations can be tricky, especially during rainy seasons. It therefore requires experience and someone with greater expertise to offer a reliable climate message rather than agricultural extension officers”*. This means that farmers perceive agricultural extension officers to be less knowledgeable and unreliable in terms of climate resilience messages. This result could be a result of limited training on climate resilience issues, whereby farmers notice a struggle in the interpretation of drought forecasts. Similarly, Sorgho et al. (2020) and Calvel et al. (2020) reported that informational/knowledge barriers to climate change adaptation create a sense of fear and helplessness in farmers’ ability to sustain their lifestyle and food insecurity. Farmers’ perception that extension officers lack sufficient knowledge undermines both response efficacy and self-efficacy, as described in PMT. If the messenger lacks credibility, farmers doubt the effectiveness of the advice (response efficacy) and their

own capacity to implement it (self-efficacy), leading to disengagement from resilience practices.

5. Reliability in Question: Inconsistency Across CRM Sources

We also sought to establish whether farmers in the Adansi North district receive reliable and quality climate resilience messages from the source they depend on. Most of the farmers agreed that CRM sources are utterly inconsistent and inaccurate. They explained that: *“The indigenous means of receiving climate resilience messages are inarguably accurate and consistent when relied upon to guide our farming practices. This has been the way to predict drought over the years and has worked for our great fathers. They never knew any modern source of receiving climate resilient messages, but I can say for a fact that they thrived in farming and harvested greater crops”*. It means that the prevailing CRM sources relied upon by the farmers are not consistent and accurate. The unreliability and inaccuracy of the CRM sources could be attributed to data gaps and infrastructure challenges. This is because in Ghana, several districts are known to have sparse weather station coverage and weak data stream systems. Hence, forecasts that rely on outdated or incomplete data sets could be misleading, resulting in inaccuracy (Andries et al., 2023). The inconsistency of forecasts increases response costs in PMT terms. Farmers perceive that acting on unreliable information risks wasted labour, time, or inputs. Since PMT posits that high response costs diminish protective behaviour, inconsistent forecasts discourage farmers from adopting adaptive measures.

4.2. Farmers’ perception of Climate Resilience Messages usability

Table 3: Farmers’ perception of Climate Resilience Messages usability

Theme	Frequency	Percent (%)
The Comprehension Gap: When Technical Language Alienates Farmers	21	60.0
Lost in Translation: Usability Barriers and the Risk of Exclusion	17	48.6

The Tyranny of Timing: When Forecasts Arrive Too Late	24	68.6
Form vs. Function: The Disconnect in Message Presentation	19	54.3

Source: Field Data, 2025

Table 3 presents the descriptive findings on farmers’ perceptions of CRM usability. The data demonstrate that timeliness was the most critical usability challenge, with 68.6% of participants reporting that forecasts often arrived too late to inform farming decisions. This highlights a major structural weakness in the alignment of CRM with agricultural decision-making cycles. Equally important were concerns about technical language, raised by 54.3% of farmers, which limited comprehension and reduced self-efficacy in applying the information. A further 48.6% of participants pointed to the high response costs associated with depending on others to interpret CRM, while 42.9% criticised the presentation formats as impractical or ill-suited to their needs. These results confirm that even when CRMs are available, their usability is undermined by barriers of timing, complexity, and inappropriate delivery formats, reducing their effectiveness in guiding adaptive action.

1. The Comprehension Gap: When Technical Language Alienates Farmers

One key characteristic of a CRM for farmers is that it has to be easy to understand. The implication is that these farmers are mostly found in rural settings and are not adequately familiar with the way in which the message is presented (Gonzalez, 2024). The analysis revealed that climate resilience messages on drought occurrence are usually difficult to understand. One farmer insisted that: *“I sometimes struggle to understand what information the message is trying to send across. For instance, if the message presents a precipitation rate of 40 inches, I would find it difficult to understand what that really means. The technique I mostly adopt is to ask my child, who is educated, to translate that for me, who might not always be available”*. The conclusion is that farmers find it difficult to understand climate resilience messages. The reason is that CRM often uses technical language to convey climate messages (Gonzalez, 2024; Graves & Kuleshov, 2020). Hence, farmers with limited formal education may find such terms

as confusing and relatively abstract (Evans et al., 2011). The result mirrors the work of Tung et al. (2024), who assessed the difficulties in communicating about climate change in rural areas and found that different kinds of practical knowledge about the environment were being passed around in different ways in the communities that were studied, and showed how these were important for the development of genuinely participatory and two-way communication strategies. Duarte et al. (2024) advocate for simplified tools with intuitive interfaces that can help farmers manage agricultural activities and understand climate information better. Complex climate terminology weakens self-efficacy in PMT. Farmers doubt their ability to apply abstract technical forecasts, reducing their willingness to act on them. PMT stresses that self-efficacy is central: without confidence in their ability to act, individuals disengage even when they accept the threat (Rogers, 1975; Conner & Norman, 2015).

2. **Lost in Translation: Usability Barriers and the Risk of Exclusion**

A recurring theme that emerged from the discussions was the difficulty farmers faced in comprehending climate resilience messages (CRM) on drought. Many participants explained that the terminology and structure of the information were often too technical, leaving them unsure how to translate the forecasts into actionable strategies. For instance, when rainfall was described in precise measurements, such as “40 inches of precipitation,” farmers with limited formal education struggled to relate this figure to their daily farming practices. In such cases, they depended on more educated family members for interpretation; an arrangement that was neither reliable nor sustainable. This suggests that while the messages were available, their usability was severely constrained by linguistic and technical barriers. As Tung et al. (2024) observed, effective communication in rural communities requires sensitivity to local knowledge systems and social structures; otherwise, even well-intentioned messages risk alienating their intended audiences. The need to depend on educated relatives to interpret CRMs raises response costs in PMT. Extra effort and dependency discourage

adoption, as PMT predicts that protective behaviours are less likely when they demand high cost, time, or resources (Rogers, 1983).

3. **The Tyranny of Timing: When Forecasts Arrive Too Late**

Beyond the language used, the timeliness of CRM was another major concern. Farmers consistently argued that the forecasts and drought warnings often arrived after climatic events were already unfolding. This mismatch between message delivery and the agricultural calendar reduced the practical value of the information. For example, adaptation strategies such as shifting planting dates, selecting drought-tolerant varieties, or planning irrigation require advance notice. Yet, farmers emphasised that messages tended to come “after or exactly when the drought is already in place,” leaving them with few viable options. The frustration expressed here underscores a structural weakness in climate communication: forecasts, however accurate, lose relevance if they are not aligned with farmers’ decision-making cycles. This observation supports Goraldo et al. (2023), who argue that the timing of information is as critical as its accuracy in determining its usefulness for climate adaptation. Delays can lead to missed opportunities for adaptation (Ebhuoma, 2022). Many farmers perceive seasonal forecasts as unreliable, which can lead to underutilization, especially when forecasts are not provided in advance of decision-making periods (Kondal et al., 2024). Tailoring the timing and content of drought warnings to align with agricultural practices enhances the relevance and uptake of information (Calvel et al., 2020). Delayed forecasts erode response efficacy in PMT. If information comes after drought has already set in, farmers view it as ineffective in reducing risk. PMT highlights that people act only when they believe recommended behaviours can meaningfully mitigate the threat before it materializes (Conner & Norman, 2015; Rogers, 1975).

4. **Form vs. Function: The Disconnect in Message Presentation**

Equally significant were concerns about the format in which messages were delivered. Farmers described the presentation of CRM

as “clumsy” and ill-suited to their needs, with many admitting they could not grasp the intended meaning. The dissatisfaction here was not merely about clarity but about a deeper disconnect between message designers and end-users. Farmers felt that if their realities were adequately considered, the messages would be tailored in ways that were both practical and accessible—for instance, through demonstrations, visuals, or context-specific examples. Current formats, often dependent on radio or verbal announcements, were seen as inadequate for conveying complex adaptation strategies. This perception resonates with the findings of Kihara and Nabushawo (2024), who emphasise that climate communication often fails because designers make assumptions about farmers’ knowledge and capacities rather than engaging directly with them. Poorly adapted formats undermine both response efficacy and self-efficacy in PMT. Farmers perceive that the advice is neither usable nor suited to their needs, reducing confidence in both the effectiveness of the recommendations and their ability to apply them (Rogers, 1983; Conner & Norman, 2015; Rogers, 1975).

5. Conclusion

The study explored farmers’ perceptions of climate resilience messages (CRMs) in Adansi North District, with a particular focus on the trustworthiness of message sources and the usability of the information provided. The findings reveal several critical insights: Farmers expressed deep skepticism towards modern forecasting systems, primarily due to inconsistencies and failed predictions. This mistrust has weakened farmers’ confidence in using CRMs for decision-making and reduced their motivation to adopt recommended resilience measures. Traditional leaders and indigenous methods remain the most credible and trusted sources of climate information. Farmers perceive these systems as more reliable and context-specific compared to modern institutional forecasts, which are often seen as detached from local realities. The overly technical presentation of CRMs alienates many farmers, especially those with

limited formal education. Difficult terminology and abstract measurements reduce comprehension and create dependence on others for interpretation, undermining self-efficacy and discouraging independent action. Agricultural extension officers are not viewed as sufficiently knowledgeable in delivering CRMs. This knowledge gap reduces farmers’ trust in extension services and weakens the credibility of institutional communication channels. Farmers frequently encounter conflicting information across different sources, which increases response costs and discourages reliance on CRMs. Poor data infrastructure, including limited weather station coverage, contributes to this inconsistency. Even when CRMs are available, their usability is constrained by four key issues: technical language, reliance on educated intermediaries, late delivery of forecasts, and poorly adapted formats. These weaknesses collectively reduce the effectiveness of CRMs in supporting timely and informed agricultural decisions. Delayed forecasts were identified as the most significant barrier. Farmers repeatedly emphasised that CRMs often arrive too late to guide meaningful adaptation strategies, diminishing their practical value.

Government and meteorological agencies should strengthen the infrastructure for climate data collection by expanding the network of weather stations in rural districts. CRMs should be packaged in farmer-friendly formats, using simple language, local dialects, and visual aids (e.g., charts, pictograms, or community demonstrations). Forecasts and drought warnings should be disseminated well in advance of planting and critical farming decisions. Development agencies and government bodies should integrate indigenous knowledge with scientific forecasts to enhance credibility and local relevance. Training programmes should be developed to improve extension officers’ expertise in climate resilience and forecast interpretation. Farmers should be actively involved in the design, testing, and evaluation of climate communication tools. CRMs should be shared through a mix of communication platforms: radio, mobile phones, community meetings, and extension visits to increase accessibility. Climate services should be tailored to minimise costs associated with understanding and applying the information.

References:

- Adebo, J., & Anang, B. T. (2024). Perceptions and adaptation strategies of smallholder farmers to climate change in Builsa South district of Ghana. *Cogent Social Sciences*, 10(1). <https://doi.org/10.1080/23311886.2024.2358151>
- Allart, L., Joly, F., Oostvogels, V., Mosnier, C., Gross, N., Ripoll-Bosch, R., & Dumont, B. (2024). Farmers' perceptions of permanent grasslands and their intentions to adapt to climate change influence their resilience strategy. *Renewable Agriculture and Food Systems*, 39, e33. <https://doi.org/10.1017/S1742170524000279>
- Andries, A., Morse, S., Murphy, R. J., & Woolliams, E. R. (2023). Examining Adaptation and Resilience Frameworks: Data Quality's Role in Supporting Climate Efforts. *Sustainability*, 15(18), 13641. <https://doi.org/10.3390/su151813641>
- Calvel, A., Werner, M., van den Homberg, M., Cabrera Flamini, A., Streefkerk, I., Mittal, N., Whitfield, S., Langton Vanya, C., & Boyce, C. (2020). Communication Structures and Decision Making Cues and Criteria to Support Effective Drought Warning in Central Malawi. *Frontiers in Climate*, 2. <https://doi.org/10.3389/fclim.2020.578327>
- Duarte, M. C., Araújo, T. P. M. de, & Souza, B. R. de. (2024). DESENVOLVIMENTO DE UM APLICATIVO MOVÉL PARA APOIO À GESTÃO DE GRANDES CULTURAS POR PRODUTORES RURAIS NÃO ALFABETIZADOS: SOLUÇÕES TECNOLÓGICAS SIMPLES E EFICAZES. *Revista Ft*, 29(141), 12–13. <https://doi.org/10.69849/revistaft/ni10202412031412>
- Ebhuoma, E. E. (2022). Factors Undermining the Use of Seasonal Climate Forecasts Among Farmers in South Africa and Zimbabwe: Implications for the 1st and 2nd Sustainable Development Goals. *Frontiers in Sustainable Food Systems*, 6. <https://doi.org/10.3389/fsufs.2022.761195>
- Evans, C., Storer, C., & Wardell-Johnson, A. (2011). Rural Farming Community Climate Change Acceptance: Impact of Science and Government Credibility. *International Journal of Sociology of Agriculture and Food*, 18(3).
- Ghana. (2012). 2010 Population and Housing Census: Summary report of final results. Accra: Ghana Statistical Service.
- Giraldo, D., Clarkson, G., Dorward, P., Obando, D., & Ramirez-Villegas, J. (2023). The development of a farmer decision-making mind map to inform climate services in Central America. *Frontiers in Climate*, 5. <https://doi.org/10.3389/fclim.2023.1235601>
- Graves, T., & Kuleshov, Y. (2025). Enhancing the communication of an early warning system for drought in the Murray-Darling Basin, Australia. *Natural Hazards*, 121(2), 1599–1619. <https://doi.org/10.1007/s11069-024-06796-7>
- Kihara, S. M., & Nabushawo, J. (2024). COMMUNICATING CLIMATE CHANGE ADAPTATION: A STUDY OF MESSAGES TARGETING SMALLHOLDER FARMERS IN MACHAKOS COUNTY, KENYA. *African Journal of Emerging Issues*, 6, 22–33. <https://ajoeijournal.org/sys/index.php/ajoei/article/view/626>
- Kom, Z., Nethengwe, N. S., Mpandeli, S., & Chikoore, H. (2023). Indigenous knowledge indicators employed by farmers for adaptation to climate change in rural South Africa. *Journal of Environmental Planning and Management*, 66(13), 2778–2793. <https://doi.org/10.1080/09640568.2022.2086854>
- Kondal, A., Hegewisch, K., Liu, M., Abatzoglou, J. T., Adam, J. C., Nijssen, B., & Rajagopalan, K. (2024). Seasonal forecasts have sufficient skill to inform some agricultural decisions. *Environmental Research Letters*, 19(12), 124049. <https://doi.org/10.1088/1748-9326/ad8bde>
- Malik, I. H., & Ford, J. D. (2025). Monitoring climate change vulnerability in the Himalayas. *Ambio*, 54(1), 1–19. <https://doi.org/10.1007/s13280-024-02066-9>

- Plazas Gonzalez, J. (2024). Sensibilización de la Crisis Climática a Productores Rurales en el Departamento de Sucre, Colombia. *Ciencia Latina Revista Científica Multidisciplinar*, 8(2), 5423–5445. https://doi.org/10.37811/cl_rcm.v8i2.10953
- Ricart, S., Castelletti, A., & Gandolfi, C. (2022). On farmers' perceptions of climate change and its nexus with climate data and adaptive capacity. A comprehensive review. *Environmental Research Letters*, 17(8), 083002. <https://doi.org/10.1088/1748-9326/ac810f>
- Sorgho, R., Mank, I., Kagoné, M., Souares, A., Danquah, I., & Sauerborn, R. (2020). "We Will Always Ask Ourselves the Question of How to Feed the Family": Subsistence Farmers' Perceptions on Adaptation to Climate Change in Burkina Faso. *International Journal of Environmental Research and Public Health*, 17(19), 7200. <https://doi.org/10.3390/ijerph17197200>
- Sutcliffe, C., Holman, I., Goodwin, D., Salmoral, G., Pardthaisong, L., Visessri, S., Ekkawatpanit, C., & Rey, D. (2024). Which factors determine adaptation to drought amongst farmers in Northern Thailand? Investigating farmers' appraisals of risk and adaptation and their exposure to drought information communications as determinants of their adaptive responses. *Mitigation and Adaptation Strategies for Global Change*, 29(1), 6. <https://doi.org/10.1007/s11027-023-10099-w>
- Tahernejad, A., Sohrabizadeh, S., & Mashhadi, A. (2024). Exploring factors affecting psychological resilience of farmers living in drought-affected regions in Iran: a qualitative study. *Frontiers in Psychology*, 15. <https://doi.org/10.3389/fpsyg.2024.1418361>
- Tung, T. M., Lan, D. H., & Tan, T. Le. (2024). Bridging The Gap: Effective Communication Strategies for Climate Change Adaptation in Rural Communities. *Pakistan Journal of Life and Social Sciences (PJLSS)*, 22(2). <https://doi.org/10.57239/PJLSS-2024-22.2.0073>