

Awareness, Implementation of Climate Change Mitigation Measures, Adaptative Practices and Challenges Faced by Rural Farmers of Lebialem Division in The South West Region of Cameroon

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Abstract

Climate change is severely affecting agriculture worldwide, and rural farmers in Lebialem Division are particularly vulnerable. Most of them rely on rain-fed farming, making them highly susceptible to unpredictable weather patterns like irregular rainfall, prolonged dry seasons, and extreme heat. To develop an effective and sustainable solutions, it is essential to understand how these farmers perceive climate change, what actions they are taking, and the challenges they encounter. A descriptive cross-sectional approach was used. Data were collected from eight villages across the three subdivisions using a multistage sampling technique. Data were analyzed using SPSS. Key statistical indicators used included Adjusted Odds Ratios (AORs), 95% Confidence Intervals (CI), and p-values. Farmers in Lebialem were highly aware (92,3%) of climate change with age group 41–50 (AOR = 7.50 (95% CI: 1.52–37.10; $p = 0.014$) more likely to be aware through daily experiences, even if they lack formal scientific understanding. They were actively involved in mitigation practices (87.1%) like planting trees, using mulch, organic manure, and avoiding bush burning, efforts which are often rooted in traditional knowledge. Adaptation strategies included crop diversification, irrigation, and planting crop varieties (84.1%). However, these efforts faced serious challenges such as poor tree survival rates, financial constraints, limited water access and unpredictable weather. Traditional leaders and NGOs offer support, but broader assistance remains limited. Rural farmers in Lebialem are committed to addressing climate change by combining indigenous practices with modern techniques. However, challenges limit their success. Strengthening institutional support, improving technical training, and providing financial resources are key to building resilience and ensuring food security in the region.

Keywords: Adaptation, Challenges, Awareness, Climate Change, Mitigation, Rural Farmers.

Introduction

Climate change has gradually moved from being a distant environmental concern to a lived reality that farmers across the world now face on a daily basis. Agriculture, more than many other sectors, feels the impact directly. Unpredictable rainfall, prolonged dry seasons, floods, rising temperatures, and increasing pest

outbreaks are disrupting farming systems and threatening food production, rural livelihoods, and even public health [1–3]. For regions that depend heavily on agriculture, especially Sub-Saharan Africa, these changes are particularly damaging. In Cameroon, where more than two-thirds of the population relies on farming for survival, climate-related shocks place

enormous pressure on food security and household incomes [4–6].

At the same time, agriculture occupies a complex position in the climate change debate. Farming activities contribute to greenhouse gas emissions through deforestation, livestock production, and land-use change, yet the sector also holds great potential for reducing emissions and building resilience. Whether farmers are able to play this positive role depends largely on their level of awareness, access to information, financial capacity, education, and the support systems around them [7, 8]. In wealthier countries, farmers are supported by strong institutions, modern technologies, climate data, insurance schemes, and extension services. These supports make it easier for them to anticipate climate risks and adopt practices that protect both productivity and the environment [9–11]. In contrast, most farmers in Sub-Saharan Africa, including those in Cameroon, rely on rain-fed agriculture and traditional practices such as mulching, composting, crop rotation, and intercropping. While these methods are often environmentally friendly, they are usually adopted as survival strategies rather than deliberate climate mitigation actions and receive little formal recognition or support [12–14].

Awareness plays a key role in shaping how farmers respond to climate change. In many developed countries, farmers increasingly recognize climate change as a serious threat and are more willing to participate in mitigation and adaptation efforts, largely because they have access to education, digital information, and organized farmer networks [15]. In Sub-Saharan Africa, however, awareness is mostly shaped by personal experience. Farmers clearly observe changes such as delayed rains, shorter growing seasons, declining yields, and rising pest pressure, yet many do not fully understand the broader scientific causes of these changes [16, 17]. Studies in Cameroon show that although many rural farmers can describe shifts in weather patterns, only a small proportion

have received formal training or reliable climate information. Most depend on informal sources such as local radio, community leaders, or NGOs, which limits the depth of understanding needed for long-term planning [18].

Beyond knowledge gaps, rural farmers face structural challenges that make effective climate action difficult. Poor road networks, limited access to electricity and internet services, inadequate irrigation systems, financial exclusion, and weak agricultural extension services all constrain the adoption of mitigation and adaptation measures [19, 20]. In areas like the Lebialem Division of the South West Region of Cameroon, these difficulties are intensified by socio-political instability, which further restricts access to markets, technical support, and external assistance. As a result, many farmers' responses to climate change remain small-scale, reactive, and insufficient to ensure long-term resilience [21].

Despite these limitations, rural farmers continue to show determination and creativity in responding to climate stress. They adjust planting dates, experiment with different crop varieties, and adopt soil conservation practices using the limited resources available to them. However, without stronger institutional backing and targeted support, these efforts are unlikely to achieve lasting impact. There is therefore a clear need for evidence that goes beyond general observations and systematically examines farmers' levels of awareness, the mitigation measures they implement, the adaptive practices they use, and the challenges they face [22]. Such data are essential for identifying patterns, understanding relationships, and informing policies that are grounded in the realities of rural farming communities.

This study responds to that need by examining climate change awareness, mitigation measures, adaptive practices, and implementation challenges among rural farmers in the Lebialem Division of Cameroon.

By focusing on a localized and vulnerable rural setting, the study provides context-specific evidence that is often missing from broader national or regional analyses. Its integrated approach helps bridge the gap between what farmers know, what they do, and what prevents them from doing more. Ultimately, the findings aim to support the design of practical, inclusive, and sustainable strategies that strengthen agricultural resilience, improve food security, and enhance the capacity of rural farmers in Cameroon to cope with a changing climate [23].

Materials and Methods

This study was conducted in the Lebialem Division of the South West Region of Cameroon, a predominantly rural area comprising three subdivisions; Alou, Fontem, and Wabane. The division is characterized by hilly terrain, fertile soils, and a high dependence on subsistence farming, with major crops including maize, cassava, Irish potatoes, beans, plantains, and vegetables. Farming activities rely heavily on rainfall and traditional methods. In recent years, farmers in the area have experienced delayed rainfall, prolonged dry seasons, and increased pest outbreaks, which have negatively affected agricultural productivity. The area also faces infrastructural challenges such as poor road networks, limited access to electricity, internet services, and agricultural extension support, compounded by ongoing socio-political instability. Lebialem Division was therefore selected because it represents a typical rural farming context in Cameroon that is highly vulnerable to climate change impacts.

A descriptive cross-sectional study design was employed to assess climate change awareness, implementation of mitigation measures, adaptive practices, and challenges faced by rural farmers. The study population consisted of rural farmers aged 18 years and above who had resided in the division for at least three years and were actively engaged in

farming activities. The sample size was determined using Cochran's formula at a 95% confidence level and 5% margin of error, yielding a minimum of 384 participants, which was increased to 403 to account for non-response. A multistage sampling technique was used: Lebialem Division was purposively selected, communities were randomly chosen from each subdivision, and households were systematically sampled by selecting every second household. One eligible farmer was recruited from each selected household.

Data were collected using a structured questionnaire developed in line with the study objectives. The instrument assessed socio-demographic characteristics, climate change awareness, mitigation measures, adaptive practices, and challenges to implementation. Awareness-related questions were multiple-choice, while mitigation, adaptation, and challenge variables were measured using a three-point Likert scale (disagreed, indifferent, agreed). The questionnaire was administered through face-to-face by trained research assistants. Literate respondents completed the questionnaire independently, while non-literate participants were assisted to ensure accurate responses. To ensure validity and reliability, the questionnaire was pretested among farmers in Fongutengong village, a community with similar characteristics to the study area, and necessary revisions were made to improve clarity and relevance.

Completed questionnaires were entered into Kobo tool, cleaned in Microsoft Excel, and analyzed using SPSS version 27. Descriptive statistics were used to summarize key variables, while Chi-square tests examined associations between categorical variables. Multivariate logistic regression analysis was conducted to identify socio-demographic factors associated with climate change awareness, with results presented as adjusted odds ratios, 95% confidence intervals, and p-values. Findings were summarized using tables and charts. Ethical approval was obtained from the Ethical

Review Board of the Faculty of Health Sciences, University of Buea. Administrative authorization was secured from relevant health authorities and village heads. Written or verbal informed consent was obtained from all participants, and confidentiality was strictly maintained throughout the study.

An approval for the study was obtained from the faculty of health science, University of Buea, Cameroon and an administrative authorization gotten from the South West Regional Delegation of Public Health and from the various heads of the communities.

Results

Lebialem Division is made up of three subdivisions: Alou, Fontem, and Wabane. The sociodemographic characteristics of the 403 respondents are presented in Tables 1. Respondents were fairly evenly distributed across the subdivisions, with 36.5% coming from Wabane, 36.0% from Alou, and 27.5% from Fontem. Participants were drawn from eight communities, with M'muock Fossimondi recording the highest number of respondents (23.1%), followed by Bechati (13.4%) and M'muock Mbie (13.2%), while Ntessseh had the least representation (6.9%). Males constituted the majority of respondents (61%), while

females accounted for 39%. Most respondents were within the productive age groups of 31–40 years (32.3%) and 41–50 years (26.1%), followed by those aged 21–30 years (17.9%). Respondents aged above 60 years were the least represented (6.9%). A greater proportion of respondents were married (60.5%). Household sizes were predominantly moderate, with nearly half of the respondents (49.4%) having 4–6 household members. Smaller households of 1–3 members accounted for 25.1%, while households with 7–9 members represented 18.4%. The smallest proportion of respondents came from households with more than 10 members (7.2%).

Most respondents had primary education (30.8%), followed by secondary education (28.0%) and high school education (21.8%). Only 13.6% had attained university education, while 5.7% had no formal education. Income levels were generally low, with 92.8% earning less than 100,000 FCFA per month. Farm sizes were mostly small to medium, with nearly half of the respondents (49.6%) cultivating 3–5 hectares and 33.5% farming less than 3 hectares. Farming experience varied, though most respondents reported 6–10 years (37.2%) or 1–5 years (28.3%) of experience.

Table 1. Demographic data of study participants in the Lebialem Division

Variable	Categories	Frequency	Percent (%)
Community	Bechati	54	13.4
	Bellah	40	9.9
	Besali	44	10.9
	M'muock Fossimondi	93	23.1
	M'muock Leteh	49	12.2
	M'muock Mbie	53	13.2
	Menji	42	10.4
	Ntessseh	28	6.9
	Total	403	100
Subdivision	Alou	145	36.0
	Fontem	111	27.5
	Wabane	147	36.5
	Total	403	100
Gender	Female	157	39.0

	Male	246	61.0
	Total	403	100
Age group	>60	28	6.9
	21–30	72	17.9
	31–40	130	32.3
	41–50	105	26.1
	51–60	68	16.9
	Total	403	100
Marital status	Married	244	60.5
	Single	159	39.5
	Total	403	100
Household size	>10	29	7.2
	1–3	101	25.1
	4–6	199	49.4
	7–9	74	18.4
	Total	403	100
Educational level	No formal education	23	5.7
	Primary	124	30.8
	Secondary	113	28.0
	High school	88	21.8
	University	55	13.6
	Total	403	100
Monthly income	<100,000 FCFA	374	92.8
	>100,000 FCFA	29	7.2
	Total	403	100
Farm size	<3 hectares	135	33.5
	3–5 hectares	200	49.6
	6–10 hectares	61	15.1
	>10 hectares	7	1.7
	Total	403	100
Farming years	1–5	114	28.3
	6–10	150	37.2
	11–15	47	11.7
	>15	92	22.8
	Total	403	100

The age distribution of respondents ranged from 21 to 86 years, with a mean age of 43.13 years (SD = 11.98), as presented in Table 2.

Table 2. Age distribution of respondents

N	Minimum	Maximum	Mean	Std. Deviation
403	21	86	43.13	11.982

Awareness of climate change among respondents is presented in Table 3. A large majority (92.3%) reported being aware of climate change. Climate change was commonly defined as changes in rainfall patterns (64.0%) and shifting seasonal changes (57.1%), followed by increased ambient temperature (34.7%). Respondents identified deforestation, loss of biodiversity, and improper fertilizer use

as major causes. Floods, drought, food insecurity, and the emergence of pests and diseases were widely perceived as environmental effects. Nearly all respondents (96.0%) reported a decrease in crop yield due to climate change. Information on climate change was mainly obtained from other farmers and friends, with less reliance on mass media and formal sources.

Table 3. Awareness of climate change by rural farmers of the Lebialem Division

Variable	Categories	Frequency	Percent %
Awareness of climate change	No	31	7.7
	Yes	372	92.3
	Total	403	100
Definition of climate change	Increase ambient temperature	140	34.7
	Change in rainfall pattern	258	64
	Shifting seasonal change	230	57.1
	Occurrence of drought	94	23.3
	Unpredictable rainfall	113	28
	Occurrence of flood	130	32.3
	Total	965	239.5
Causes of climate change	Burning of fossil fuel	120	34
	Careless use of fertilizer	134	38
	Over tilling of land	90	25.5
	Burning crop residue	115	32.6
	Cutting down of trees	175	49.6
	Loss of biodiversity	146	41.4
	Total	780	221
Effect of climate change	Food insecurity	167	43.5
	Appearance of new pest and disease	185	48.2
	Storm	153	39.8
	Drought	167	43.5
	Flood	212	55.2
	Water scarcity	123	32
	Total	1007	262.2
Effect of climate change on crop yield	Increase crop production	44	11.1
	Decrease crop production	382	96
	Increase adaptation cost	1	0.3
	Total	427	107.3
Source of information	Key informants	93	23.4
	Other farmers	288	72.4

	/Radio/television/social media	90	22.6
	Friends	235	59
	Opinion leaders	102	25.6
	NGO's	164	41.2
	Total	972	244.2

Mitigation measures adopted by farmers are illustrated in Figure 1. Organic manure use, tree planting, improved soil cover, mulching,

irrigation, and minimum tillage were widely supported as effective strategies to reduce climate change impacts on farming activities.

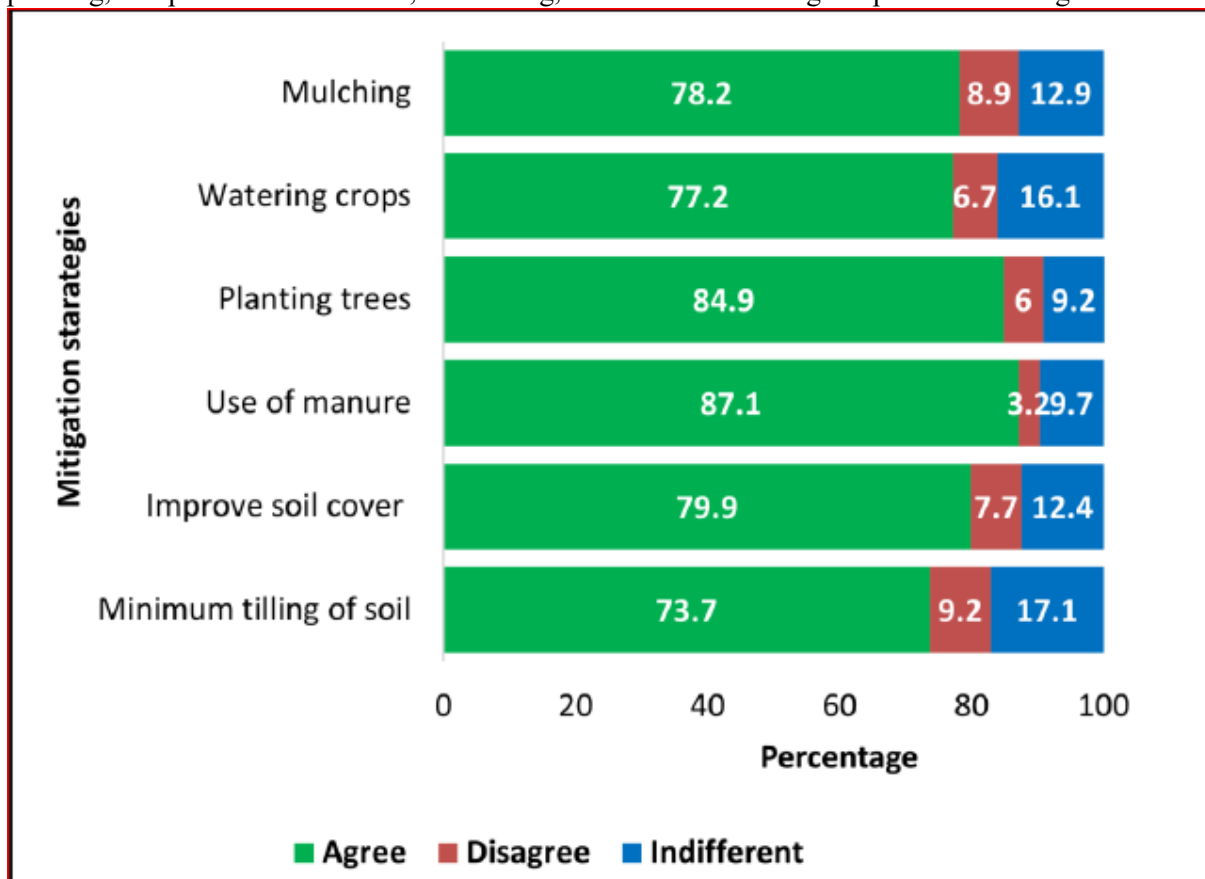


Figure 1: Mitigation measures put in place to fight against climate change by rural farmers of the Lebiale Division

Factors independently associated with climate change awareness are shown in Table 4. Married respondents and those aged 31–50 years were significantly more likely to be aware

of climate change. Higher income was inversely associated with awareness, while farmers with smaller farm sizes (<3 hectares) were significantly more aware.

Table 4. Factors independently associated with awareness of climate change

Variable	Categories	AOR	95% CI		Sig.
			Lower	Upper	
Marital status	Married	2.99	1.15	7.78	0.025*
	Single	1			
Age group	>60	3.73	0.59	23.76	0.164

	31-40	4.45	1.25	15.84	0.021*
	41-50	7.50	1.52	37.10	0.014*
	51-60	1.59	0.53	4.77	0.406
	21-30	1			
Monthly income	Above 100 000	0.09	0.03	0.24	<0.001*
	Less than 100 000	1			
Farm size	<3 hectares	5.26	1.41	19.67	0.014*
	>10 hectares	1.60	0.12	21.26	0.720
	3_5 hectares	1.25	0.46	3.39	0.666
	6_10 hectares	1			

Adaptive practices used by rural farmers are presented in Table 5. Practices such as planting resistant crop varieties, sharing information, adjusting farming calendars, crop rotation,

drainage, and pesticide use were widely supported. Early harvesting and blocking water canals received the lowest levels of support.

Table 5. Adaptive practices put in place to fight against climate change by rural farmers

Variable	Agree (%)	Disagree (%)	Indifferent (%)
Any available policy	321 (79.7)	25 (6.2)	57 (14.1)
Adjust farming timing according to rainfall	325 (80.6)	35 (8.7)	43 (10.7)
Plant crop varieties to resist scarcity	339 (84.1)	22 (5.5)	42 (10.4)
Planting more leguminous plant	311 (77.2)	43 (10.7)	49 (12.2)
Follow up weather forecasts	305 (75.7)	33 (8.2)	65 (16.1)
Change to other plant types	293 (72.7)	54 (13.4)	56 (13.9)
Use of pesticides	313 (77.7)	32 (7.9)	58 (14.4)
Crop rotation	311 (77.2)	30 (7.4)	62 (15.4)
Drainage	311 (77.2)	35 (8.7)	57 (14.1)
Cleaning canals	301 (74.7)	31 (7.7)	71 (17.6)
Blocking water canal	232 (57.6)	106 (26.3)	65 (16.1)
Early harvest	160 (39.7)	188 (46.7)	55 (13.6)
Farm inspection	315 (78.2)	39 (9.7)	49 (12.2)
Share information	326 (80.9)	33 (8.2)	44 (10.9)
Late sowing	254 (63)	77 (19.1)	72 (17.9)
Decrease in use of fertilizer	224 (55.6)	147 (36.5)	32 (7.9)

Finally, challenges faced in implementing mitigation measures are illustrated in Figure 2. Major barriers included lack of clear policies, poor implementation of existing policies, inadequate knowledge and skills, high cost and

limited availability of organic inputs and irrigation systems, pest and disease pressure, unpredictable weather, poor market access, and widespread deforestation, sustainable agriculture.

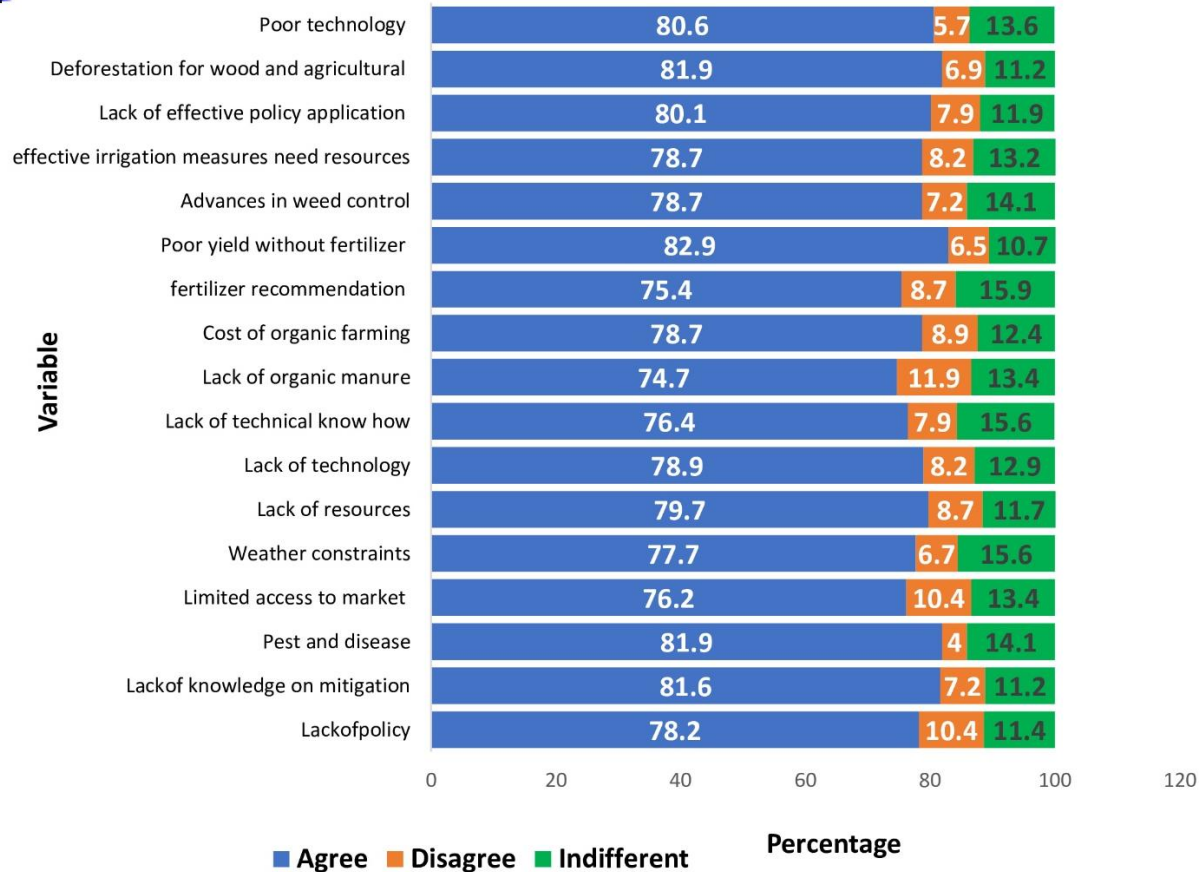


Figure 2: Challenges faced in the implementation of these measures by the rural farmers in the Lebialem Division

Discussion

The demographic profile of respondents provides important context for understanding awareness, mitigation, adaptation, and challenges related to climate change among rural farmers in the Lebialem Division. The relatively balanced distribution of respondents across Wabane, Alou, and Fontem subdivisions enhances the representativeness of the findings and suggests that the results reasonably reflect climate-related experiences across the division. However, variations in community participation, with higher representation from more accessible areas such as M’muock Fossimondi and lower participation from less

accessible communities like Ntesseh, highlight the persistent influence of geographical accessibility on research participation and service delivery in rural Cameroon. Similar patterns have been reported in other rural studies where infrastructure and road conditions significantly affect farmer engagement [24].

The predominance of male respondents reflects existing gender dynamics in rural agricultural systems, where men are more likely to be recognized as household heads and primary landholders. This finding is consistent with national and regional studies indicating that women, despite contributing substantially to agricultural labor, remain underrepresented

in formal agricultural surveys and decision-making structures [25, 26]. Such gender disparities have implications for climate change mitigation and adaptation, as women often have limited access to land, finance, and extension services, which may constrain their ability to implement climate-smart practices.

The age distribution shows that farming activities in Lebialem are largely undertaken by middle-aged adults, particularly those between 31 and 50 years. This age group is generally considered economically active and physically capable of engaging in labor-intensive farming practices. However, the relatively low participation of younger farmers suggests potential long-term sustainability concerns, especially in the context of youth migration and declining interest in agriculture. Similar trends have been observed across Sub-Saharan Africa, where rural youth increasingly migrate to urban centers due to limited economic opportunities and climate-related uncertainties [27].

Educational attainment among respondents was generally low, with most farmers having only primary or secondary education. This limited educational background may restrict farmers' ability to fully understand complex climate processes or access written and digital climate information. Several studies have shown that education plays a crucial role in enhancing climate change awareness, technology adoption, and adaptive capacity [28, 29]. Therefore, low educational levels may partly explain gaps observed between awareness of climate change and the effective implementation of mitigation strategies.

The economic profile of respondents reveals widespread income vulnerability, with the vast majority earning less than 100,000 FCFA per month. Low income significantly limits farmers' capacity to invest in climate-resilient technologies such as irrigation systems, improved seeds, and soil conservation infrastructure. This finding supports earlier research in Cameroon and other African countries, which indicates that financial

constraints are a major barrier to climate change mitigation and adaptation among smallholder farmers [30, 31]. The predominance of small to medium farm sizes further underscores the subsistence nature of agriculture in the study area, where farmers operate with minimal buffers against climate shocks.

Despite these socio-economic constraints, awareness of climate change among respondents was remarkably high. Over 90% of farmers reported being aware of climate change, largely through observable environmental changes such as irregular rainfall, shifting seasons, and rising temperatures. This suggests that experiential knowledge plays a critical role in shaping climate awareness in rural settings. Similar findings have been reported across Sub-Saharan Africa, where farmers often recognize climate change through lived experiences rather than formal climate education [32, 33]. However, awareness alone does not necessarily translate into comprehensive understanding, as knowledge of less visible drivers such as biodiversity loss and soil degradation was comparatively limited.

The regression analysis provides further insight into the socio-economic factors influencing climate change awareness. Married farmers were significantly more likely to be aware of climate change than unmarried farmers, possibly due to greater household responsibilities and stronger engagement in community networks. Age also played a significant role, with farmers aged 31–50 showing higher awareness compared to younger farmers. This aligns with findings from other studies which suggest that accumulated farming experience enhances sensitivity to environmental change [34]. Interestingly, higher income was negatively associated with climate awareness, a finding that may reflect reduced direct engagement in day-to-day farming activities among wealthier farmers. Similarly, farmers with smaller landholdings were more likely to be aware of climate change,

likely because limited land increases vulnerability to climate shocks and heightens sensitivity to environmental change [35].

In terms of mitigation measures, the findings indicate widespread adoption of low-cost, locally accessible strategies such as tree planting, use of organic manure, mulching, and reduced tillage. These practices are consistent with climate-smart agriculture principles and have been widely promoted across Africa due to their affordability and environmental benefits [36]. However, more capital-intensive strategies such as irrigation, while widely recognized as important, remain difficult to implement due to water scarcity and high costs. This gap between perceived usefulness and actual implementation reflects structural constraints rather than lack of willingness among farmers.

Adaptive practices followed a similar pattern, with high uptake of crop diversification, adjustment of farming calendars, and reliance on informal information-sharing networks. These strategies demonstrate farmers' capacity for autonomous adaptation based on experience and social learning. However, practices requiring technical knowledge or external inputs, such as advanced water management and optimized fertilizer use, showed lower levels of adoption. This finding supports existing evidence that adaptation among smallholder farmers is often incremental and constrained by access to resources and institutional support [37].

The challenges identified were multifaceted and interrelated. A large proportion of respondents reported limited technical knowledge, inadequate policy support, high costs of inputs, water scarcity, pest and disease pressure, and poor market access. These constraints collectively undermine the effectiveness and sustainability of mitigation and adaptation efforts. The findings align with broader regional studies indicating that weak extension services, limited financial support,

and poor infrastructure remain major barriers to climate resilience in rural Africa [38, 39].

Overall, the findings suggest that while rural farmers in the Lebialem Division possess high awareness of climate change and are actively engaging in mitigation and adaptation practices, their efforts are significantly constrained by socio-economic, institutional, and environmental barriers. Strengthening extension services, improving access to affordable inputs, investing in water infrastructure, and developing inclusive climate policies tailored to smallholder realities are essential for translating awareness into sustained climate resilience.

Conclusion

This study examined the level of awareness of climate change, the mitigation and adaptive practices employed, and the challenges faced by rural farmers in the Lebialem Division of the South West Region of Cameroon. The findings demonstrate that rural farmers in the study area possess a high level of awareness of climate change, largely driven by observable changes in rainfall patterns, temperature increases, soil fertility decline, and increased pest and disease incidence. Although most farmers may lack formal scientific knowledge of climate change, their awareness is strongly grounded in long-term farming experience and direct environmental observation.

The results further reveal that rural farmers are actively implementing various climate change mitigation and adaptation measures. Commonly adopted mitigation practices include tree planting, mulching, composting with organic manure, crop rotation, and reduced bush burning. Adaptive practices such as adjusting planting calendars, cultivating drought-tolerant crop varieties, diversifying crops, and engaging in small-scale irrigation and livestock farming were also widely reported. These findings indicate that farmers are not passive victims of climate change but

are proactively responding within the limits of their available resources and knowledge.

Despite this willingness to act, the study identified significant challenges that hinder the effective implementation and sustainability of climate change mitigation measures. Major constraints include limited access to water resources, poor survival rates of planted trees, inadequate financial capacity, insufficient technical knowledge, and weak access to agricultural extension services. Inadequate infrastructure and limited institutional and policy support further constrain farmers' ability to scale up climate-smart practices. These barriers reduce the overall effectiveness of mitigation and adaptation strategies and expose farmers to continued climate-related risks.

The findings also highlight the importance of local and traditional governance structures in supporting climate-related actions. Community leadership and local organizations play a complementary role in mobilizing farmers and encouraging collective responses to climate change, particularly in areas where formal government support is limited. However, reliance on local initiatives alone is insufficient to ensure long-term climate resilience.

Overall, the evidence suggests that while rural farmers in the Lebialem Division are aware of climate change and are making efforts to mitigate and adapt to its impacts, their capacity to do so effectively remains constrained by socio-economic, institutional, and infrastructural challenges. Strengthening institutional support systems, improving access

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to extension services, enhancing climate education, and providing affordable climate-smart inputs are essential for transforming existing farmer-led efforts into sustainable and scalable climate resilience strategies. Addressing these gaps will not only improve agricultural productivity and food security but also contribute to broader climate change mitigation efforts in Cameroon.

Conflict of Interest

The authors report no conflict of interest in this study.

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Data Availability

The datasets used in this study are available from the corresponding author and can be gotten on reasonable request.

Author Contributions

Dr Fietsop Ernestine Nkemtah conceived the study, collected the data, conducted the analysis, and drafted the manuscript. The other authors supervised the research, contributed to the interpretation of results, and critically reviewed the manuscript. All authors read and approved the final manuscript.

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