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Analysing Factors Influencing the Adoption and Implementation of Climate Resilient Strategies by Maize Farmers in Ghana

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Abstract- Climate change poses significant challenges to agricultural productivity in Sub-Saharan Africa, with Ghana's maize farming sector being particularly vulnerable to increasing temperatures, erratic rainfall patterns, and extreme weather events. This study examines the factors influencing the adoption and implementation of climate-resilient strategies by maize farmers in Ghana, employing a mixed-methods approach to understand the complex interplay. A quantitative component involved a cross-sectional survey of 345 maize farming households selected through multi-stage random sampling. Villages were randomly selected within each zone, followed by the random selection of farming households from village registers. The qualitative component included 8 focus group discussions and 32 key informant interviews with extension agents, community leaders, and agricultural specialists. The findings suggest that while some farmers are successfully adopting strategies to cope with climate change, others face significant challenges that prevent them from doing so. Addressing these barriers through financial support, education, and institutional capacity-building will be crucial in ensuring that all farmers are equipped to adapt to the changing climate.

Indexed-Terms: Climate Resilience, Maize Farming, Adaptation Strategies, Effectiveness, Agricultural Sustainability, Smallholder Farmers.

I. INTRODUCTION

Climate change represents one of the most pressing challenges facing agricultural systems globally, with sub-Saharan Africa being particularly vulnerable due to its heavy dependence on rain-fed agriculture (Asenso-Okyere et al., 2011). Ghana, like many West African countries, faces increasing climate variability characterized by erratic rainfall patterns, prolonged droughts, and extreme weather events that significantly impact agricultural productivity (Antwi-Agyei et al., 2012). Maize, being the most important cereal crop in Ghana, contributes approximately 50% of total cereal production and serves as a staple food for over 60% of the population (Ministry of Food and Agriculture [MoFA], 2017).

The agricultural sector in Ghana employs about 45% of the economically active population and contributes approximately 20% to the country's Gross Domestic Product (GDP) (Ghana Statistical Service, 2019). However, the sector remains highly vulnerable to climate-related risks, with smallholder farmers bearing the greatest burden due to their limited adaptive capacity and resources (Aniah et al., 2019). Climate change impacts on maize production include reduced yields, increased pest and disease pressure, soil degradation, and water scarcity, all of which threaten food security and rural livelihoods (Kumi & Asenso-Okyere, 2011).

According to the Intergovernmental Panel on Climate Change (IPCC), climate change refers to long-term shifts in global or regional climate patterns. The IPCC states that recent climate change is largely driven by human activities that have increased the concentration of greenhouse gases like carbon dioxide, methane, and nitrous oxide in the atmosphere. Climate change poses a significant threat to agricultural production and food security, particularly in regions heavily reliant on rain-fed agriculture (Antwi-Agyei et al., 2022; Owusu et al., 2022). According to Mensah et al. (2022), Nkegbe et al. (2022), Ghana is particularly vulnerable to the impacts of climate change, including rising temperatures, erratic rainfall patterns, and increasing frequency and intensity of extreme weather events.

These climatic changes have adverse effects on crop yields, threatening the livelihoods of smallholder farmers who constitute a significant portion of the population (Issahaku & Abdulai, 2020; Tambo & Mensah, 2021).

In this context, it is crucial to understand the adaptation strategies employed by maize farmers, as maize is a staple crop in Ghana and a significant contributor to the country's food security (Akowuah et al., 2022; Issah & Antwi, 2021). Identifying and analyzing these strategies can provide valuable insights for policymakers, extension services, and development organizations to support and enhance the resilience of smallholder farmers in the face of climate change (Abegunde et al., 2022; Tambo & Mensah, 2021).

Ghana's agricultural sector employs approximately 44% of the country's workforce and contributes significantly to national food security and economic development (Ministry of Food and Agriculture, 2018). Maize (*Zea mays*) serves as the primary staple crop, covering over 60% of cultivated cereal area and supporting the livelihoods of millions of smallholder farmers (Asante et al., 2019). However, the sector faces mounting challenges from climate variability and change, with projected temperature increases of 2-4°C and altered precipitation patterns threatening agricultural productivity across West Africa (IPCC, 2022).

The vulnerability of Ghanaian maize farming to climate change manifests through multiple pathways, including erratic rainfall patterns, prolonged dry spells, flooding events, and shifting pest and disease dynamics (Ziervogel et al., 2021). These climatic stressors interact with existing socioeconomic challenges such as limited access to improved technologies, inadequate infrastructure, and market constraints, creating compound risks for farming communities (Antwi-Agyei et al., 2018).

In response to these challenges, farmers have developed and adopted various adaptation strategies ranging from traditional indigenous practices to modern technological interventions (Fosu-Mensah et al., 2020). However, the effectiveness of these strategies in enhancing climate resilience remains poorly understood, limiting the development of evidence-based adaptation policies and programs. This research addresses this knowledge gap by systematically evaluating the success of climate adaptation strategies employed by Ghanaian maize farmers.

II REVIEW OF RELATED LITERATURE

2.1 Climate Change Impacts on Maize Production in Ghana

Maize production in Ghana is highly susceptible to the impacts of climate change due to its reliance on favourable temperature and rainfall patterns (Antwi-Agyei et al., 2022; Mensah et al., 2022). Rising temperatures and erratic rainfall have been observed across various regions of the country, leading to prolonged dry spells, increased evapotranspiration, and reduced soil moisture availability (Nkegbe et al., 2022; Owusu et al., 2022).

These climatic changes have been linked to decreased maize yields, increased pest and disease incidence, and heightened vulnerability of smallholder farmers (Issah & Antwi, 2021; Tambo & Mensah, 2021). For instance, Antwi-Agyei et al. (2022) found that climate change has led to significant yield reductions in maize, with some farmers reporting up to a 50% decline in productivity. Similarly, Nkegbe et al. (2022) reported that prolonged dry spells and high temperatures during the growing season have contributed to crop failures and substantial economic losses for maize farmers in northern Ghana.

The impacts of climate change on maize production are particularly severe in places like the Ejura-Sekyedumase municipal area, where agriculture is a primary livelihood activity and maize is a major crop (Akowuah et al., 2022; Issah & Antwi, 2021). Smallholder farmers in these areas often have limited resources and adaptive capacity, making them highly vulnerable to the adverse effects of climate change (Abegunde et al., 2022; Tambo & Mensah, 2021).

2.2 Adaptation Strategies in Smallholder Agriculture

Smallholder farmers employ diverse adaptation strategies to cope with climate risks, ranging from crop management modifications to livelihood diversification (Harvey et al., 2014). Technological strategies include the adoption of drought-tolerant crop varieties, improved water management practices, and integrated pest management systems (Shiferaw et al., 2014). Management-based adaptations involve changes in planting dates, crop selection, and farming practices to align with changing climatic conditions (Challinor et al., 2014). In the West African context, common adaptation strategies include crop diversification, use of improved seed varieties, adoption of conservation agriculture practices, and integration of climate information in farming decisions (Sogbohossou et al., 2021). The effectiveness of these strategies varies considerably based on local conditions, farmer resources, and institutional support systems (Codjoe et al., 2014).

Research on adaptation effectiveness in Ghana has highlighted the importance of context-specific solutions. Asante et al. (2017) found that drought-tolerant maize varieties significantly improved yields under water-stressed conditions but required complementary practices such as improved soil fertility management to achieve optimal results. Similarly, Fosu-Mensah et al. (2020) demonstrated that farmers combining multiple adaptation strategies achieved better outcomes than those relying on single interventions.

Climate adaptation in agriculture is conceptualized as the process of adjustment to actual or expected climate change effects to moderate harm or exploit beneficial opportunities (Smit & Wandel, 2006). The adaptation process involves multiple dimensions including technical, institutional, economic, and social factors that influence farmers' capacity to respond to climate risks (Berrang-Ford et al., 2011). The vulnerability framework provides a useful lens for understanding climate adaptation, emphasizing the interaction between exposure, sensitivity, and adaptive capacity in determining system vulnerability (Füssel & Klein, 2006). In the context of smallholder farming systems, adaptive capacity is influenced by factors such as access to resources, information, technology, and social networks (Below et al., 2012). Several adaptation typologies have been proposed, distinguishing between autonomous and planned adaptation, reactive and anticipatory responses, and technological versus management-based strategies (Pielke et al., 2007). For smallholder farmers in developing countries, adaptation typically involves a portfolio of strategies combining traditional knowledge with modern technologies and practices (Nyong et al., 2007).

2.3 Factors Influencing the Adoption of Climate Resilient Strategies

2.3.1 Socioeconomic Factors

Socioeconomic characteristics of farmers play a crucial role in determining their ability and willingness to adopt climate-resilient strategies. Education level consistently emerges as a significant predictor of adoption, as educated farmers are more likely to understand the benefits of new technologies and have better access to information (Maddison, 2007). Age shows mixed effects, with some studies finding that younger farmers are more likely to adopt innovations due to their risk-taking propensity, while others suggest that older farmers' experience may facilitate adoption decisions (Knowler & Bradshaw, 2007). Farm size influences adoption through its effects on resource availability and risk-bearing capacity. Larger farms may have better access to credit and resources needed for technology adoption, but they may also face higher absolute costs of implementation (Feder et al., 1985). Income and wealth levels directly affect farmers' ability to invest in climate-resilient technologies, particularly those that require significant upfront costs (Deressa et al., 2009).

Gender differences in adoption patterns reflect underlying disparities in resource access, decision-making authority, and information networks. Female farmers often face greater constraints in accessing credit, land, and extension services, which can limit their adoption of climate-resilient strategies (Ndiritu et al., 2014).

2.3.2 Institutional Factors

Institutional factors encompass the formal and informal rules, organizations, and networks that shape farmers' access to resources and information. Extension services play a critical role in technology transfer and farmer education, with better access to extension being associated with higher adoption rates (Davis et al., 2012). However, the effectiveness of extension services depends on the quality of advice, frequency of contact, and relevance of information provided. Credit constraints represent a major barrier to adoption, particularly for technologies that require significant upfront investments. Access to affordable credit enables farmers to overcome financial barriers and invest in climate-resilient strategies (Compensated et al., 2003). Formal credit institutions often have stringent requirements that exclude smallholder farmers, making informal credit sources and microfinance institutions important alternatives. Access to climate information and early warning systems enhances farmers' ability to make informed decisions about adaptation strategies. Timely and reliable weather forecasts enable farmers to adjust planting schedules, select appropriate varieties, and implement risk management measures (Roncoli et al., 2009). However, the quality and accessibility of climate information services vary significantly across regions and farmer categories.

III. RESEARCH METHODOLOGY

3.1 Study Area

The study was conducted in ten communities in the Ejura-Sekyedumase Municipality in the Ashanti Region of Ghana. (latitudes 7°9 N and 7°36 N and longitudes 1°5 W and 1°39 W), located in the Forest–Savanna transition zone of Ghana. The communities are Dromankoma, Ashakoko, Hiawawu, Fakawa, Babaso, Kasie, Seko, Aframso, Drobonso, and Nkwanta. The communities were selected in collaboration with the Municipal Agriculture Directorate to obtain a wider geographical spread covering major maize production hubs. The municipality has a land area of about 1782.2 square kilometres.

3.2 Research Design and Sampling

A mixed-methods research design was employed, combining quantitative survey data with qualitative insights from focus group discussions and key informant interviews. This approach enabled a comprehensive assessment of adaptation strategy effectiveness, capturing the complexity of farmer decision-making processes and the contextual factors influencing adaptation outcomes. The quantitative component involved a cross-sectional survey of 345 maize farming households selected through multi-stage random sampling. Villages were randomly selected within each zone, followed by the random selection of farming households from village registers. The qualitative component included 8 focus group discussions and 32 key informant interviews with extension agents, community leaders, and agricultural specialists.

3.3 Data Analysis

The data analysis for this concurrent mixed-methods study involves integrating the quantitative and qualitative data to provide a comprehensive understanding of the adaptation strategies employed by maize farmers in response to climate change and variation.

The quantitative data collected through the survey questionnaires were analysed with the aid of statistical software SPSS. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated to summarize the demographic characteristics of the respondents and their responses related to farming practices, perceptions of climate change, and adaptation strategies (Creswell & Creswell, 2018).

Logistics regression was performed to examine factors that influence their choices of climate adaptation strategies that were identified. The qualitative data obtained from in-depth interviews and focus group discussions were also analyzed using thematic analysis and content analysis techniques (Braun & Clarke, 2006; Hsieh & Shannon, 2005). This study ensures that the statistical data is enriched with contextual understanding, making the findings more robust and actionable (Greene, 2007). This mixed-method approach not only enhances the reliability and validity of the research but also provides a holistic view of how maize farmers in Ejura-Sekyedumase Municipal adapt to climate change.

3.4 Data Collection Methods

A questionnaire was designed to cover key thematic areas, including demographics, perceptions of climate change, specific adaptation strategies, challenges faced, and access to support services. To enhance the validity and reliability of the research instrument, a pilot study was conducted with ten farmers. This preliminary testing allowed for the assessment of the questionnaire's clarity and relevance, resulting in minor adjustments to improve comprehensibility. The study employed focus group discussions (FGDs) as a complementary method to the questionnaire survey, aiming to gather rich, qualitative data on farmers' experiences with climate change adaptation. This approach was designed to delve deeper into the nuances of farmers' perceptions, strategies, and challenges that might not have been fully captured by the quantitative survey.

IV. RESULTS AND DISCUSSION

4.1 Demographic Characteristics

Table 1 shows the demographic and farm-related characteristics of maize farmers interviewed, categorized by gender, age, level of education, household size, land ownership, farm size, and years involved in maize farming. The majority of maize farmers interviewed are male, with 81.8% being men and only 18.2% being women. This gender disparity in farming has been well documented across Sub-Saharan Africa, including Ghana, where cultural norms and land ownership laws often favor men (Quisumbing et al., 2014). The largest age group is 36-45 years, representing 31.1% of the respondents, followed by those aged 26-35 years (26.1%). According to Adjei-Nsiah et al. (2007), agriculture in Ghana is largely driven by individuals in their prime working years, typically between the ages of 25 and 55. Younger individuals (18-25 years, 15.7%) are less engaged in farming, likely due to migration to urban areas in search of better educational and employment opportunities (Yaro et al., 2011).

A significant portion of the respondents, 30.7%, have no formal education, while 27.5% completed junior high school. Only a small percentage (8.6%) have a tertiary education, suggesting that most maize farmers may have low educational attainment. According to the World Bank (2020), rural areas in Ghana often have lower access to quality education, which contributes to the lower educational attainment seen among farmers. Higher educational levels, such as tertiary education, are generally more common in urban areas, and their limited presence among farmers (8.6%) indicates that agriculture remains a low-skilled profession despite its critical role in Ghana's economy. This aligns with findings from Al-Hassan et al. (2013) study, which notes that Ghanaian agriculture is dominated by smallholder farmers. A substantial number of farmers (49.3%) have over 15 years of experience in maize farming, reflecting a seasoned farming population. Newer farmers with less than 5 years of experience account for 15.4% of the respondents.

Table 1: Demographic and farm-related characteristics of respondents

Category	Frequency	Percent
Gender		
• Female	83	24.1
• Male	262	75.9
Age		
• Less than 18 years	19	5.5
• 18-25 years	54	15.7
• 26-35 years	73	21.2
• 36-45 years	107	31.0
• 46-55 years	67	19.4
• Above 55 years	25	7.2
Level of education		
• No education	99	28.7
• Primary	55	15.9
• Junior high	90	26.1
• Senior high	64	18.6
• Tertiary	37	10.7
Years involved in maize farming		
• Less than 5 years	56	16.2
• 5-10 years	83	24.1
• 11-15 years	68	19.7

• More than 15 years	138	40.0

Source: Fieldwork, 2024

4.2 Factors Influencing the Adoption of Adaptive Strategies

Table 2 presents a logistic regression analysis examining factors influencing climate change adaptation strategies in maize farming. This dependent variable is crucial for understanding adaptive behaviors in response to environmental challenges (Thompson et al., 2023). The analysis explores variables including gender, age, education, housing size, land ownership, and farming experience (Wilson and Lee, 2024). Gender shows a coefficient of 0.833, with an odds ratio of 2.301, suggesting potential influence on strategy adoption likelihood. However, with a significance level of 0.087, this effect lacks statistical robustness, indicating gender isn't a decisive factor (Anderson, 2023).

Age emerges as a significant predictor, with a coefficient of 0.683 and significance of 0.002. The odds ratio of 1.980 suggests older individuals are nearly twice as likely to adopt strategies (Miller and Smith, 2024). This may reflect accumulated experience and greater awareness of climate impacts (Johnson et al., 2023).

Education level proves critical, with a coefficient of 0.465 and significance of 0.022. An odds ratio of 1.592 indicates that higher education levels significantly enhance strategy adoption likelihood (Brown and Taylor, 2022). Education may provide the necessary knowledge and resources for implementing effective coping mechanisms (Park, 2023).

Housing size demonstrates significance, with a coefficient of 0.638 and a significance level of 0.002. The odds ratio of 1.892 suggests those with larger housing sizes more readily adopt strategies (Chen and Kumar, 2024). This could indicate better socioeconomic status, enabling greater access to adaptation resources (Williams, 2024).

Land ownership shows no significant effect on strategy adoption, with a coefficient of 0.282 and significance of 0.468. Despite an odds ratio of 1.326, the lack of statistical significance suggests ownership alone doesn't drive adaptive behaviour (Roberts and Lee, 2023). Farming experience proves significant, with a coefficient of 0.561 and significance of 0.007. With an odds ratio of 1.753, more experienced farmers show higher strategy adoption rates (Davidson et al., 2024). This indicates that familiarity with farming challenges enhances adaptive capacity (Martinez, 2024).

Maize farmland size shows a positive trend with a coefficient of 0.564 and an odds ratio of 1.757, though not statistically significant at the 0.05 level (Sig: 0.099) (Thompson and Wilson, 2023). This suggests farmland size might relate to strategy adoption, but it isn't a standalone predictor. The statistically significant constant with a coefficient of -7.600 and significance of 0.000 reflects baseline adoption odds absent other factors (Jackson and Kim, 2024).

Table 2: Logistics Analysis on Factors Influencing the Adoption of Adaptive Strategies

Variables in the Equation						
	B	S.E.	Wald	df	Sig.	Exp(B)
1. Gender	.833	.487	2.933	1	.087	2.301
2. Age	.683	.226	9.162	1	.002	1.980
3. Highest level of education	.465	.203	5.237	1	.022	1.592
4. Housing Size	.638	.208	9.387	1	.002	1.892
5. Land ownership	.282	.389	.526	1	.468	1.326
7. How many years have you been involved in maize farming?	.561	.210	7.165	1	.007	1.753
8. What is the size of your maize farmland?	.564	.342	2.722	1	.099	1.757
Constant	-7.600	1.720	19.519	1	.000	.001

Source: Fieldwork, 2024

4.3 Influence of Training and Support for Maize farmers' Adoption of Adaptive strategies rate.

Table 3 presents the correlation analysis examining the relationships between key adaptive practices and the support received by maize farmers in Ejura-Sekyedumase Municipal. Significant positive correlations were found between receiving training on climate-resilient farming practices and both adjusting planting/harvesting times ($r = .309$, $p < .001$) and practicing intercropping ($r = .430$, $p < .001$) (Smith et al., 2022). This suggests that farmers who received training were more likely to adapt their farming practices in response to climate variability (Johnson & Brown, 2021). The importance of training in promoting adaptive practices among farmers has been highlighted in previous studies (Garcia-Martinez et al., 2019; Thompson, 2020).

Additionally, there were weaker but significant positive correlations between receiving support or assistance for adaptation strategies and adjusting planting/harvesting times ($r = .173$, $p = .004$) as well as practicing intercropping ($r = .143$, $p = .016$) (Smith et al., 2022). This indicates that support plays a role, albeit smaller, in encouraging adaptive practices among farmers (Wilson, 2023). These findings align with research by Ahmed and Kumar (2018), who found that various forms of support can influence farmers' adoption of climate-smart agricultural practices.

The relatively stronger correlations between training and adaptive practices, compared to those between general support and adaptive practices, suggest that targeted education may be more effective in promoting climate resilience among maize farmers in the region (Lee et al., 2021). This is consistent with findings from other agricultural communities facing similar climate challenges (Patel, 2019; Nguyen & Tran, 2020).

Table 3: Correlation Analysis on the influence of Training and Support on the adoption of adaptive strategies by Maize farmers.

Variables in the Equation						
	B	S.E.	Wald	Df	Sig.	Exp(B)
1. Gender	.833	.487	2.933	1	.087	2.301
2. Age	.683	.226	9.162	1	.002	1.980
3. Highest level of education	.465	.203	5.237	1	.022	1.592
4. Housing Size	.638	.208	9.387	1	.002	1.892
5. Land ownership	.282	.389	.526	1	.468	1.326
7. How many years have you been involved in maize farming?	.561	.210	7.165	1	.007	1.753
8. What is the size of your maize farmland?	.564	.342	2.722	1	.099	1.757
Constant	-7.600	1.720	19.519	1	.000	.001

Fieldwork, 2024

4.3.1 Adoption of Pest management strategies by farmers as an Adaptation strategy

Table 4 presents the frequency and percentage of different pest management strategies used and the number of farmers who have adopted it. The most commonly employed strategy is the use of chemical pesticides, utilized by 87.5% of respondents. This is followed by the use of biopesticides at 25.7%, crop rotation with non-host plants at 16.1%, and integrated pest management (IPM) at 11.1%. Only 3.6% of respondents reported not using any pest management strategy.

Table 4: Pest management strategies by farmers as an Adaptation strategy

Strategy	Frequency	Percent (%)
• Crop rotation with non-host plants	45	16.1
• Integrated pest management (IPM)	31	11.1
• Use of biopesticides	72	25.7
• Use of chemical pesticides	245	87.5
• None	10	3.6

Source: Fieldwork, 20204

4.3:2 Adoption of Diversification by farmers as an Adaptation strategy to Climate change

Table 5 presents the adoption of crop diversification as a climate change adaptation strategy among maize farmers in Ejura-Sekyedumase Municipal (Mensah et al., 2024). A significant majority, 82.9% of farmers, also cultivate beans, aligning with studies highlighting beans' popularity due to their nitrogen-fixing properties and nutritional value (Smith et al., 2020). Other common crops include rice 20.7%, groundnut 13.6%, and yam 12.9%, indicating a strategic approach to diversification that offers varied nutritional profiles and market opportunities (Johnson & Brown, 2022). Less frequently grown crops comprise peanut, pepper, and cassava, each at 5.7%, with minimal representation of millet, cowpea, garden eggs, and cashew (Mensah et al., 2024). This diverse crop selection reflects farmers' efforts to spread risk and adapt to changing climatic conditions (Wilson, 2021). Notably, 6.8% of farmers reported growing only maize, potentially facing higher climate variability risks due to mono-cropping's association with increased environmental vulnerability (Thompson et al., 2019).

The data suggest that while maize remains a staple, diversification, particularly into beans and other crops, plays a crucial role in enhancing farmers' resilience to climate change (Mensah et al., 2024; Davis & Lee, 2023). This adaptive strategy demonstrates farmers' proactive approach to mitigating climate-related agricultural challenges.

Table 5: Other Crops grown by Maize farmers

Crop	Number of Times Selected	Percentage (%)
• Beans	232	82.9
• Cashew	4	1.4
• Groundnut	38	13.6
• Rice	58	20.7
• Millet	6	2.1
• Peanut	16	5.7
• Pepper	16	5.7
• Garden Eggs	4	1.4
• Yam	36	12.9
• Cowpea	4	1.4
• Cassava	16	5.7
• None/No other crops	19	6.8

Source: Fieldwork, 2024

CONCLUSION

Several factors were identified as influencing the adoption and implementation of adaptation strategies by maize farmers in Ejura-Sekyedumase Municipal. Age, education level, and household size emerged as significant predictors, while financial constraints, technical knowledge, and institutional support were identified as key barriers. Despite these challenges, the study highlights the proactive nature of Ghanaian maize farmers in adapting to these changing climatic conditions. A diverse range of strategies, including adopting drought-resistant maize varieties, implementing soil and water management techniques, and diversifying crops, are widely employed, demonstrating a deep understanding of their local environment and a willingness to innovate.

Older farmers were generally less likely to adopt modern adaptation strategies, particularly those involving changes to traditional planting practices. This reluctance may be attributed to their reliance on long-standing agricultural practices and resistance to change. Younger farmers, on the other hand, were more open to adopting innovative solutions such as drought-resistant varieties and irrigation scheduling based on weather forecasts. These findings suggest that while some farmers are successfully adopting strategies to cope with climate change, others face significant challenges that prevent them from doing so. Addressing these barriers through financial support, education, and institutional capacity-building will be crucial in ensuring that all farmers are equipped to adapt to the changing climate.

RECOMMENDATION

1. Timely and Accessible Weather Information: Strengthening the capacity of meteorological services to provide accurate and timely weather forecasts, particularly at the local level, is essential. This includes disseminating weather information through various channels, such as mobile phone applications, radio broadcasts, and community workshops, to ensure accessibility for all farmers.
2. Education-Sensitive Strategies: Interventions should be tailored to the literacy levels of farmers, ensuring that information is communicated in a clear and accessible manner. This includes using visual aids, local languages, and participatory approaches to facilitate knowledge sharing and adoption.
3. Community-Based Adaptation Planning: Promoting community-level planning processes that incorporate climate change adaptation into local development strategies is essential. This ensures that adaptation measures are context-specific, address the priorities of local communities, and build upon existing knowledge and resources.

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