TRANSLATING AWARENESS INTO REGULATORY POLICY ACTION: A STUDY ON CLIMATE CHANGE ENGAGEMENT AND IMPLEMENTATION

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Abstract

This study assessed the level of climate change awareness among residents in Sto. Domingo, Nueva Ecija, Philippines, with a focus on their understanding of the Local Climate Change Action Plan (LCCAP) (2018–2023). Using a quantitative descriptive method, 414 residents across 24 barangays were surveyed to evaluate their awareness of climate change causes, effects, mitigation, and adaptation. Results revealed moderate awareness overall, with higher understanding of causes and effects than of mitigation strategies. Television and local government sources were the most common information channels. Socio-demographic factors such as gender, employment, education, and particularly location, showed varying degrees of correlation with awareness levels, with those in more exposed areas being more informed. The study highlights the need for community-focused educational interventions and improved information dissemination tailored to local realities. Findings contribute to the understanding of how Climate Action Plans can be better aligned with community needs and the Sustainable Development Goal (SDG) 13 on Climate Action.

Keywords: Adaptation, Climate Change Awareness, Local Climate Change Action Plan, Mitigation, SDG 13 Climate Action, Sto. Domingo, Strategic Development Plan, Sustainable Development Goals

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1. INTRODUCTION

Climate change is a pressing global issue that affects nature, economies, and human well-being. It is characterized by increasingly extreme weather patterns, including hotter temperatures, heavier rainfall, and stronger storms. These changes are largely attributed to human activities such as fossil

fuel combustion and deforestation, which contribute to the accumulation of greenhouse gases and intensify global warming. In response, Sustainable Development Goal (SDG) 13 calls for urgent action to combat climate change through mitigation and education.

In the Philippines, the danger is higher. Why? Because we are in the typhoon belt. Every year, around 20 typhoons hit the country, plus floods, droughts, and cyclones. One example is Sto. Domingo, a lowland farming town that is easily affected by disasters. When Typhoon Lando hit, many homes were destroyed and farmlands were damaged (Local Climate Change Action Plan [LCCAP], 2018–2023). This shows the need for strong climate action at the local level to protect barangays.

People need to understand what climate change is. When they are aware, they can take action. Awareness helps people do things like mitigation (reducing harmful emissions) or adaptation (preparing for storms). In rich countries, more people know about climate change. In poor countries, not as much. But local people are very important, they are the ones who feel the changes and live with the effects. So, it's important to listen to them, learn their problems, and make climate plans that match their real needs (Aversa, 2023; Basyith et al., 2024; Guo & Oh, 2024; Wedayanti et al., 2025).

Education helps a lot in raising climate change awareness. When people study more, they usually care more about the environment (Santos et al., 2025). But the problem is still there in many provinces; it's hard for people to learn about climate issues. Schools and information are not easy to access. In the Philippines, even if we have the National Climate Change Action Plan and we joined the Paris Agreement, it's still hard to reach people in barangays (Climate Change Commission, n.d.; National Integrated Climate Change Database Information and Exchange System [NICCDIES], n.d.). Poor communities often do not get enough support, so programs don't work well.

To address climate change, reducing excessive carbon emissions through the use of clean energy and improved energy efficiency is essential. Efforts to lower emissions require coordinated action that supports economic development while also protecting the environment. Collaboration among governments, private sector actors, and communities plays a key role in achieving these goals.

In terms of adaptation, preparing communities for climate-related risks is critical. This includes strengthening local readiness through early warning mechanisms, disaster preparedness planning, and capacity-building initiatives. In Sto. Domingo, measures such as improving community awareness, enhancing disaster response planning, and providing agricultural education can contribute to safer and more resilient food production systems.

But even if there are many programs, people in Sto. Domingo still does not know much about climate change, especially about mitigation or how to reduce emissions. That makes the programs weaker. Also, there's no clear data yet on how age, income, work, or education affect people's climate knowledge. So this study asks: How do people's backgrounds and local efforts affect their climate change awareness in Sto. Domingo, Nueva Ecija?

While existing studies have explored general awareness of climate change in urban and rural settings, there is limited empirical research in the Philippine context — particularly in semi-rural, agriculture-based municipalities like Sto. Domingo. Specifically, there is a lack of data assessing how socio-demographic variables intersect with awareness of local climate mitigation and adaptation efforts. This study fills this gap by examining localized awareness in relation to actual programs under the LCCAP. This study aims to evaluate the level of awareness and understanding of climate change and the LCCAP among residents of Sto. Domingo, Nueva Ecija. It seeks to answer the research question:

RQ1: How do socio-demographic factors and information sources influence climate change awareness — specifically in terms of context, causes, effects, mitigation, and adaptation — among Sto. Domingo residents?

This research aims to measure how well the people in Sto. Domingo understands climate change and how aware they are of the LCCAP (2018–2023). It uses a quantitative descriptive method to see if factors like age, education, and barangay information affect awareness. If we find gaps, we can help make better plans for SDG 13: Climate action, so people can be more prepared and stronger against climate risks.

This research is grounded in the theory of planned behavior (TPB) (Ajzen, 1991), which posits that individual behavior is influenced by attitudes, social norms, and perceived behavioral control. TPB serves as the lens through which the influence of background, information access, and trust in institutions is assessed in relation to climate change awareness and engagement.

Using a quantitative descriptive design and correlation analysis, the study contributes evidence on how to improve climate education and local action in vulnerable communities, supporting progress toward SDG 13.

The paper follows a structured flow. Section 2 provides a detailed literature review, highlighting the state of the research and identifying gaps. Section 3 explains the research methodology employed. Section 4 presents the primary findings. Section 5 delves into a detailed discussion of these results. The final Section 6 concludes the study, offering recommendations for future research.

2. LITERATURE REVIEW

The study highlights that climate change awareness is influenced by factors such as education, occupation, and geographic location. Individuals with higher educational attainment tend to have a greater understanding of the causes, impacts, and solutions to climate-related challenges (Ng'ombe et al., 2020). Similarly, those working in agriculture or environmental sectors are often more informed, especially in rural areas like Sto. Domingo, where livelihoods are directly affected by typhoons and droughts (Ajuang et al., 2016). Geographic location also plays a role; residents living in flood-prone or disaster-affected areas tend to exhibit higher awareness and stronger motivation to act (Lee et al., 2015). Firsthand exposure to climate risks significantly motivates individuals and communities to prioritize protective measures for their homes, land, and families. Studies indicate that local experiences of climate vulnerabilities, such as

drought or floods, enhance awareness of climate threats, prompting communities to adopt adaptation strategies tailored to their unique situations (Sulamo & Mulugeta, 2024; Oliver et al., 2023). Specifically, smallholder farmers have been shown to modify their practices in response to their experiences with climatic variability, indicating a strong link between exposure and adaptive behavior (Sulamo & Mulugeta, 2024; Mahama et al., 2024). Additionally, emotional responses, such as climate anxiety, can further mobilize individuals and communities to take protective actions (Momenpour & Choobchian, 2025). The significance of community-driven adaptation strategies highlights the need for integrating local knowledge and lived experiences into broader climate policy frameworks (Oliver et al., 2023), thereby fostering resilience in high-risk communities.

But awareness is not equal everywhere. In rich countries with strong schools, the internet, and government support, more people understand climate change. In poor countries like the Philippines, it's different; many areas don't have enough schools or access to information, so people know less about climate issues. The necessity for localized solutions in climate change adaptation is increasingly evident, as a "one-size-fits-all" strategy proves inadequate for addressing community-specific needs (Maulana et al., 2023; Mulyawati et al., 2024; Que & Islam, 2024). Different areas face unique challenges that demand tailored approaches, highlighting the importance of integrating local knowledge and practices into adaptation planning (Gudoshava et al., 2024). Education stands as a fundamental instrument in this process; empowering communities with knowledge fosters resilience and enables informed decision-making while promoting sustainable practices (Rom, 2023; Nason, 2024). For instance, engaging communities in understanding local ecosystems can help implement strategies that effectively mitigate natural hazards (Lubis et al., 2024). The synergy between local engagement and educational initiatives can enhance community preparedness, thereby reducing vulnerability to climate-related impacts (Sun et al., 2025; Fambirai et al., 2022). Many studies say that when people go to school, they learn more about climate change. But in far barangays, there are problems with not enough teachers, books, or support. If we bring strong climate education to these areas, people can learn and help their communities.

In the Philippines, we already have climate laws and plans like the National Climate Change Action Plan and our pledge under the Paris Agreement (Climate Change Commission, n.d.; NICCDIES, n.d.). But even with these, the real problem is on the ground: not enough budget, skilled workers, or trained people.

To fix this, we need community participation. Mitigation means stopping harmful emissions, like using clean energy, saving electricity, and planting trees. Adaptation means preparing for danger, building strong houses, doing smart farming, and having disaster plans. Towns like Sto. Domingo also needs to act, since they are among the most at risk.

This review shows that climate awareness is not simple. Many things are connected to the place, the people, and the government. This study looks deeply into Sto. Domingo to see how people understand and respond to climate issues. With this, we can get real data to help create better plans for future climate action.

3. METHODOLOGY

This study employed a quantitative descriptive method to assess climate change awareness in Sto. Domingo, Nueva Ecija — a small town comprising 1.32% of the province, with 24 barangays and a 2020 population of 61,092. Using the Raosoft Sample Size Calculator, 414 households were proportionately sampled to ensure fair representation across barangays. Respondents included barangay leaders and residents selected through key informant surveys. Data were gathered through a structured questionnaire on a four-point Likert scale, rating awareness from high to not aware. The tool had three parts: 1) socio-demographic profile (age, gender, education, occupation, etc.), 2) knowledge and understanding of climate change causes, effects, and misconceptions, and 3) sources of information such as television, radio, social media, and barangay meetings. This helped the researchers see which sources are most used or trusted by the community when it comes to learning about climate issues. To understand the results, the researchers used the weighted mean, which gives more value to important answers, to find the true average of people's views. Then, they used Pearson correlation to see if there's a connection between people's background (like education, age, or job) and their awareness. The study used Pearson correlation to examine relationships between socio-demographic variables and awareness levels, while Tukey's honest significant difference (HSD) after analysis of variance (ANOVA) identified which groups differed significantly. These tools ensured that observed differences were statistically valid and not due to chance, strengthening the reliability of the findings. They also used Tukey's HSD test, after doing ANOVA, to compare groups. This helped them see which groups really had different levels of knowledge, for example, whether farmers know more than non-farmers. Tukey's test gave a deeper look at which groups are more aware or less aware. Qualitative methods such as focus group discussions or interviews, as well as a mixed-methods approach, could have offered deeper insights into residents' perceptions. However, to effectively measure awareness across a broad population, the study adopted a quantitative descriptive design to capture general patterns and socio-demographic relationships. The TPB informed the design of the questionnaire, especially in crafting items related to attitudes (e.g., perceived seriousness of climate change), subjective norms (e.g., trust in local institutions), and perceived behavioral control (e.g., information access). TPB also guided the selection of explanatory variables for correlation analysis to evaluate the influence of socio-demographic traits on climate awareness and engagement.

4. RESULTS

4.1. Program, project, and activity on climate change mitigation in Sto. Domingo

Table 1 outlines the programs, projects, and activities (PPAs) related to climate change mitigation as listed in the LCCAP (2018–2023) of Sto. Domingo. These initiatives span several sectors, emphasizing multi-level governance in addressing climate risks.

Table 1. PPAs on mitigation (Climate Change Action Plan of Sto. Domingo)

Sector	*PPAs*
Environmental management	• Establishment of a Local Knowledge Management Center on Climate Change.
Education	• Inclusion of climate change and disaster preparedness in the school curriculum. • Adoption of climate change adaptation/disaster risk reduction. • Curriculum/lesson exemplars. • Establishment of Safe Schools Committee.
Emergency response	• Establishment of the health emergency response unit.
Disaster risk reduction and management (DRRM)	• Comprehensive DRRM training program, organized and functional. • Municipal Disaster Risk Reduction Management Council (MDRRMC)/Barangay Disaster Risk Reduction and Management Plan (BDRRM)/La Consolacion College Caloocan (LCCC). • Establishment of emergency educational shelter. • Training regarding Republic Act (RA) 10121 or the Philippine DRRM Act of 2010. • Training on RA 9729 or the Climate Change Act of 2009. • Installation of multi-hazard warning sirens in flood-prone areas. • Installation of flood measuring equipment. • Installation of rain gauges.

Sto. Domingo is addressing climate change through a collaborative, multi-sectoral strategy focused on resilience-building. A central initiative is the Local Knowledge Management Center on Climate Change, which equips communities with critical information and tools for action. Education plays a vital role, with climate change and disaster preparedness integrated into school curricula and the formation of Safe Schools Committees focused on risk assessment, preparedness, and infrastructure improvements (Gamit et al., 2024). Emergency response units strengthen health security during disasters by delivering timely medical assistance (De Lara & Santos, 2024). A holistic DRRM framework also includes Emergency Educational Shelters, capacity-building programs, and early warning systems — such as multi-hazard warning sirens and flood monitoring tools — to enhance local disaster response. Collectively, these initiatives reflect Sto. Domingo's strong commitment to community safety and climate resilience.

4.2. Program, project, and activity on climate change adaptation in Sto. Domingo

Table 2 presents the adaptation-focused PPAs outlined in the Sto. Domingo Climate Action Plan, showing localized strategies in agriculture, Water, Sanitation, and Hygiene (WASH), DRRM, and energy conservation.

Table 2. PPA's on adaptation (Climate Change Action Plan of Sto. Domingo)

Sector	*PPAs*
Agriculture	• Diversified cropping. • Agricultural practices prepared by the Department of Agriculture to combat the effects of climate change in agriculture. • Introduction of new varieties that can adapt to climate change. • Facilitation of erosion mitigation strategy. • Conduct an intensified information education campaign. • Intensive rehabilitation of the local drainage system.
WASH	• Comprehensive training program on safe water and proper hygiene, and sanitation. • Construction of a condominium septic tank and level III water system. • Carrying an intensified International Electrotechnical Commission (IEC) on water conservation awareness and practices. • Intensive IEC on water-borne disease brought by massive climate change.
DRRM	• Enhancement of the post-disaster scheme. • Comprehensive hazard mapping and policy formulation. • Rehabilitation/construction of infrastructural facilities.
Energy	• Energy conservation practice in the localityLocal energy plan. • Carry out intensified efforts on local energy conservation.

Sto. Domingo has adopted multiple adaptation strategies to address the diverse impacts of climate change across key sectors. In agriculture, crop diversification and climate-smart farming practices enhance food security, farmer income, and resilience by reducing risks associated with monoculture systems (Lane et al., 2024). Educational programs further strengthen farmers' capacity to adapt to changing environmental conditions.

In the water sector, efforts prioritize infrastructure improvement, hygiene promotion, and conservation campaigns to enhance water security and protect public health, consistent with the interlinkages between health systems and disaster preparedness (Clark & Sheehan, 2023). Disaster risk management initiatives, including hazard identification and recovery planning, aim to improve community readiness for climate-related hazards, aligning with adaptive approaches highlighted in recent studies (Wang et al., 2024).

Energy conservation initiatives promote cleaner energy sources to reduce greenhouse gas emissions and support broader environmental protection goals. Collectively, these strategies reflect a comprehensive approach to strengthening climate resilience in Sto. Domingo.

4.3. Socio-demographic profile

The socio-demographic profile of the respondents offers a detailed quantitative understanding of their characteristics, covering age, sex, income sources, employment status, and educational attainment. A significant portion of the respondents, specifically 26.33%, are aged between 26 years old to 35 years old, making this the largest age group. Following

closely are respondents aged 16 years old to 25 years old, accounting for 23.19%, and those aged 36 years old to 45 years old, comprising 21.50% of the total. Smaller percentages were recorded for the older age groups, with 17.15% falling between the ages of 46 years old to 55 years old, 9.66% between 56 years old to 65 years old, and only 2.17% for those aged 66 and above. This distribution highlights that the majority of the population is relatively young, with over half of the respondents being under 45 years old, indicating a youthful demographic profile.

Regarding gender, the majority of respondents are female, representing 57.49% of the sample, while males make up 42.51%. This notable difference suggests that women are more engaged in or willing to participate in the survey, which could reflect gender dynamics in the community's engagement with climate change awareness.

A substantial portion of respondents, specifically 38.89%, reported having no source of income, reflecting economic challenges in the area. Among those who do have a source of income, 28.5% are engaged in farming, making it the most common livelihood. Retail business follows at 14.73%, indicating that small business operations are also a notable source of income. Various other occupations are represented in smaller percentages, such as driving (2.42%), construction work (2.17%), and barangay official roles (2.17%). A small fraction of respondents, around 1.21%, are involved in onion farming or security work. Online selling, self-employment, and barangay police work each account for 0.97% of respondents. Other minor income sources include fast food crew (0.72%), sales (0.72%), and various other roles such as baristas, street sweepers, and lottery operators, each contributing 0.48% or less to the overall sample. This broad spectrum of income sources, coupled with the high percentage of those without income, underscores the economic diversity and significant unemployment or underemployment within the community.

In terms of employment status, the data reveal that an overwhelming majority of respondents, 93.72%, are unemployed. Only a small percentage, 3.38%, are employed as teachers, and even fewer hold government jobs (0.97%), work as nurses (0.48%), serve as police officers (0.48%), or manage businesses (0.48%). Other professions, such as bank employees and daycare workers, are scarcely represented, each comprising only 0.24% of the total respondents. These figures highlight a significant lack of formal employment opportunities within the community, with only a handful of respondents engaged in professional or governmental roles.

Educational attainment data show that 52.42% of the respondents have completed high school, making it the most common level of education. A smaller proportion, 20.29%, have attained tertiary education, while 18.12% have only completed elementary school. A further 9.18% reported other forms of educational background. These figures indicate that while basic education is relatively widespread, the proportion of individuals with higher education is limited. This lack of advanced education may have implications for the community's capacity to fully engage in more complex discussions or actions related to climate change mitigation and adaptation.

4.4. Level of awareness of the respondents on climate change

4.4.1. Context of climate change

When asked about climate change, most respondents said they only know a little. The average score was 3.10, which means "moderate" awareness. People have a general idea that climate change is happening, but don't fully understand the details. The findings indicate a moderate level of climate change awareness among respondents, particularly regarding its impacts on health and agriculture. Awareness of livestock diseases associated with parasites scored 3.23, suggesting some recognition of climate-related zoonotic risks, although this is not directly supported by the cited reference (Collier et al., 2021). A mean score of 3.02 reflects partial acknowledgment of human contributions to climate change, though the cited studies do not specifically address public perception of anthropogenic causes (Cisneros et al., 2025; Liu, 2023). Lower awareness was observed for temperature-related waterborne illnesses (2.91), while awareness of extreme weather events was higher (3.27), consistent with broader findings on health outcomes linked to temperature extremes (Pakdemirli et al., 2021). Awareness of pests increases due to rising temperatures, scoring 3.06, but lacks direct support from the referenced literature. These results suggest that while respondents demonstrate basic awareness of climate change impacts, their understanding remains limited, highlighting the need for strengthened climate and health education initiatives.

4.4.2. Causes of climate change

The findings indicate a moderate level of awareness of climate change causes among respondents, with an average score of 3.10, suggesting general but limited understanding. Higher awareness was observed for air pollution from vehicles (3.32), reflecting recognition of a visible contributor to climate change (Piran et al., 2023), while lower awareness of fossil fuel combustion (2.84) points to gaps in understanding energy-related emissions, consistent with previous findings (Piran et al., 2023). Awareness of deforestation scored 3.17, indicating recognition of its role in carbon emissions, whereas knowledge of methane emissions from waste was relatively higher (3.29). In contrast, awareness of chemical pesticide use and its implications for the ozone layer was low (2.89), highlighting a critical knowledge gap (Gautam et al., 2021). Overall, while respondents demonstrate some awareness of climate change causes, their understanding remains shallow, underscoring the need for enhanced educational initiatives to deepen climate literacy (Bishoge et al., 2022).

4.4.3. Effects of climate change

Respondents in Sto. Domingo showed moderate awareness of climate change impacts (mean = 3.08), with the highest awareness related to agricultural effects, particularly changes in rainfall (3.41), consistent with the community's farming context (Erkan & Kavak Budak, 2025). Awareness of health

issues from urban air pollution (3.23) and biodiversity loss (3.18) was also evident (Ruz et al., 2020). However, awareness of the negative effects of fertilizers and pesticides on soil was low (2.50), and understanding of water-related issues such as floods and droughts was only moderate (3.08), indicating gaps in knowledge about the causes and broader interactions of climate change and agricultural practices (Nepraš et al., 2023).

4.4.4. Mitigation

When asked about solutions to fight climate change, awareness was low, with an average score of 2.48, which means "Not aware". Only a few respondents were aware of government-led training under RA 10121 (Philippine DRRM Act of 2010), which scored 2.71. However, many only attended these activities if invited by the Local Government Unit (LGU). Some never joined at all. Knowledge about flood control equipment scored very low at 2.24, and awareness of rain gauge projects also scored low at 2.27. Awareness of flood sirens was slightly better but still low at 2.51. These findings suggest that many people are not well-informed about disaster preparation, and government communication needs to improve.

4.4.5. Adaptation

In terms of adaptation, or how people adjust to climate change, the average score was 2.83, still in the moderate range. The highest awareness was on tree planting, which scored 3.33. Many respondents had joined tree-planting activities and understood their importance. However, awareness of local energy plans was very low, scoring only 2.21, indicating that these programs are not well promoted. Information campaigns scored 2.73, while the Department of Agriculture's support for climate-smart farming scored 2.82. Awareness of waste management programs was a bit higher at 3.07. Overall, while people are aware of some adaptation efforts, more education and outreach are needed to help them respond better to climate challenges.

4.5. Sources of information of the respondents on climate change

Respondents in Sto. Domingo accesses climate change information through various sources, including television, radio, social media, government agencies, and educational activities. Each source differs in usage frequency and perceived usefulness. Television is the most frequently used and trusted medium, with an overall mean score of 2.78 ("Frequently"). Weather reports scored the highest at 3.36 ("Always"), confirming TV's role in delivering timely updates on rain, heat, and storms. In contrast, radio is less used, scoring 2.43, likely due to a shift toward mobile and visual platforms. Social media is accessed rarely, with a mean score of 2.39. Facebook is the most used platform (mean: 2.29), while Twitter is the least used (1.95), reflecting preferences for more familiar and accessible formats. Respondents reported incidental exposure to climate-related content while browsing. Among government agencies, the Municipal Disaster Risk Reduction and Management Office (MDRRMO) is the most relied upon, with a mean score of 2.80. Overall, government sources scored 2.63 ("Frequently"), indicating institutional trust during emergencies. Other agencies like DENR and the Department of Agriculture were mentioned less frequently. The Department of Education received a lower score (2.35), suggesting limited integration of climate topics in school or community discussions. Educational activities such as seminars and webinars scored 2.48 ("Rarely"). Seminars (mean: 2.64) were more accessible, especially when held locally. Webinars scored lower (2.26) due to barriers like limited internet access, digital illiteracy, and time constraints related to agricultural work. In summary, TV and local government agencies are the most accessible and trusted sources of climate information. Social media, schools, and online webinars play smaller roles. To improve awareness, communication should prioritize television, face-to-face seminars, and community-based meetings that accommodate local contexts and capacities.

4.6. Relationship of the profile of the respondents with their awareness of climate change

The correlation analysis between socio-demographic factors and climate change awareness across context, causes, effects, mitigation, and adaptation reveals consistent but weak trends. For the climate context, weak positive correlations were found with *Sex* (0.041), *Employment* (0.168), and *Educational attainment* (0.153), suggesting that female, employed, and more educated respondents tend to have slightly higher awareness. Regarding climate change causes, correlations were negligible for *Sex* (0.009), but weakly positive for *Location* (0.062), *Employment* (0.152), and *Educational attainment* (0.127), indicating a modest influence from these variables. For awareness of effects, weak positive correlations were again observed for *Sex* (0.160), *Employment* (0.154), and *Educational attainment* (0.056), implying that lived experience and educational exposure may slightly enhance understanding. In mitigation, *Sex* (0.009) and *Educational attainment* (0.016) showed negligible correlation, while *Location* (0.193) and *Employment* (0.122) showed weak positive links, suggesting that proximity to risk and work-related exposure influence awareness. Finally, for adaptation, awareness correlated weakly with *location* (0.077) and *Employment* (0.154), but *Educational attainment* showed a negligible effect (0.005), indicating that higher education does not significantly influence understanding of adaptation strategies. These findings suggest that while socio-demographic traits — especially *Location* and *Employment* — do shape climate awareness, their influence is limited. Notably, education appears less impactful for practical adaptation knowledge, reinforcing the need for localized, experiential learning beyond formal education.

Table 3. Correlation between the profiles of the respondents in terms of: sex, source of income, location, employment, and educational attainment

Socio-demographic variables	*Context of climate change*	*Causes*	*Effect*	*Adaptation*	*Mitigation*
Age	-0.008	-0.130	-0.114	-0.022	-0.126
Sex	0.041	0.009	0.160	-0.047	0.009
Source of income	-0.077	-0.136	-0.148	-0.113	-0.108
Location	-0.040	0.062	-0.047	0.077	0.193
Employment	0.168	0.152	0.154	0.154	0.122
Educational attainment	0.153	0.127	0.056	0.005	0.016

5. DISCUSSION

5.1. Evaluating the effectiveness of local mitigation strategies in Sto. Domingo

Sto. Domingo's climate mitigation strategy demonstrates a multi-sectoral approach, with efforts in environmental education, institutional preparedness, and infrastructure. The establishment of a Knowledge Management Center on Climate Change in Sto. Domingo represents a strategic step toward strengthening community capacity through localized knowledge systems while advancing climate literacy through the integration of climate topics in school curricula and the formation of Safe Schools Committees, which together promote community resilience (Clark & Sheehan, 2023). The creation of health emergency response units further addresses climate-related public health risks by enabling timely and coordinated responses, consistent with the need to link disaster risk reduction and health system strengthening (Clark & Sheehan, 2023). Investments in early warning systems, particularly when combined with public training and regular drills, demonstrate a commitment to reducing disaster risks by integrating physical infrastructure with "soft" preparedness measures (Milivojevic, 2021). However, the long-term effectiveness of these initiatives depends on sustained funding, integration into local policies, and active community engagement. To prevent these efforts from becoming merely symbolic, Sto. Domingo must prioritize continuous monitoring, evaluation, and transparent communication to ensure that climate strategies remain effective, inclusive, and responsive to community needs, with particular attention to equity and inclusion in adaptation efforts (Slesinski et al., 2025).

5.2. Strengthening community adaptation strategies for climate resilience

Sto. Domingo's adaptation strategies are comprehensive, addressing key vulnerabilities in agriculture, WASH, disaster risk management, and energy conservation. In agriculture, crop diversification, erosion control, and the adoption of climate-resilient varieties enhance adaptive capacity and reflect climate-smart agriculture principles proven effective in resilience-building (Ndlovu & Mafuratidze, 2024), although marginalized farmers continue to face barriers to accessing extension services, underscoring the need for more inclusive support frameworks (Meher et al., 2024). WASH initiatives focused on infrastructure upgrades, hygiene training, and educational campaigns on water conservation and disease prevention strengthen community preparedness, while disaster risk management efforts, such as hazard mapping and rehabilitation, align with established standards but would benefit from stronger community participation to improve transparency and local ownership (Foley et al., 2022). Energy conservation contributes to both adaptation and mitigation goals, yet low public awareness limits its impact, highlighting the need for sustained education and engagement (Valencia, 2023). Overall, while Sto. Domingo's initiatives show strong potential, achieving long-term effectiveness requires closer alignment with national policies, systematic monitoring, and inclusive governance that empowers vulnerable groups (Tran et al., 2022).

5.3. Socio-demographic dimensions of climate adaptation capacity

Sto. Domingo's socio-demographic profile shows both vulnerabilities and opportunities for climate adaptation. Its young, predominantly female population faces barriers such as limited access to education, land, and finances (Das et al., 2022), yet also holds potential for empowerment if supported through education and leadership (Gebrehiwot et al., 2016). While high school completion is common, limited tertiary education may restrict deeper engagement, as higher education often correlates with climate preparedness (Sardar et al., 2020). Economic vulnerability — marked by high unemployment and dependence on climate-sensitive agriculture — further constrains resilience, with rural livelihoods especially exposed to risks like heat, rainfall variability, and pests (Call et al., 2019). Without income diversification, maladaptive practices may arise. Programs combining vocational training with climate education could strengthen both economic security and adaptive capacity (Boon, 2016). Inclusive planning is essential: participatory approaches foster ownership and align interventions with community needs (Álvarez-Nieto et al., 2022). Engaging young women in policy-making can improve long-term outcomes and cohesion. Overall, locally tailored, gender-responsive, and education-based strategies are needed, as socio-demographic factors should remain central to climate resilience planning (Habib et al., 2015).

5.4. Community awareness and understanding of climate change

5.4.1. Interpreting awareness of climate change context

Respondents in Sto. Domingo showed only moderate understanding of climate impacts, with stronger recognition of visible effects like extreme weather and animal disease, supporting Damoah's (2023) claim that awareness doesn't always lead to action. While many understand the human role in climate

change (mean: 3.02), the grasp of anthropogenic causes remains partial. Tewari et al. (2023) advocate integrating climate change education (CCE) in schools to boost scientific literacy, especially in agricultural areas. Acharibasam (2022) suggests combining Indigenous and formal knowledge for culturally resonant education, while Rushton et al. (2023) highlight the role of emotional, experiential learning in fostering internalized climate awareness. These insights point to the need for ongoing, community-based education grounded in the local context.

5.4.2. Understanding of climate change causes

While respondents are moderately aware of key causes like vehicle emissions and deforestation, their understanding of fossil fuel combustion is low (mean: 2.84). This reflects the "value-action gap" noted by Whitmarsh et al. (2011). Structured programs improve comprehension and engagement (Flora et al., 2014), and Horry et al. (2023) call for building "climate capability" by combining knowledge with civic action. Linking education to public health, as Gould and Rudolph (2015) recommend, may enhance its relevance by connecting global issues to daily life.

5.4.3. Perceptions of climate change effects

Awareness is strongest around precipitation effects on crops (mean: 3.41), confirming Niles et al. (2019) that personal exposure shapes perceptions. Yet, awareness of soil degradation from chemical use is low (mean: 2.50), raising concerns for sustainability. Dorji et al. (2021) and Damoah (2023) stress the need to include land management in CCE. Participatory workshops that connect abstract concepts to farming challenges — like yield decline and pest issues — can enhance understanding and action.

5.4.4. Awareness of mitigation measures

Low awareness of local mitigation efforts (mean: 2.48) highlights disconnects between planning and community engagement. While some awareness exists for RA 10121 and RA 9729 trainings, knowledge of specific projects like flood equipment remains limited. This reflects a "top-down" approach criticized by Poortinga et al. (2011) and Balderas Torres et al. (2020), where low institutional trust and communication gaps hinder public involvement. Wu et al. (2018) and Mutune and Nunow (2018) advocate for participatory governance and transparent outreach to improve engagement and accountability.

5.4.5. Awareness of adaptation measures

Moderately high awareness of visible actions like tree planting (mean: 3.33) shows success in community-led initiatives. However, awareness of technical plans — such as local energy adaptation — is low (mean: 2.21). Rana et al. (2022) warn that symbolic actions need to be paired with education on long-term impact, while Macdonald et al. (2020) stress tailoring outreach to participant profiles. Matias et al. (2023) and Gobir et al. (2021) emphasize using localized messaging, community champions, and incentives to increase participation in technical adaptation. Linking adaptation to practical concerns like energy savings and food security can turn awareness into action.

The findings align with the TPB by showing a connection between perceived behavioral control, awareness, and behavioral intention. Perceived control, encompassing access to information and institutional trust, was crucial in mediating awareness, consistent with evidence that higher trust in scientific institutions promotes compliance with expected health behaviors (Dawson et al., 2023; Thompson et al., 2023). This supports TPB's premise that perceived control influences intentions to act. However, the influence of subjective norms and attitudes was weaker. Subjective norms — defined as perceived social pressure — vary across contexts and may not strongly translate awareness into action without cues from trusted institutions or reinforcement (McDonnall & Cmar, 2022; Nguyen & Hoang, 2022; Marfuah et al., 2023). This gap, often noted in TPB, occurs when norms do not correlate with actual behavior, particularly where institutional or community-level supports are lacking (Dewi et al., 2022; McLamore et al., 2022). Thus, while the study substantiates TPB's core — linking control and awareness to intentions — the limited role of norms and attitudes highlights the need to enhance institutional trust and community reinforcement to ensure awareness leads to behavior (Chang & Kabilan, 2022; Tambun & Haryati, 2022).

5.5. Evaluating communication channels and information access on climate change

The study shows that television remains the most dominant and trusted source of climate information in Sto. Domingo, with weather reports frequently accessed, is consistent with Demir et al. (2023) and Samuel et al. (2018), who emphasize the enduring role of traditional media in rural contexts. TV serves as a bridge between scientific data and local understanding. Radio, once central, now sees reduced use, reflecting changing media habits. Engagement with social media and digital platforms, particularly Twitter and webinars, is minimal, pointing to a digital literacy gap that limits access to timely climate information (Çıplak, 2022). The low use of webinars may also result from technological barriers and labor demands, like farming. Facebook use is relatively common, showing that social media is not absent, but concentrated on familiar platforms. However, without quality control, misinformation can spread; credible content from trusted figures is needed. Government sources, especially the MDRRMO, are also key channels — supporting Mandleni and Anim's (2011) finding on the importance of transparent institutional communication. In contrast, the Department of Education's lower visibility suggests missed opportunities for promoting climate literacy through schools and barangay learning hubs. Participation in climate education activities like seminars and webinars is limited, indicating the need for more accessible formats such as printed modules, radio segments, or community-based sessions. As Shahid (2023) notes, low climate literacy can have serious socio-economic consequences. To improve awareness and capacity,

Sto. Domingo must adopt hybrid strategies — combining traditional media, local government outreach, and interactive digital tools. Linking climate messaging to daily concerns, as Gould and Rudolph (2015) suggest, may also enhance relevance and engagement. Strengthening digital literacy and communication diversity is essential for fostering a climate-aware, responsive community.

5.6. Socio-demographic influences on climate change awareness

Correlation analysis showed generally weak links between socio-demographic variables and climate awareness, though some patterns emerged. Employment status and location had the strongest positive correlations with mitigation and adaptation awareness (0.122 and 0.193), suggesting higher awareness among those employed or in climate-vulnerable areas due to direct exposure or targeted programs (Ajuang et al., 2016; Lee et al., 2015). Educational attainment correlated modestly with awareness of context and causes (0.153 and 0.127) but was minimal for adaptation and mitigation, challenging the assumption that formal education alone ensures understanding (Ng'ombe et al., 2020). Weak correlations with sex (e.g., 0.041 for context) align with Das et al. (2022), indicating gender is less decisive than intersecting factors like agricultural roles or digital access. Negative correlations for income may reflect the informal, low-wage nature of livelihoods with limited climate information, supporting Samuel et al. (2018). Broader influences such as sociopolitical narratives and trust also matter (McCright & Dunlap, 2011). Overall, location and employment were the most consistent predictors, underscoring the importance of proximity to risk and practical experience. Effective communication should move beyond generic messaging by using localized storytelling, workplace-based training, and participatory mapping to bridge the gap between knowledge and action in semi-rural areas like Sto. Domingo.

Although TPB anticipates that attitudes, norms, and perceived control significantly influence climate-related behavior, the observed weak correlations suggest that structural constraints (e.g., poverty, low institutional capacity, limited digital literacy) may moderate these effects. The weak role of education in adaptation awareness, for instance, highlights the need to supplement formal education with experiential and community-based learning. Future applications of TPB in rural settings should account for such contextual barriers to behavioral change.

6. CONCLUSION

This study assessed climate change awareness among residents of Sto. Domingo, Nueva Ecija, focusing on their understanding of climate change and the LCCAP. While moderate awareness levels were found for causes and effects, awareness of mitigation strategies was significantly lower. Employment status and geographic location were the most consistent socio-demographic predictors of awareness. The results underscore the importance of context-based communication and education. Traditional media and local government agencies remain the most accessible information sources, while formal education and digital platforms are underutilized.

The findings are important for future research because they provide empirical evidence from a semi-rural, agriculture-based municipality — a setting often underrepresented in climate awareness studies. They show that institutional trust, accessible communication, and community-based education are central to bridging the gap between awareness and actual behavioral change. Future research can build on this by testing participatory models of climate planning, evaluating the effectiveness of localized communication strategies, and exploring how digital literacy programs may reshape awareness and engagement.

This study has limitations. It relied primarily on self-reported survey data, which may be subject to response bias. The quantitative design also limited deeper exploration of personal perceptions, values, and cultural practices that may shape awareness. Furthermore, the study was localized to Sto. Domingo, so generalizations to other municipalities should be made with caution. Despite these limitations, the implications are clear:

- Local governments should prioritize educational initiatives that address specific knowledge gaps (e.g., energy use, soil degradation).
- Barangay-level programs and school curricula should integrate CCE more explicitly.
- Community-based and culturally appropriate communication strategies should be designed to match residents' lived realities.
- Digital literacy programs must be developed to ensure equitable access to climate information in an increasingly online environment.

Addressing these areas, Sto. Domingo and similar municipalities can better align their local actions with SDG 13 and enhance long-term climate resilience.

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