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Population Perception of Climate Change and its Effects on Health in the Biyem Assi Health District, Cameroon

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Abstract

Climate change is posing growing threats to global public health and security of the vulnerable population. The adverse effects on human health are enormous and understanding factors associated with awareness and its health impacts is essential for effective public health communication and intervention. A descriptive cross-sectional study was conducted to assess population perception of climate change and its effects on human health in the Biyem Assi Health District. Sociodemographic variables, environmental factors, and access to information and resources were analyzed using descriptive statistics and inferential tests, including chi-square and multivariate logistic regression. Majority of respondents (96.2%) were aware of climate change. Awareness was significantly higher among individuals under 40 years ($p = 0.003$), those with higher education levels, and those exposed to climate-related health or environmental effects. Awareness was also significantly associated with understanding of its consequences, such as heatwaves, flooding, water scarcity, and local weather variability (all $p < 0.05$). Perception that climate change affects health was significantly associated with gender ($p = 0.000$), with all male respondents affirming the link compared to 81% of females. Respondents who believed in the health impacts of climate change were significantly more likely to report issues such as respiratory diseases, vector-borne illnesses, and diarrhoea (all $p = 0.000$). Climate change awareness in the study population is high but shaped more by informed perception, trusted information sources than by demographic characteristics. Public health strategies should prioritize accessible, community-based education that links climate change to health outcomes.

Keywords: *Change, Climate, Health, Perception, Population.*

Introduction

Climate change is widely acknowledged as the greatest health threat of the 21st century, exerting profound and wide-ranging effects on human health globally [1]. Irrespective of geographic location, no region is immune from its consequences, making it a pressing concern for global public health and security. The urgency of addressing climate change has gained significant traction in both media and policy spheres, emphasizing its prominence on international public health agendas. The World Health Organization (WHO) reinforced this stance by selecting “Protecting Health from Climate Change” as the theme for World Health Day, further demonstrating the global consensus on the need for immediate action [2].

Historically, the health impacts of climate change were recognized relatively late in climate science and policy discussions [3]. Climate change refers to long-term shifts in temperature and weather patterns, increasingly driven by anthropogenic activities. Chief among these are the burning of fossil fuels, deforestation, and large-scale land use changes, which contribute to greenhouse gas (GHG) emissions and the accumulation of heat in the Earth's atmosphere [4]. These human-induced processes have raised global temperatures by approximately 1.1°C above pre-industrial levels, with further

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increases projected under current emission trends [5]. These changes disproportionately affect vulnerable populations, especially in low- and middle-income countries, exacerbating pre-existing social and economic inequalities.

The health impacts of climate change are both direct and indirect, and require urgent intervention [6]. Direct effects include injuries, heat-related illnesses, and fatalities from extreme weather events such as floods, droughts, and heatwaves. Indirect effects are equally dangerous, encompassing shifts in the patterns of vector-borne diseases (e.g., malaria, dengue), reductions in air and water quality, food insecurity, and mental health disorders [7]. According to WHO projections, climate change could cause an additional 250,000 deaths annually between 2030 and 2050 due to heat stress, malnutrition, malaria, and diarrhea [8].

Public awareness and perception play a critical role in shaping adaptive strategies and influencing policy responses to climate change [9]. In Cameroon, often referred to as "Africa in miniature" for its ecological diversity, the effects of climate change are increasingly visible. The northern regions suffer from chronic droughts, while coastal and highland areas face frequent floods and landslides [10]. Forests covering nearly 40% of the country are vital for the livelihoods of millions who depend on them for food, medicine, and fuel. Yet, rising temperatures and erratic rainfall patterns threaten these resources and exacerbate vulnerabilities among rural populations [11].

Women in Cameroon, who constitute over 75% of the agricultural workforce, are especially impacted, as climate-induced changes undermine their roles in food production and informal trade, thereby deepening gender inequalities and economic insecurity [12]. Additionally, the increasing unpredictability of seasonal cycles and the intensification of extreme weather events underscore the urgency of climate-responsive health interventions.

Despite mounting evidence, climate change remains abstract or distant to many individuals. This psychological distancing can be exacerbated by media portrayals that prioritize political narratives over localized impacts [13]. Understanding how the public perceives climate change and its health implications is crucial for promoting effective communication, policy formulation, and community resilience. In Cameroon, recent studies show that while awareness is growing, there remains a significant gap in understanding the root causes and health-related consequences of climate change [14].

Vector-borne diseases such as malaria and dengue are particularly sensitive to climatic variability. Research highlights how changes in temperature and precipitation influence the geographic distribution and seasonality of disease vectors, posing serious challenges for public health systems in Africa [15]. Additionally, Cameroon has experienced an increase in extreme weather events. A notable example includes a deadly landslide in 2024 triggered by torrential rains, underscoring the immediate threat posed by climate-driven disasters [16].

Addressing the complex health challenges posed by climate change in Cameroon necessitates integrated approaches—spanning public education, health system strengthening, disease surveillance, and disaster preparedness. These efforts must aim to foster resilience, especially among the most vulnerable populations, while promoting sustainable development and environmental stewardship.

Materials and Methods

This study was conducted in Yaoundé, the political and administrative capital of Cameroon. Located on a hilly, forested plateau between the Nyong and Sanaga Rivers in the south-central region of the country, Yaoundé is the second-largest city in Cameroon, with a population estimated at 4,509,000 as of 2023. The city functions as a major administrative, commercial, and service centre, as well as a hub for road, rail, and air transport. It hosts several

small and medium-sized industries, including a brewery, cigarette factory, sawmills, and printing presses. Yaoundé also serves as a central market for a rich agricultural region, with a significant portion of the population engaged in subsistence farming and timber processing.

Yaoundé experiences a tropical climate moderated by its altitude, with four distinct seasons: spring (March 1 to May 31), summer (June 1 to August 31), autumn (September 1 to November 30), and winter (December 1 to January 28).

The objective of this study was to assess public perceptions of climate change and its impact on health in the Biyem-Assi Health District. The study specifically examined population awareness of climate change, its perceived health effects, and measures taken to prevent climate-related health risks.

A descriptive cross-sectional study design was adopted. The target population included all residents of the Biyem-Assi Health District aged 18 years and above who had resided in the area for at least six months. Individuals under 18 years of age or who had lived in the district for less than six months were excluded.

Systematic random sampling was employed. A random starting point was selected, and data were collected from every second household. A total of 400 participants were recruited for the study. Data were collected using a structured, closed-ended questionnaire. Literate participants completed the questionnaire independently, while for those unable to read or write due to limited education or health conditions, the investigator administered the questionnaire orally and recorded the responses.

A pilot test of the questionnaire was carried out in the Effoulan Health District, which shares similar demographic characteristics with Biyem-Assi, to assess the tool's reliability and clarity.

Data were entered and analyzed using SPSS version 25. Results were categorized and summarized in tables for presentation.

Ethical approval for the study was obtained from EXHIST University. Informed written consent was obtained from all literate participants. For participants unable to read or write, the purpose of the study was clearly explained in the local language, and verbal consent was obtained.

While the findings can provide insights applicable to the broader Yaoundé population, limitations such as the city's expansive size, challenging topography, and budget constraints restricted the study to the Biyem-Assi Health District

Results

According to table 1 below, the majority of respondents were female (65.8%), while males made up 34.3%. Most were single (70.5%), followed by married individuals (29.5%). In terms of age distribution, the largest group was above 40 years old (63.5%), and the minority (36.5) were below 40 years. Regarding education, a significant portion had gotten a level of former education (94.3%), while 5.7% had no formal education. In terms of income, most respondents fell within the income range of 51,000-200,000 (50.8%), while 45.5% earned 50,000 or less. Only 3.7% earned above 201,000.

Table 1. Demographic Characteristics of Respondents

Variables		**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Gendered	Male	137	34.3	34.3	34.3
	Female	263	65.8	65.8	100.0
	Total	400	100.0	100.0	
Marital status	Married	118	29.5	29.5	29.5
	unmarried	282	70.5	70.5	100.0

	Total	400	100.0	100.0	
Age in range	< 40	146	36.5	36.5	36.5
	>40	254	63.5	63.5	100.0
	Total	400	100.0	100.0	
Level of education	No formal education	23	5.7	5.7	5.7
	formal education	377	94.3	94.3	100.0
	Total	400	100.0	100.0	
Level of income	< 50000	182	45.5	45.5	45.5
	51000-200000	203	50.8	50.8	96.3
	>201000	15	3.7	3.7	100.0
	Total		100.0	100.0	

Source: *Author's Survey data, 2025*

The majority of the respondents (385) as shown in table 2 below acknowledged that they were aware of climate change (96.3%). This could be as a result of the higher level of education of most respondents. A very few of them (15) making up 3.7% of the respondents were ignorant about climate change. This study is in line with a study carried out by Lee et al., (2015), and Pew Research Center (2021), where they found out that most people across nations are aware of climate change and awareness is generally higher among educated individuals than the non-educated.

Table 2. Climate Change Awareness

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Aware of climate change	Yes	385	96.3	96.3	96.3
	No	15	3.7	3.7	100.0
	Total	400	100.0	100.0	

Source: *Author's Survey data, 2025*

According to table 3 below, 291 respondents (92.4%) were aware of climate change while 24 of them did not know anything concerning climate change making 7.6% of the respondents.

Table 3. Climate Change Affecting Health

Variable		Frequency	%	Valid %	Cumulative %
Effects of climate change on health	No	31	7.8	7.8	7.8
	Yes	369	92.3	92.3	100.0
	Total	400	100.0	100.0	

Source: *Author's Survey data, 2025*

The table 4 below is a cross-tabulation of awareness of climate change (Yes/No) across various independent variables like gender, education, age. From the table above the dependent variable was awareness of climate change and it depended on a number of factors or variables. Several variables were

significantly associated with the awareness of climate change.

Among respondents of ages below 40, 98.43% showed significantly greater awareness of climate change than their counterpart 40 years and above where 92.47% of them were aware of climate change (p-value = 0.003). older respondents were therefore significantly more aware of climate change.

The participants were able to identify the definition of climate change as long term in temperature and weather pattern (*p-value = 0.03) and change in rain fall pattern (p-value = 0.03). 97.54% of the respondents identified climate change as long-term shift in temperate and weather pattern while 93.1% of all the respondent believed change in rain fall pattern better defined climate change.

The potential consequences of climate change were more understood by the population as heat wave (p = 0.009), flooding with strong awareness (p- value = 0.000). local weather changes with very strong association between climate change and awareness (p-value = 0.000). the respondents also knew that decrease in crop yield (p-value = 0.000) and increased water scarcity (p-value = 0.02) were all link to climate change awareness. The results showed that respondents who were aware of a particular consequence of climate change were more likely to be aware of all the other consequences.

According to participants, causes of climate change were significantly associated to climate change awareness. Understanding human-caused drivers of climate change such as burning of fossil fuels (p-valued = 0.012), Deforestation (p = 0.028), Surface temperature changes (p = 0.019) are all linked to climate change awareness.

From the results, most respondents were able to correctly identify carbon dioxide (p = 0.000 as the main greenhouse gas likely to cause climate change.

Many respondents had as their source of information the family (p-0.021) and NGO's (p- 0.001) showing that these were effective communication channels.

The various perceived health effects of climate change were are significantly associated to climate change. Perceived health effect (p- 0.033), vector-borne diseases awareness (0.001), poor air quality (p-0.052), poor water quality (p- 0.045), personal actions to protect health (p = 0.021). this showed that people who believed that climate change could affect their health were more aware and those who took action to protect their health from climate change were more aware of climate change than the others.

Concerning access to resources, access to clean air (p = 0.029), clean water (p = 0.032), and healthcare (p = 0.032) were positively associated with climate change awareness.

Demographic variables like gender, marital status, formal education, and other health problems like mental health, diarrhoea, malnutrition did not show any statistically significant differences in the awareness of climate change. This showed that climate change awareness does not depend only on demographic characteristics but more on perception and access to information.

The results suggest that improving public understanding of the causes and consequences of climate change, especially through trusted sources like family or NGOs, may be key to boosting awareness. Strategies that connect climate change to health impacts and local realities may be particularly effective for outreach and education.

Table 4. Bivariate Analysis between Awareness of Climate Change and the Independent Variables

Aware of climate change						**CI (95%)**	**P value**
variable	**categories**	**yes**	**%**	**No**	**%**		
Gender	Male	133	97.08%	4	2.92%		0.528

	Female		252	95.82%	11	4.18%	0.594-0.372	
Marital status	Married		114	96.61%	4	3.39%	1.000-0.532	0.806
	Unmarried		271	96.1%	11	3.90%		
Age range	< 40		135	92.47%	11	7.53%	0.004-0.004	**0.003***
	<40		250	98.43%	4	1.57%		
Level of education	No formal education		23	100%	0	0.00%	0.615-0.405	0.330
	Formal education		362	96.02%	15	3.98%		
Definition of climate change	Long term shift in temperature/ whether pattern	No	108	93.1%	8	6.90%	0.044-0.038	**0.03***
		Yes	277	97.54%	7	2.46%		
	Change in rain pattern	No	277	97.54%	7	2.46%	0.044-0.038	**0.03***
		Yes	108	93.1%	8	6.90%		
Potential consequences of climate change	Heat waves	No	264	100%	0	0.00%	0.007-0.004	**0.009***
		Yes	121	88.97%	15	11.03%		
	Drought	No	59	93.65%	4	6.35%	0.270-0.198	0.237
		Yes	326	94.77%	18	5.23%		
	Flood	No	67	89.33%	8	10.67%	0.002-0.002	**0.000***
		Yes	318	97.85%	7	2.15%		
	Change in local weather patten	No	194	92.82%	15	7.18%	0.000-0.000	**0.000***
		Yes	191	100%	0	0.00%		
	Increase crop yield	No	366	96.06%	15	3.94%	0.631-0.475	0.378
		Yes	19	100%	0	0.00%		
	Decrease crop yield	No	204	93.15%	15	6.85%	0.000-0.000	**0.000***
		Yes	181	100%	0	0.00%		
	Increase water scarcity	No	237	94.05%	15	5.95%	0.02-0.01	**0.02***
		Yes	148	100%	0	0.00%		
Causes of climate change	Burning of fossil fuel	No	181	93.78%	12	6.22%	0.016-0.011	**0.012***
		Yes	204	98.55%	3	1.45%		
	Deforestation	No	36	90%	4	10.00%	0.052-0.052	**0.028***
		Yes	349	96.94%	11	3.06%		
	Volcanic eruption	No	312	95.41%	15	4.59%	0.084-0.046	0.062
		Yes	73	100%	0	0.00%		
	Change in surface temperature	No	281	94.93%	15	5.07%	0.030-0.010	**0.019***
		Yes	104	100%	0	0.00%		
Most common greenhouse gas	carbondioxide	No	54	87.1%	8	12.90%	0.001-0.001	**0.000***
		Yes	331	97.93%	7	2.07%		
	Water vapor	No	358	95.98%	15	4.02%	0.416-0.344	0.288
		Yes	27	100%	0	0.00%		
Source of information	Social media	No	56	93.33%	4	6.67%	0.257-0.174	0.197
		Yes	329	96.76%	11	3.24%		
	Family	No	283	94.97%	15	5.03%	0.029-0.011	**0.021***
		Yes	102	100%	0	0.00%		
	Health personnel	No	325	95.59%	15	4.41%	0.141-0.083	0.097
		Yes	60	100%	0	0.00%		

	NGOs	No	213	93.42%	15	6.58%	0.001-0.000	**0.001***
		Yes	172	100%	0	0.00%		
Degree of effects on health	Not at all		37	90.24%	4	9.76%	0.056-0.056	0.033*
	Very much		348	96.94%	11	3.06%		
Effects on crops	High crop yield		16	100%	0	0.00%	0.652-0.536	0.420
	Low crop yield		369	96.09%	15	3.91%		
Effects on environment	Flood	No	16	100%	0	0.00%	0.652-0.536	0.420
		Yes	369	96.09%	15	3.91%		
	Land slide	No	89	89%	11	11.00%	0.186-0.101	0.126
		Yes	296	98.67%	4	1.33%		
	drought	No	62	93.94%	4	6.06%	0.286-0.223	0.280
		Yes	323	96.71%	11	3.29%		
Specific health problems due to climate change	Respiratory	No	199	94.76%	11	5.24%	0.118-0.082	0.100
		Yes	186	97.89%	4	2.11%		
	Water/food borne diseases	No	160	95.24%	8	4.76%	0.428-0.259	0.365
		Yes	225	96.98%	7	3.02%		
	Vector borne disease	No	74	90.24%	8	9.76%	0.004-0.004	**0.001***
		Yes	311	97.8%	7	2.20%		
	Mental health	No	190	95.96%	8	4.04%	0.798-0.484	0.762
		Yes	195	96.53%	7	3.47%		
	Diarrhoea	No	200	96.15%	8	3.85%	1.000-0.564	0.916
		Yes	185	96.35%	7	3.65%		
	Malnutrition	No	185	95.85%	8	4.15%	0.795-0.444	0.688
		Yes	200	96.62%	7	3.38%		
	Poor air quality	No	184	94.36%	11	5.64%	0.066-0.045	**0.052***
		Yes	201	98.05%	4	1.95%		
	Poor water quality	No	181	94.27%	11	5.73%	0.063-0.040	**0.045***
		Yes	204	98.08%	4	1.92%		
	Specific action to protect health	No	219	98.21%	4	1.79%	0.031-0.020	**0.021***
		Yes	166	93.79%	11	6.21%		
	Community doing enough to protect health	No	48	92.31%	4	7.69%	0.116-0.116	0.109
		Yes	337	96.84%	11	3.16%		
Access to resources to protect health	Clean air	No	291	95.1%	15	4.90%	0.027-0.017	**0.029***
		Yes	94	100%	0	0.00%		
	Clean water	No	107	93.04%	8	6.96%	0.042-0.036	**0.032***
		Yes	278	91.76%	7	8.24%		
	Health care	No	231	95.45%	11	4.55%	0.442-0.224	**0.032***
		Yes	154	97.47%	4	2.53%		

Source: *Author's Survey data, 2025*

Gender was found according to table 5 below to be significantly associated with the fact that climate change affects health (p = 0.000). a high significant difference existed between gender. All male respondents (100%) agreed with this perception, compared to 81% of females who

were for the fact that climate change affect health.

On the contrary, age group (p = 0.513), marital status (p = 0.4467), and education level (p = 0.530) did not show statistically significant associations with climate change affecting health.

Respondents who were aware of climate change were significantly more likely to remark climate change as a health issue (p = 0.005). A significant relationship was also seen between climate change affecting health and respondent who correctly identified climate change as a long-term shift in temperature and weather patterns or as a change in rainfall patterns (p = 0.000 for both).

A majority of respondents showed a statistically significant relationship and affirmed climate change had 'very much' affected their health (p = 0.000). the study equally found out that there was a strong association with specific health problems attributed to climate change like respiratory diseases, water/food-borne diseases, vector-borne diseases, diarrhoea, and poor air quality (all p = 0.000). However, mental health (p = 0.806), malnutrition (p = 0.696), and poor water quality (p = 0.055) were not statistically significant.

With variables concerning the environment, drought was found to be significantly associated with what the respondent perceived as health effect of climate change (p = 0.000). Flooding as an effect of climate change on the environment (p = 0.050) was towards significance.

Increased or decreased crop yields with p = 0.195 and p = 0.255, respectively were not significantly associated with the belief that climate change has an effect on health.

Respondents who reported taking personal health protection measures due to climate change were significantly more likely to perceive it as affecting health (p = 0.000).

Perception was not significantly influenced by the belief that the community is doing enough to protect public health (p = 0.987).

No significant association was found between access to clean air (p = 0.147), clean water (p = 0.202), or healthcare (p = 0.925) and the belief that climate change effects health.

Table 5. Bivariate Analysis between Effect of Climate Change on Health and the Independent Variables

Climate change affecting health					**CI**	**P-value**
Variables	**Categories**		**No**	**Yes**		
Gender		Male	0	137	0.000-0.000	**0.000***
		Female	31	132		
Marital status		Married	11	107	0.538-0.284	0.4467
		Unmarried	20	262		
Age range		< 40	13	133	0.562-0.319	0.513
		≥40	18	236		
Level of education		No formal education	1	22	0.712-0.452	0.530
		Formal education	30	247		
Awareness of climate change		No	27	358	0.022-0.022	**0.005***
		Yes	4	11		
Definition of climate change	Long term shift in temperature/ change in weather pattern	No	19	97	0.000-0.000	**0.000***
		Yes	12	272		

	Change in rain pattern	No	12	272	0.000-0.000	**0.000***
		Yes	19	97		
Degree of effects on health		No at all	11	30	0.000-0.000	**0.000***
		Very much	20	339		
Specific health problem due to climate change	Respiratory diseases	No	31	179	0.000-0.000	**0.000***
		Yes	0	190		
	Water/food borne diseases	No	24	144	0.000-0.000	**0.000***
		Yes	7	225		
	Vector borne diseases	No	16	66	0.000-0.000	**0.000***
		Yes	15	303		
	Mental health	No	16	182	0.853-0.477	0.806
		Yes	15	187		
	Diarrhoea	No	27	181	0.000-0.000	**0.000***
		Yes	4	188		
	malnutrition	No	16	177	0.713-0.419	0.696
		Yes	15	192		
	Poor air quality	No	27	168	0.000-0.000	0.000*
		Yes	4	201		
	Poor water quality	No	20	172	0.62-0.42	0.055
		Yes	11	197		
Effects on crops	Increase crop yield	No	31	350	0.383-0.208	0.195
		Yes	00	19		
	Decrease crop yield	No	20	199	0.268-0.171	0.255
		Yes	11	170		
Effects on environment	flood	No	12	85	0.078-0.046	**0.050***
		Yes	19	284		
	Land slide	No	19	197	0.456-0.256	0.396
		Yes	12	172		
	Drought	No	19	47	0.000-0.000	**0.000***
		Yes	12	322		
Specific action to protect health		No	08	215	0.001-0.000	**0.000***
		Yes	23	154		
community doing enough to protect health		No	04	48	1.000-0.624	0.987
		Yes	27	321		
Access to resources to protect your health	Clean air	No	27	279	0.187-0.106	0.147
		Yes	04	90		
	Clean water	No	12	103	0.218-0.143	0.202
		Yes	19	266		
	Healthcare	No	19	223	1.000-0.543	0.925
		yes	12	146		

Source: *Author's Survey data, 2025*

A multivariate analysis was conducted on the various significant variables and the results and presented on the tables below.

Table 6 below shows statistically significant association between climate change awareness which is the dependent variable and other independent variable. In almost all the significant cases, a noticeable higher percentage were aware of climate change.

A great majority of participants under the age of 40 years (98.43%) were more likely to be aware of climate change than those above 40years (92.47%) (p = 0.003). Younger individuals are therefore significantly more aware of climate change than older ones.

Awareness of climate change levels were significantly associated with participants' definitions of climate change. Respondents who recognized climate change as a long-term shift in temperature and weather patterns had higher awareness (97.54%) than those who did not (93.1%) (p = 0.034). Conversely, those who identified change in rain pattern as the main feature were less aware (93.1%) than those who did not (97.54%), also statistically significant (p = 0.034).

Specific consequences of climate change as recognized by participants was strongly associated with awareness. Awareness was seen to be highest among respondents who acknowledged changes in local weather patterns (100%) (p= 0.000), decreased crop yields (100%) (p= 0.000), increased water scarcity (100%) (p= 0.02), and floods (97.85%) (p= 0.000). Lower awareness was observed among those who did not recognize these consequences, with differences statistically significant across all items ($p < 0.05$). Interestingly, those who did not link climate change to heat waves showed complete awareness (100%) compared to 88.97% among those who did, possibly due to misclassification or misunderstanding.

There was a high significant association with human driven causes of climate change and awareness. Majority of the respondents could identify fossil fuel combustion (98.55%) (p = 0.012), deforestation (96.94%) (p = 0.028), change in surface temperature (100% (p = 0.019). the identification of key causes of climate change like fossil fuels or deforestation is strongly tied to overall climate change awareness.

There was a strong correlation observed between identifying carbon dioxide as the most common greenhouse gas and awareness of climate change. Participants who correctly identified CO_2 showed 97.93% awareness, compared to 87.1% among those who did not (p = 0.000). This emphasizes the role of foundational scientific literacy in climate education.

Information access through family members and NGOs showed a significant impact. There was 100% awareness among those informed by family vs. 94.97% otherwise (p = 0.021). NGOs equally scored a 100% awareness for those informed by them vs. 93.42% (p = 0.001).

Respondents who reported health effects due to climate change had higher levels of awareness of the effect of climate change on health. Those perceiving vector-borne diseases, poor air quality, or poor water quality as linked to climate change showed significantly greater awareness ($p < 0.05$). Among those who felt climate change had not affected their health, awareness was lower (90.24%) compared to 96.94% in those reporting strong effects (p = 0.033).

Contrary to expectations, those who reported taking specific actions to protect their health from climate change were slightly less aware (93.79%) than those who had not (98.21%)—though the association was significant (p = 0.021). This may reflect action driven by other motivations (e.g., general health awareness) rather than direct climate knowledge.

Access to resources such as clean air, clean water, and health care also showed varying associations. Clean air showed 100% awareness vs. 95.1% (p = 0.029). Clean water showed 98.08% vs. 94.27% (p = 0.032). Health

care access was not significantly associated (p = 0.300). This suggests that environmental living conditions may foster awareness more than general healthcare access.

The results therefore revealed that awareness of climate change was significantly influenced by age, accurate scientific understanding, perception of its causes and consequences, and exposure to environmental health effects. Trusted information sources and resource availability further shape this awareness.

Table 6. Multivariate Analysis between Awareness of Climate Change and Various Independent Variables

Aware of climate change							**CI (95%)**	**P value**
variable	**Categories**		**yes**	**%**	**No**	**%**		
Age range		< 40	135	92.47%	11	7.53%	0.004-0.004	**0.003***
		<40	250	98.43%	4	1.57%		
Definition of climate change	Long term shift in temperature and whether pattern	No	108	93.1%	8	6.90%	0.044-0.038	**0.034***
		Yes	277	97.54%	7	2.46%		
	Change in rain pattern	No	277	97.54%	7	2.46%	0.044-0.038	**0.034***
		Yes	108	93.1%	8	6.90%		
Potential consequences of climate change	Heat waves	No	264	100%	0	0.00%	0.007-0.004	**0.009***
		Yes	121	88.97%	15	11.03%		
	Flood	No	67	89.33%	8	10.67%	0.002-0.002	**0.000***
		Yes	318	97.85%	7	2.15%		
	Change in local weather patten	No	194	92.82%	15	7.18%	0.000-0.000	**0.000***
		Yes	191	100%	0	0.00%		
	Decrease crop yield	No	204	93.15%	15	6.85%	0.000-0.000	**0.000***
		Yes	181	100%	0	0.00%		
	Increase water scarcity	No	237	94.05%	15	5.95%	0.02-0.01	**0.02***
		Yes	148	100%	0	0.00%		
Causes of climate change	Burning of fossil fuel	No	181	93.78%	12	6.22%	0.016-0.011	**0.012***
		Yes	204	98.55%	3	1.45%		
	Deforestation	No	36	90%	4	10.00%	0.052-0.052	**0.028***
		Yes	349	96.94%	11	3.06%		
	Change in surface temperature	No	281	94.93%	15	5.07%	0.030-0.010	**0.019***
		Yes	104	100%	0	0.00%		
Most common greenhouse gas	carbondioxide	No	54	87.1%	8	12.90%	0.001-0.001	**0.000***
		Yes	331	97.93%	7	2.07%		
	Family	No	283	94.97%	15	5.03%	0.029-0.011	**0.021***
		Yes	102	100%	0	0.00%		
	NGOs	No	213	93.42%	15	6.58%	0.001-0.000	**0.001***
		Yes	172	100%	0	0.00%		
Degree of effects on health		Not at all	37	90.24%	4	9.76%	0.056-0.056	0.033*
		Very much	348	96.94%	11	3.06%		
		No	74	90.24%	8	9.76%	0.004-0.004	**0.001***

	Vector borne disease	Yes	311	97.8%	7	2.20%		
	Poor air quality	No	184	94.36%	11	5.64%	0.066-0.045	**0.052***
		Yes	201	98.05%	4	1.95%		
	Poor water quality	No	181	94.27%	11	5.73%	0.063-0.040	**0.045***
		Yes	204	98.08%	4	1.92%		
	Specific action to protect health	No	219	98.21%	4	1.79%	0.031-0.020	**0.021***
		Yes	166	93.79%	11	6.21%		
Access to resources to protect health	Clean air	No	291	95.1%	15	4.90%	0.027-0.017	**0.029***
		Yes	94	100%	0	0.00%		
	Clean water	No	107	93.04%	8	6.96%	0.042-0.036	**0.032***
		Yes	278	91.76%	7	8.24%		
	Health care	On	231	95.45%	11	4.55%	0.442-0.224	0.300
		Yes	154	97.47%	4	2.53%		

Source: *Author's Survey data, 2025*

From the results on the table 7 below, males unanimously believed climate change has effects on health and a minority of the females (19%) do not. This difference is highly significant, suggesting gender plays a role in perception (P = 0.000).

There was a statistically significant between awareness of climate change and its effects on health. The majority of respondents (96.2%) were aware of climate change and equally believed that it had an effect on health (P= 0.005) while the minority had never heard of climate change and its effects on health.

A statistically significant association was found with the definition of climate change. Those who defined climate change as shifts in temperature or rainfall were more likely to believed it affects health. The stronger association with the long-term temperature shift suggests a more informed understanding correlates with health awareness (p = 0.000).

Respondents who feel climate change has significantly affected health overwhelmingly believe in its health impact (P = 0.000).

Belief in specific health consequences (respiratory, diarrhoea, vector/water-borne diseases) is strongly tied to the belief that climate change affects health. These perceptions likely stem from direct or community-level experiences (P = 0.000).

A marginal significant relationship was found in respondents who associated flood to climate change (P = 0.050). on the contrary there was a strong link between drought and effects of climate change on health (P = 0.000).

Those taking protective measures were significantly more likely to believe in climate-related health risks, likely driven by awareness and perceived vulnerability (P = 0.000).

Table 7. Multivariate Analysis between Effects of Climate Change on Health and Various Independent Variables

Climate change affecting health						
Variable	**Category**		**No**	**Yes**	**CI**	**P-value**
Gender	Male		0	137	0.000-0.000	**0.000***
	Female		31	132		
Awareness of climate change	No		27	358	0.022-0.022	**0.005***
	Yes		4	11		
		No	19	97	0.000-0.000	**0.000***

Definition of climate change	Long term shift in temperature and change in weather pattern	Yes	12	272		
	Change in rain pattern	No	12	272	0.000-0.000	**0.000***
		Yes	19	97		
Degree of effects on health		No at all	11	30	0.000-0.000	**0.000***
		Very much	20	339		
Specific health problem due to climate change	Respiratory diseases	No	31	179	0.000-0.000	**0.000***
		Yes	0	190		
	Water/food borne diseases	No	24	144	0.000-0.000	**0.000***
		Yes	7	225		
	Vector borne diseases	No	16	66	0.000-0.000	**0.000***
		Yes	15	303		
	Diarrhoea	No	27	181	0.000-0.000	**0.000***
		Yes	4	188		
	Poor air quality	No	27	`168	0.000-0.000	**0.000***
		Yes	4	201		
Effects on environment	flood	No	12	85	0.078-0.046	**0.050***
		Yes	19	284		
	Drought	No	19	47	0.000-0.000	**0.000***
		Yes	12	322		
Specific action to protect health		No	08	215	0.001-0.000	**0.000***
		Yes	23	154		

Source: *Author's Survey data, 2025*

Discussion

Several statistically significant factors associated with climate change awareness among participants were identified in this study. These include age, educational level, information sources, accurate knowledge of climate causes and consequences, and gendered perceptions of health impacts.

Age was a significant determinant of awareness; participants under 40 years old exhibited significantly higher levels of awareness ($p = 0.003$). This trend aligns with global findings where younger individuals tend to be more environmentally engaged, potentially due to greater exposure to climate content via education and digital platforms. Younger populations have also been found to express stronger intentions to participate in climate-positive behaviours [17].

Educational level also significantly influenced climate change awareness. Participants with formal education demonstrated greater awareness compared to those with no formal educational. This supports previous findings that higher education levels are associated with improved scientific literacy and environmental concern [18]. Formal education fosters the intellectual capacity needed to understand complex global issues like climate change.

Sources of information were another influential factor. Participants who cited family ($p = 0.021$) and NGOs ($p = 0.001$) as their primary sources of climate information were significantly more aware of climate change. These findings highlight the importance of trusted interpersonal and community networks in effective climate communication [19]. The

limited mention of governmental sources suggests a gap in national public sensitization efforts.

Awareness was also significantly associated with accurate identification of climate change causes and consequences. Respondents who correctly cited human activities like fossil fuel combustion ($p = 0.012$), deforestation ($p = 0.028$), and rising surface temperatures ($p = 0.019$) had significantly higher awareness. This corroborates findings from studies showing that understanding the mechanisms behind climate change is one of the strongest predictors of awareness and concern [20]. Likewise, awareness was higher among those recognizing key consequences such as flooding ($p = 0.000$), heatwaves ($p = 0.009$), and food insecurity.

Gender-based differences in awareness and health perception were also observed. All male respondents believed that climate change affects health, compared to 81% of female participants ($p = 0.000$). While global data often show that women express greater concern about environmental risks [21], this finding suggests localized gendered experiences may influence perceptions differently. Men are sometimes reported to show greater belief in environmental risk when framed in terms of health threats, whereas women often emphasize emotional or social vulnerability [22].

There was also a strong association between climate change awareness and perceived health impacts. Participants who believed climate change could affect health were more likely to take protective health measures ($p = 0.021$), supporting the theory that perceived personal health risks drive both awareness and adaptive behaviour [23, 24].

Moreover, awareness was significantly linked to specific perceived health threats such as vector-borne diseases ($p = 0.001$), poor air quality ($p = 0.052$), and poor water quality ($p = 0.045$). These findings reflect a growing body of literature connecting climate variability to health risks [25].

Environmental resource access also showed significant associations with awareness. Participants with access to clean air ($p = 0.029$), clean water ($p = 0.032$), and healthcare ($p = 0.032$) were more aware of climate change, reinforcing the idea that lived environmental realities may outweigh demographic predictors like marital status or education [26].

Interestingly, while men in this study were unanimously aware of the health impacts of climate change, only 81% of women agreed ($p = 0.000$). This contradicts broader research indicating that women are generally more environmentally concerned [21]. Such findings point to contextual differences possibly driven by gendered roles or information access.

Furthermore, participants who defined climate change as a long-term shift in temperature and weather patterns were significantly more aware ($p = 0.034$), reinforcing the role of scientific literacy in shaping environmental awareness [27].

Environmental stressors such as drought ($p = 0.000$) and flooding ($p = 0.050$) were also linked to increased perception of health impacts. These results echo studies showing that extreme weather events enhance public recognition of the health dimensions of climate change [28].

Multivariate analysis supported these findings: younger age ($p = 0.003$), recognition of anthropogenic drivers like fossil fuel use and deforestation, and understanding of CO_2 as a key greenhouse gas ($p = 0.000$) were strong predictors of awareness. These results emphasize the value of climate science literacy [29].

Lastly, the strong association between trusted information sources such as family and NGOs ($p = 0.021$ and $p = 0.001$, respectively) and awareness highlights the critical role of localized and personal communication strategies, especially in contexts of low institutional trust [30].

Conclusion

This study identified several significant predictors of climate change awareness, including age, educational level, accurate knowledge of causes and consequences, trusted sources of information, gendered health perceptions, and access to essential resources. Younger and more educated individuals demonstrated higher awareness, highlighting the roles of formal education in climate change awareness and effects on health. Accurate understanding of anthropogenic drivers and climate-related health threats also strongly influenced awareness. Furthermore, trusted community-based information sources like family and NGOs were more effective in raising awareness than institutional channels. The findings emphasize the need for targeted, gender-sensitive, and context-specific public education strategies that prioritize scientific literacy and leverage trusted social networks to enhance climate change awareness and health preparedness.

Overall, the findings emphasize that climate change awareness is influenced not just by demographic variables, but also by accurate scientific understanding, the relevance of information to lived experience, and trust in the source of information. Strategies aimed at improving awareness should thus consider both informational content and the channels through which it is delivered.

The results suggest that enhancing public understanding of climate change requires multidimensional strategies. These include integrating climate content into formal education, utilizing trusted communication networks such as family and NGOs, and ensuring scientific accuracy in public messaging. Moreover, acknowledging gender and age-specific communication preferences may enhance engagement and policy support.

Conflict of Interest

The author reports no conflict of interest in this study.

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