

# Understanding the concern to communicate climate change in Northeast of Catanduanes, Philippines

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## Abstract

The study understands the levels of concern and communication strategies regarding climate change causes, effects, and mitigation, as influenced by the respondent's sex, age, educational attainment, and position within the Barangay in the Northeast of Catanduanes, Philippines. The barriers to effective climate change communication are also thoroughly investigated. A mixed-methods approach utilizing quantitative and qualitative methodologies through an online survey was employed. Through the survey, comprising 154 valid responses, it was observed that females and males exhibit considerable concern regarding climate change, with variations in prioritizing causes, effects, and mitigation strategies. Age-based analysis reveals differences in preferred strategies, where younger respondents emphasize renewable energy, and the older demographic favors interpersonal communication. Educational attainment positively correlates with a heightened concern for effective mitigation strategies, emphasizing the role of education in fostering informed responses to climate challenges. The study highlights distinctive concerns and strategies between Barangay Residents and Officials, underlining the need for tailored approaches considering different priorities. In identifying primary barriers, such as lack of information and financial constraints, the study recommends multifaceted solutions. These include sex-focused engagements, age-specific efforts, educational drives, customized Barangay plans, and tackling communication challenges, aiming to enhance community-centric solutions and overcome barriers associated with climate change communication within the local community. This research provides nuanced insights into the varied demographic, psychological, and social factors influencing climate change communication. The findings are aligned with established theories and prior research, emphasizing the importance of tailored strategies and diverse communication approaches to engage diverse audiences and address climate change concerns effectively.

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**Keywords:** Barangay; Climate change communication; Catanduanes; Local community

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## 1. Introduction

In the contemporary era, climate change stands as one of the most critical challenges globally, recognized as an imperative focus under the United Nations Sustainable Development Goals (UN SDGs), prominently highlighted within Goal 13: Climate Action (Neal, 2016; Bhore, 2016). The urgency to address this intricate and continually evolving climate change phenomenon has grown increasingly apparent, necessitating a profound understanding of its impacts and the implementation of effective communication strategies, particularly within local communities (Canfield et al., 2021; Nash et al., 2019). The global discourse on climate change is shaped by various international agreements and frameworks (Anwar et al., 2019; Cynk, 2018; Ebi et al., 2016). Notably, the Paris Agreement, a pivotal international treaty operating under the United Nations Framework Convention on Climate Change (UNFCCC), stands as a cornerstone for international cooperation in combating climate change (Senathirajah et al., 2023; Pietrapertosa et al., 2021). This landmark agreement calls for unified efforts among nations to limit global temperature rise and adapt to its impacts. Within the Philippine context, legislative instruments such as the Climate Change Act of 2009 established the legal framework for addressing climate-related challenges, emphasizing the necessity for strategic communication, education, and community engagement to mitigate its impacts (Zaplan, 2023; Pulhin & Tapia, 2022). These legal foundations underscore the critical importance of informed communication strategies in engaging local communities to address and adapt to the multifaceted challenges posed by climate change.

Climate change is a complex and gradually unfolding phenomenon that necessitates effective communication to foster understanding and action. As posited by Spence (2011), grasping climate change often relies on observable weather patterns and seasonal events, serving as fundamental indicators for individuals to comprehend this intricate process. In the context of the Philippines, which endures an average of 20 typhoons annually (Genilo, 2018), crisis communication has become a standard procedure during calamities. Moreover, higher education institutions (HEIs), as emphasized by Cuaresma (2017), play a significant role in addressing climate change issues through instruction, research, and capacity building.

Communicating about climate change remains challenging, as highlighted by Lyytimäki et al. (2013), due to its complexity and the limited sources available for effective communication. However, achievable solutions, such as harmonizing multiple communication channels and forming partnerships, can enhance communication efforts (Lyytimäki et al., 2013). According to Moser (2010), communicators often face skepticism regarding human-induced global climate alterations. Addressing this skepticism, as supported by Hine et al. (2013), proves essential in bettering climate change communication, although it might not entirely achieve the goals of climate change programs.

The involvement of local communities in formulating climate change solutions, as demonstrated by Dulic et al. (2016), is a crucial aspect. This aligns with the current study's approach, targeting barangay officials and their residents—the primary recipients of climate change communication at the local level. Ballantyne (2016) asserts that communication transcends conveying technical information and instead serves as a practice influencing the truth about climate change as an ethical, cultural, and sociological occurrence. Moreover, Moser (2017) emphasizes the need for more guidance in communicating and combating climate threats amidst long-term environmental degradation. Floranza (2020) further underlines that awareness alone might not drive effective climate change mitigation.

In light of these scholarly perspectives, this study intends to delve into the communication dynamics surrounding climate change within the Northeast of Catanduanes, Philippines. By investigating the profile, level of concern and common strategies to communicate climate change, and the perceived barriers among barangay officials and residents, this study aims to bridge existing gaps in climate change communication strategies tailored to the community's diverse demographics. Addressing these gaps and barriers holds crucial significance in fostering informed decision-making, mobilizing communities, and driving behavioral change in the collective effort to combat climate change.

Aligned with global and national climate change agendas and considering the prevailing research gaps, this study is a vital academic pursuit. By providing insights into localized communication strategies, it informs policy formulation, educational outreach, and community engagement. The ultimate goal is to empower and mobilize communities in effectively combating the challenges posed by climate change (Leal et al., 2023).

### *1.2 Statement of the Problem*

The study understands the concern of communicating Climate Change in the Northeast of Catanduanes, Philippines. Specifically, the study answered the following questions: 1. What is the level of concern and common strategies to communicate Climate Change among the Barangay respondents in Northeast Catanduanes in terms of A) Climate Change causes, B) Climate Change effects, and C) Climate Change mitigation according to their A) Sex; B) Age; C) Educational

Attainment; and Position in the Barangay?; 2. What are the Barriers to communicating Climate Change among the Barangay respondents, and what further details explain the barriers to communicating Climate Change?

## 2. Literature review

This portion presents International and local papers that may clarify the variables of the present study.

### Climate Change Versus Sex

The study by Zainulbhai (2015) unveiled that Women, more than men, are noticeably more worried about climate change impacting them personally, particularly in wealthier nations. In many developed countries, including the U.S., Canada, Germany, and South Korea, women tend to see climate change as a severe problem, feel concerned about its potential personal harm, and advocate for significant lifestyle changes to combat it. For instance, in the U.S., there is a significant difference: 17% more women view climate change as a serious issue compared to men. Similar trends are observed in Canada and Australia, with women expressing 12 to 13 percentage points more concern than men in their respective countries. This gender gap extends to concerns about personal harm from climate change. For example, in the U.S., 69% of women worry about being personally affected, while only 48% of men share the same concern. This trend is seen in other surveyed countries, such as Germany and Canada, where women exhibit 14 to 15 percentage points higher concerns than men.

The local present study shares similarities with the global findings that reveal a notable trend: women tend to express greater concern about the personal impacts of climate change compared to men. As observed in the broader global study across developed nations, the local research here also indicates a similar gender discrepancy in climate change concerns.

Understanding and acknowledging this discrepancy is crucial in shaping local strategies and initiatives related to climate change. Recognizing that women exhibit higher levels of concern can guide tailored approaches to engage and involve them more effectively in local climate action plans. Leveraging the specific interests and priorities of women can be instrumental in fostering more vital community awareness and mobilization for climate change initiatives at a local level.

The study of Desrochers et al. (2019) provided discussion focuses on the consistent observation that women tend to exhibit higher pro-environmental attitudes and engage more in conservation behaviors compared to men. This finding is substantiated across various studies and is considered a robust aspect of environmental psychology. The discussion highlights the importance of this gender disparity in the context of societal efforts to combat environmental degradation. It emphasizes the need to investigate the underlying reasons for these differences, specifically through the lens of personality traits, notably conscientiousness. The studies touch upon the exploration of continuous gender measures, indicating that gender differences might manifest differently from biological sex. Results suggest that while conscientiousness continues to mediate gender differences in environmental behavior, gender variance might impact protectionist attitudes differently. The study of Desrochers et al. (2019) emphasizes the importance of conscientiousness in mediating gender differences in pro-environmental attitudes and behaviors. Encouraging conscientiousness among men could potentially bridge the gap in environmental engagement between genders.

McCarthy and Citizen (2020) reported that Climate change affects everyone, but it is worsened by gender inequality. Extreme weather events like heat waves, droughts, and storms harm women more. Why? Women often face poverty, limited rights, and violence, making them more vulnerable. As climate change worsens, women will face the toughest challenges. The Paris climate agreement aims to help women deal with these hazards. The International Panel on Climate Change noted that women's workload, health risks, and mortality due to climate hazards are higher compared to men, thanks to gender inequalities. This inequality limits women's ability to take action against climate change. Lack of resources, education, information, and unequal rights affect what women can do in the face of climate change.

McCarthy and Citizen (2020) further claimed that the future might seem challenging, but women globally show incredible resilience. They lead movements for climate action, promote clean energy, and create sustainable, cooperative communities. It is important to note that women are not just victims of climate change. Their active involvement and leadership can create positive change in their countries and communities.

Consistent with Desrochers et al. (2019) and McCarthy & Citizen (2020), the present study highlights the necessity for targeted strategies. Leveraging women's slightly higher concern can effectively propel climate initiatives. This echoes the broader trends observed, emphasizing the importance of tailored approaches to engage and mobilize women, fostering community awareness and impactful climate action.

### Climate Change Versus Age Group

Funk, C. (2021) survey by the Pew Research Center delineates significant generational disparities in attitudes and engagement concerning climate change. Younger cohorts, notably Gen Z and Millennials, exhibit more pronounced involvement both online and offline in addressing climate concerns. This involvement encompasses personal actions such as donations, volunteerism, and advocacy through contacting elected officials, attending rallies, and discussing climate change within their social circles. Notably, younger generations display a higher degree of engagement with climate-related content on social media, sharing posts and interacting with accounts focused on climate issues. While a consensus exists on prioritizing alternative energy sources over fossil fuels, there is a distinct generational divide regarding more extreme measures, such as completely phasing out gasoline-powered vehicles and eliminating the use of oil, coal, and natural gas. Notably, within the political landscape, disparities persist, with younger Republicans less supportive of increased fossil fuel usage compared to older Republicans and showing greater willingness to phase out gasoline-powered vehicles. Democrats across generations largely support climate action, but younger Democrats exhibit more pronounced favor toward policies entirely breaking from fossil fuels.

Funk, C. (2021) also reveals emotional and knowledge gaps influenced by social media engagement, with deeply concerned individuals expressing more anxiety and anger in response to climate-related content. Additionally, there is a growing divergence in trust and perception of expertise in climate scientists, with Democrats increasingly trusting their understanding while Republicans become more skeptical, echoing the broader partisan divide on trust in scientists. These findings highlight the complex interplay between age, political affiliations, media engagement, and trust in shaping attitudes toward climate change and associated policy measures.

Ballew et al. (2019) reported that Younger Americans, compared to their older counterparts, are notably more concerned about global warming, as evidenced by higher levels of worry among adults aged 18 to 34 compared to those aged 55 or older. However, despite this elevated concern, there needs to be more certainty about the extent of their engagement with the issue. While younger Republicans are more inclined to acknowledge the reality and human causes of climate change, the generational gap in views on this subject is narrower among them than among older Republicans. Conversely, younger Democrats exhibit varied beliefs compared to older generations within their party. In the upcoming 2020 Presidential election, younger generations, projected to constitute a significant portion of registered voters, prioritize global warming as an important issue in their voting decisions. The potential impact of the youth vote on climate policy is considerable, highlighting the need to engage and mobilize younger individuals effectively. Initiatives such as the Green New Deal and youth-led movements have successfully captured the attention of young adults and inspired action, signaling the influence young voices can have in shaping policies concerning climate change.

Frumkin et al. (2012) discussed that Climate change poses a challenging and multifaceted issue known as a "super wicked problem" due to its complexity, uncertain outcomes, and the long-term nature of solutions. As society ages, understanding how older individuals perceive and engage with climate change becomes increasingly important. Aging populations represent a significant portion of voters and consumers, capable of influencing behavioral choices and policies. Their attitudes toward climate change vary; some may be more vulnerable to its health impacts, while others may prioritize leaving a positive legacy for future generations. Assumptions that older individuals tend to become more conservative are not always accurate; attitudes toward climate change vary and are not solely determined by age. Some studies show older individuals worrying about global warming but doubtful about its existence. This discrepancy between concern and certainty is puzzling.

Frumkin et al. (2012) further said there are varied perspectives on how older individuals maintain or change their values over time, with influences from historical events and cohort effects. Despite general trends suggesting more conservative voting patterns with age, older individuals do not consistently vote based on their interests, further complicating this dynamic. Notably, older individuals' knowledge and attitudes regarding climate change are diverse. Some studies indicate higher concern among older age groups, while others suggest skepticism or disengagement. This divergence between attitudes and actions highlights the complexity of environmental issues in survey research. Key attributes linked to aging, such as wisdom and the desire to leave a positive legacy, offer potential support in addressing climate change. Wisdom, acquired through experience, suggests that older individuals can make balanced and far-sighted judgments. Additionally, the desire to leave a legacy for future generations might encourage policies and practices that reduce greenhouse gas emissions and adapt to climate change.

Frumkin et al. (2012) ultimately said that to engage and leverage the potential of older adults in addressing climate change, several strategies could be implemented. Encouraging public discussions about intergenerational responsibilities, revising economic approaches to discounting future investments, and fostering environmental volunteerism among elders are potential avenues. Furthermore, tailored communication strategies, intergenerational dialogues, and research focusing on understanding the factors influencing older individuals' attitudes toward climate change are essential.

The local study found that different age groups hold distinct concerns about climate change, aligning with the abovementioned authors. For instance, Ballew et al. (2019) also observed higher worry among younger Americans than older individuals, echoing the local study's discovery of increased concern in younger age brackets. Similarly, both studies noted uncertainties about younger individuals' active engagement with climate change. Frumkin et al. (2012) emphasized the



diversity of attitudes among older age groups, akin to the local study's recognition of varied concerns across different age brackets. Both studies also suggest tailored interventions as crucial, echoing the need for customized strategies to engage various age groups effectively. Funk (2021) highlighted political differences among younger age groups regarding climate change, aligning with the local study's identification of political variations within younger demographics. Both studies emphasize the importance of age-specific strategies to address climate change concerns across different generational groups.

### Climate Change Versus Educational Attainment

Ambasz et al. (2023) make a comprehensive review that addresses the interrelation between human development, particularly education, and its impact on environmental behavior concerning climate change. Despite a predominance of observational studies, limited causal research suggests a correlation between higher education levels and pro-environmental attitudes. Adaptation and mitigation strategies have been proposed, emphasizing the role of education as a catalyst for fostering environmentally conscious behaviors. The conceptual framework highlights the potential pathways between education and pro-environmental behaviors, but establishing causality remains challenging. Research efforts employing various econometric methods and analyses of compulsory schooling laws hint at a positive association between increased education and climate literacy. Nonetheless, there is a notable need for extensive research to conclusively determine the impact of education on fostering environmentally responsible behaviors and garnering support for climate policies.

Zaval and Cornwell (2017) underscore the crucial role of education and behavioral science in driving pro-environmental action, especially in the context of climate change awareness and sustainability. While research in this field has primarily been conducted in the United States and Europe, global applicability still needs to be improved, necessitating a cross-cultural approach to understanding diverse contextual and cultural factors influencing climate change attitudes and behaviors. The study emphasizes non-monetary interventions, citing the powerful impact of behavioral approaches, such as default options and appeals to social norms, in influencing environmentally responsible actions. However, it notes the need for caution in their application, mainly when these approaches involve non-trivial consumer costs. The report suggests that these behavioral nudges complement, rather than substitute, other economic incentives or mandates. Integrating insights from behavioral science into public policy and developing large-scale behavioral interventions would be instrumental in promoting environmental responsibility. Furthermore, the report advocates for incorporating behavioral science into humanitarian and environmental organizational strategies, emphasizing the need for ongoing research partnerships to enhance sustainable decision-making practices and improve the effectiveness of such organizations.

Ledley et al. (2017) emphasize the crucial connection between education and addressing the pressing emissions gap stipulated by the Paris Agreement. It argues that enhancing society's comprehension of climate change, its associated risks and the necessary energy transition demands an education push that transcends scientific knowledge. This approach integrates multifaceted concepts across various disciplines, encompassing emotional, social, and cultural aspects. Employing a systems thinking framework, education emerges as a potent force to drive swift societal transformation. The figures outlined in the article illustrate the role of education in fostering climate-informed decision-making, boosting social willingness for action, and preparing a skilled workforce for transitioning to a sustainable future. While many existing climate change education initiatives have successfully elevated climate and energy literacy and community capacity, challenges persist in coordinating efforts across diverse audiences, managing resources, and scaling up effective programs. It is emphasized that education at all societal levels is pivotal in fostering knowledgeable and responsible leadership across governmental, business, and community sectors, enabling better decision-making and facilitating proactive citizen engagement.

The current local study highlights the positive correlation between higher education and heightened concern for climate change, echoing Ambasz, Gupta, and Patrinos (2023), who emphasize education's role in fostering pro-environmental attitudes. Zaval and Cornwell (2017) echo the importance of education by highlighting the impact of behavioral approaches in promoting environmentally responsible actions. Ledley, Rooney-Varga, and Niepold (2017) stress education's role in fostering informed leadership and proactive citizen engagement. All align with the local study, emphasizing the need for education-based initiatives to promote awareness and knowledge about climate change across diverse educational levels, fostering a more responsive society.

### Climate Change among the barangay residents and officials

Alcantara et al. (2023) study reveals valuable insights into the awareness and risk perceptions of climate change in vulnerable coastal areas, highlighting the impact of climate-related events and socio-demographic characteristics within these communities. While a significant proportion of participants (82%) displayed high awareness of climate change, there remains an 18% segment who still need to be made aware of its existence. Primary climate change impacts observed or experienced included temperature rise and excessive rainfall, while other effects like declining income, sea level rise, and floods were observed less frequently. Of these experiences, temperature rise and excessive rainfall significantly predicted climate change awareness. Significantly, experiences or observations of sea level rise were strong predictors of risk perception regarding climate change impacts on the mangroves and coastal marine ecosystems. The study also identified that women and non-poor

participants exhibited higher risk perceptions of climate change effects on coastal marine ecosystems, as did the 19–29-year-old group. However, this younger age group displayed a lower risk perception concerning sea level rise's impact on mangrove ecosystems. Geographical context also influenced risk perception of sea level rise impact.

Alcantara et al. (2023) study expressed that Most participants recognized high impacts of anthropogenic drivers and climate change on coral reefs and seagrasses but perceived marine livelihood as having a lower impact. Risk perceptions were influenced by local temperature rise, excessive rainfall, and declining income, while education significantly impacted risk perception regarding the impacts on coral reefs and seagrasses. Furthermore, non-poor participants had notably higher risk perceptions than those from the poor demographic regarding the various factors affecting these ecosystems.

Siña et al. (2016) study shed light on how climate change is perceived within the governing bodies of Lima, offering insights into the municipalities' priorities and decision-making processes concerning public programs and initiatives. Although climate change and environmental concerns were acknowledged as vital for public health and safety, they were not consistently prioritized. The lack of emphasis on climate-related issues might be attributed to confusion about the causes and impacts of climate change, leading to oversight in decision-making processes.

Siña et al. (2016) study said that implementing strategies for adapting to and mitigating climate change could yield substantial long-term benefits for Lima's population, positively impacting both health and the economy. Addressing the gaps in understanding climate change and its associated mitigation and adaptation strategies could be facilitated by developing a tool. This tool could assist municipal officials in evaluating diverse strategies, providing a more informed and structured approach to addressing climate-related issues in their decision-making processes.

The local study identifies disparities in concern levels and response strategies between Barangay Officials and Residents regarding climate change in Northeast Catanduanes. Similarly, Siña et al. (2016) shed light on varying priorities and decision-making within Lima's governing bodies, pointing to confusion about climate change causes and impacts, affecting decision-making processes. Tailored communication and intervention strategies are highlighted in both studies to address nuanced differences and align with the differing preferences and priorities of distinct groups.

Moreover, Alcantara et al. (2023) delve into climate change awareness and risk perceptions in the coastal marine ecosystem of Palawan, revealing varying levels of awareness and risk perceptions among different demographic segments. They note influences such as experiences of climate-related events, socio-demographic characteristics, and geographical contexts on individuals' awareness and risk perceptions, echoing the importance of understanding local contexts and demographic differences in addressing climate change concerns highlighted in both the local study and Siña et al. (2016).

## The Barriers to Communicate Climate Change

Ricart et al. (2022) research explores the relationship between farmers' perceptions of climate change and observed data through bibliometrics and content analysis. It identifies consolidated research areas such as perceived risk, crop vulnerability, forecasting use, and climate change awareness. However, significant gaps exist in conceptual discrepancies in defining 'normal' weather and 'drought,' limited access to quality data affecting farmers' perceptions, insufficient consideration of local knowledge, reliance on recent events in perception, and a geographical bias towards the Global South. To address these gaps, future research should define climate patterns, include socio-psychological analysis, and consider a broader global perspective. The study suggests that while both perceived and observed data have limitations, combining them offers a comprehensive understanding of climate change's impact on agriculture, with farmers' qualitative perceptions potentially complementing instrumental climate data in data-scarce areas.

Markowitz and Guckian (2018) concluded that Communicating Climate Change (CCC) is a challenging task with numerous pitfalls and few clear, universally applicable recommendations. However, recent years have seen notable progress in enhancing communication and outreach efforts. This advancement is partially credited to the dedicated work of social science researchers. They have delved into understanding the factors that drive or impede public engagement with climate change, exploring how different communication strategies and narratives influence people, and identifying effective forms of outreach to engage diverse audiences. Particularly encouraging is the ongoing diversification and experimentation in CCC. As researchers and communicators venture into new and innovative approaches, the potential to significantly transform public engagement and discourse around climate change, fostering better individual and collective decisions, continues to grow.

The current study highlights varied barriers to climate change communication, encompassing information gaps, financial concerns, and psychological factors. Addressing these requires tailored strategies that bridge the information gap and tackle financial, psychological, and behavioral hurdles. This aligns with the study by Ricart et al. (2022) that also stresses the insufficiency of information as a barrier, and Markowitz and Guckian (2018) note ongoing progress in diverse communication strategies, aligning with the need for tailored approaches identified in the present study to engage diverse audiences in climate change discourse effectively.

### 3. Theoretical framework and hypothesis development

Two prominent theories that could serve as a theoretical framework for the study of communicating Climate Change in the Northeast of Catanduanes, Philippines, are:

#### 3.1 Diffusion of Innovation Theory

This theory, proposed by Everett Rogers, focuses on how new ideas, innovations, or practices spread within a community or society. It could help understand the adoption of climate change communication strategies among the Barangay-Respondents. It categorizes individuals based on their readiness to adopt new ideas (innovators, early adopters, early majority, late majority, laggards) and considers factors like communication channels, social systems, and perceived benefits of adopting the innovation. This theory could display why certain demographic groupings within the Barangay might be more receptive to communicate climate change and which communication strategies might be more effective based on their characteristics (Van Houtven et al., 2023; Iqbal & Zahidie, 2022).

#### 3.2 Social Learning Theory

This theory as established by Albert Bandura, stresses the importance of social interaction, observation, and modeling in the learning process. It advocates that people learn not just from their own experiences but also by observing others. Applied to the concern to communicate climate change, it could help understand how individuals in the Barangay learn about climate change and its implications through interactions within their social groups. This theory could help to identify influential figures within the community who could serve as effective communicators and also highlight the importance of peer-to-peer learning and community engagement in disseminating information about climate change (Ozer, 2022; Duffy, 2021).

The mentioned theories offer frameworks for understanding the diffusion and acceptance of new ideas (like climate change communication strategies) within a community and the role of social interactions in the learning process, which could be highly relevant in analyzing the concern and strategizing communicating climate change in the context of the Northeast of Catanduanes, Philippines.

### 4. Methodology

#### 4.1 Research Design

This study employs a mixed-methods approach (Johnson & Onwuegbuzie, 2004), combining quantitative and qualitative research methodologies through an online survey. The quantitative component aims to assess the degree of concern and the common strategies used for communicating climate change, as well as to identify barriers among the respondents from various barangays in the Northeast of Catanduanes. At the same time, the qualitative part involves an open-ended query directed at the barangay respondents, prompting them to elaborate on their chosen barriers to communicating climate change, enabling the emergence of prominent themes. This method facilitates a nuanced understanding of the complexities surrounding climate change communication within the specific context of the Northeast of Catanduanes. In essence, this study aligns with a descriptive research approach, capturing, analyzing, and interpreting current phenomena related to climate change communication within the targeted community. The data collection primarily utilizes an online survey questionnaire hosted on Google Forms.

The credibility of the responses provided by the barangay respondents is pivotal for the accuracy of the research findings. Consequently, employing descriptive research techniques is deemed the most appropriate design for this study (Siedlecki, 2020). The structure and methodology of this online survey draw inspiration from studies conducted by Sarathchandra and Haltinner (2021), Muto et al. (2020), and Rakhmanov and Dane (2020) that utilized online surveys in diverse contexts, particularly amid the backdrop of the COVID-19 pandemic. Sarathchandra and Haltinner's (2021) research employed an online survey to explore the influence of gender and education on environmental attitudes and climate change beliefs. Similarly, Muto et al. (2020) utilized an online platform with quota sampling to analyze the behavioral shifts among Japanese citizens during the early stages of the pandemic. Moreover, Rakhmanov and Dane (2020) conducted an online survey during the COVID-19 lockdown, targeting students self-isolating at home within the Nile University of Nigeria. These referenced studies provide valuable insights into the effective utilization of online surveys in diverse scenarios, offering a framework that resonates with the objectives and context of the current research in examining climate change communication within the Northeast of Catanduanes.

## 4.2 Units of analysis/source of data/sampling

The term 'population' refers to a certain grouping of individuals, occurrences, or objects that are the focal point of study or consideration by the researcher. In the context of the present local study, the population under scrutiny comprises the barangay respondents from the Municipalities of Viga, Panganiban, and Bagamanoc. These respondents collectively represent the designated population for this research.

### 4.2.1 Sampling Procedure

The research universe consists of barangay respondents in the Northeast of Catanduanes. In observance of the measures of the Philippine Government in fighting COVID-19, the incidents required that the data gathering be carried out through an online survey.

Sharma and Tikka (2020) acknowledged certain limitations associated with online survey questionnaires, specifically in employing convenience sampling and gathering relatively small sample sizes that may deviate significantly from recommended research standards. However, they underscored the importance of refining the quality of online surveys, which mitigates the inherent limitations of convenience sampling and selection bias among responders. In alignment with the principles expounded by Sharma and Tikka (2020), the current study adopted a similar methodology, utilizing Google Forms for conducting an online survey to facilitate voluntary participation from respondents—outreach efforts involved using cell phones, email, and various social media platforms to engage potential participants. Given the inherent limitations in determining the exact number of potential participants in the digital environment, convenience and snowball sampling were deemed appropriate sampling methods for this study. Emerson (2020) and Sedgwick (2013) support the utilization of convenience sampling, defining it as the identification and classification of suitable individuals meeting the criteria for study respondents through any accessible means. Simultaneously, snowball sampling was employed, as participants were encouraged to recollect and share the electronic questionnaire link, acquiring the desired number of respondents.

The data collection process commenced on October 9, 2020, at 7:54:36 PM, concluding on October 24, 2020, at 3:00:14 PM, spanning 15 days. During this period, a total of 154 valid online responses were collected. This quantity of online responses is deemed sufficient considering the scope of the research population under investigation.

Table 1 presents the profile distribution of the barangay respondents, showing a diversified demographic landscape. Among them, females constitute a more significant proportion at 60.39% compared to males at 39.61%. Regarding age, the majority falls within the 29 and below category, comprising 51.30%, while 30-59-year-olds represent 41.56%, and those aged 60 and above are at 7.14%. Educational attainment showcases a higher percentage in technical and higher education at 65.58%, followed by individuals with elementary and secondary education at 24.03% and those with advanced education at 10.39%. Regarding their positions within the barangay, barangay residents make up a significant share at 83.77% compared to barangay officials at 16.23%. This categorization emphasizes the diverse structure of the respondents, reflecting various demographics and positions within the barangay.



**Table 1:** Profile distribution of the barangay-respondent

Profile	Frequency	%
<b>Sex</b>		
Male	61	39.61
Female	93	60.39
<b>Total</b>	<b>154</b>	<b>100.00</b>
<b>Age</b>		
29 and below	79	51.30
30-59 age range	64	41.56
60 and above	11	7.14
<b>Total</b>	<b>154</b>	<b>100.00</b>
<b>Educational Attainment</b>		
Elementary and Secondary Education	37	24.03
Technical and Higher Education	101	65.58
Advanced Education	16	10.39
<b>Total</b>	<b>154</b>	<b>100.00</b>
<b>Position in the Barangay</b>		
Barangay Official	25	16.23
Barangay residents	129	83.77
<b>Total</b>	<b>154</b>	<b>100.00</b>

*Source: Author's elaboration*

### 4.3 Data Collection/Instrumentation

The process of data collection in this study was influenced by the insights drawn from Hager et al.'s (2020) research, which noted the impracticality of a physical, paper-based questionnaire due to the prevailing COVID-19 pandemic and associated lockdown measures. As a result, reaching out to respondents was conducted through electronic means, such as emails and various social media platforms. This method aligns with the approach adopted in Geldsetzer's (2020) study, which utilized an online platform to assess public perceptions and knowledge about COVID-19 among a convenient sample of the general population.

In alignment with the methodologies employed by Hager et al. (2020) and Geldsetzer (2020), the present study also gathered research data from respondents residing in barangays within Northeast Catanduanes through online responses. These data underwent tabulation and subsequent statistical analysis to facilitate interpretations and discussions within the research. Moreover, the item statements from previous research studies explicitly addressing the communication of climate change concerns were revisited, simplified, and adapted to suit the constructs pertinent to the current investigation.

The finalized research instrument is accessible online, enabling outreach to potential respondents. This online approach holds particular advantages, especially in the context of the ongoing COVID-19 situation, where physical interaction is discouraged, as emphasized by Hager et al. (2020). The survey instrument initiates with a preamble to the respondents, elucidating the research's objectives and ensuring the confidentiality and ethical handling of the gathered data.

Strategic modifications were made to the research tool item statements to ensure they resonated well with the comprehension levels of the targeted respondents. The electronic version of the research instrument was available online for a 15-day duration, accessible through the link <https://forms.gle/A9aVHxjY1Bntd4f39>. The survey commences with a preliminary letter to the respondents, outlining the research's purpose and guaranteeing the confidentiality of the collected data while observing ethical considerations.

The questionnaire's structure encompasses sections devoted to profiling the barangay officials and residents in Northeast Catanduanes concerning sex, age, educational attainment, and position within the barangay. Subsequent segments involve presenting images accompanied by textual descriptions to gauge respondents' levels of concern regarding climate change and their intended methods of communicating or relaying the image's message to others. The questionnaire also encompasses queries about barriers to communicating climate change and solicits additional insights to elucidate these barriers among the respondents.

Moreover, the questionnaire includes an Informed Consent Form to comply with ethical research standards. The author considered insights from Carlton and Jacobson (2016), Metag (2016), Vulturius et al. (2016), Kaesehage et al. (2014), and local experts involved in climate change initiatives at the writer's affiliated University to validate the questionnaire. The validation process confirmed the accuracy and relevance of the included questionnaire items.

The study utilized Cronbach's Alpha Coefficient to ensure the reliability of the questionnaires. It measures the internal consistency to establish the tool's reliability. The actual data, collected from 154 respondents through the survey, were subjected to Cronbach's Alpha Coefficient estimation. The results, as presented in Table 2, affirm the questionnaire's reliability as a research instrument.

**Table 2. Reliability Analysis**

Variables	No. of items	Cronbach's Alpha Coefficient ( $\alpha$ )
The level of concern to communicate climate change among the respondent-barangay-residents in Northeast of Catanduanes	10	.905
The strategies adopted for communicating climate change among the respondent-barangay-residents in Northeast of Catanduanes	10	.751

*Source: Author's elaboration*

The study data collection adhered strictly to ethical standards in administering the research process. The targeted respondents were duly informed about the research's nature and its procedural features, giving them the freedom to participate or decline participation in the study. The Catanduanes State University Ethics Committee has approved the execution of this study, underscoring its alignment with recognized ethical guidelines and regulations (Geneviève et al. 2018).

#### 4.4 Data Processing

The data processing methods employed in this study encompassed various statistical tools, particularly Frequency count, Percentage, and weighted average mean. These statistical tools determined the level of concern about climate change and the common strategies for communicating climate change issues among the barangay respondents in Northeast Catanduanes. The assessment was categorized across crucial parameters, namely, A) Climate Change causes, B) Climate Change effects, and C) Climate Change mitigation, with a focus on participants' demographic characteristics such as A) Sex, B) Age, C) Educational Attainment; and Position within the Barangay. Furthermore, the study examined the barriers obstructing effective communication about climate change among the barangay residents and officials in Northeast Catanduanes. The study involved a systematic tallying and ranking of these barriers, identifying the most significant to the least significant impediments to effective communication in the community.

## 5. Results

**Table 3,** The level of concern and common strategies about the messages of Climate Change among the Barangay respondents in Northeast Catanduanes in terms of A) Climate Change causes, B) Climate Change effects, and C) Climate Change mitigation according to their Sex

Item #	Item # in the questionnaire	Type of pictures being communicated	Female (n=93)			Male (n=61)		
			Weighed Mean	Qualitative Response	Common Strategies	Weighed Mean	Qualitative Response	Common Strategies
<b>Climate Change Causes</b>								
1	3	Unsegregated garbage	4.61	Very much concerned	I will refer or consult it to the proper authority.	4.48	Much Concern	I will refer or consult it to the proper authority.
2	4	Chopped wood	4.30	Much Concern		4.33	Much Concern	
3	5	Toxic gas emitted from industries	4.19	Much Concern		4.28	Much Concern	
4	7	Burning of garbage	4.34	Much Concern		4.36	Much Concern	
		<b>Average Weighted Mean</b>	<b>4.36</b>	<b>Much Concern</b>		<b>4.36</b>	<b>Much Concern</b>	
<b>Climate Change Effects</b>								
5	1	Dry land due to drought	4.35	Much Concern	I will refer or consult it to the proper authority.	4.56	Very much concerned	I will refer or consult it to the proper authority.
6	2	Flooding due to extreme weather	4.63	Very much concerned		4.64	Very much concerned	
7	8	Forest fire	4.34	Much Concern		4.38	Much Concern	
		<b>Average Weighted Mean</b>	<b>4.44</b>	<b>Much Concern</b>		<b>4.52</b>	<b>Very much concerned</b>	
<b>Climate Change Mitigation</b>								
8	6	Garbage Segregation	4.66	Very much concerned	I will tell it to my family and friends about the matter	4.49	Much Concern	I will tell it to my family and friends about the matter
9	9	Coastal Clean-up	4.60	Very much concerned		4.39	Much Concern	
10	10	Solar panel – renewable energy	3.94	Much Concern		4.13	Much Concern	
		<b>Average Weighted Mean</b>	<b>4.40</b>	<b>Much Concern</b>		<b>4.34</b>	<b>Much Concern</b>	

Source: Author's elaboration

The table 3 outlines the level of concern and common strategies about the messages of Climate Change among the barangay respondents in the Northeast of Catanduanes, segmented by sex and categorized into three key areas: A) Climate Change Causes, B) Climate Change Effects, and C) Climate Change Mitigation. The data includes the type of pictures being communicated, qualitative responses, common strategies, and the weighted mean for both female (93) and male (61) respondents.

The items under this category focus on the causes of climate change, including unsegregated garbage, chopped wood, toxic gas emitted from industries, and garbage burning. Both female and male respondents showed relatively high concern for these causes, with an average weighted mean of 4.36 for both genders. Common strategies expressed by respondents include referencing or consulting the issue with the proper authority.

This section addresses the effects of climate change, such as dry land due to drought, flooding due to extreme weather, and forest fires. Female respondents displayed slightly higher concern compared to male respondents in terms of weighted means: 4.44 for females and 4.52 for males. The qualitative response commonly involved referencing or consulting the matter with the proper authority.

Mitigation strategies discussed include garbage segregation, coastal clean-up, and solar panels for renewable energy. In this category, females tended to show slightly more concern (with an average weighted mean of 4.40) than males (with an average weighted mean of 4.34)—common strategies involved sharing the matter with family and friends.

The results indicate a generally high level of concern among both female and male respondents regarding the causes, effects, and mitigation strategies related to climate change. Concerns are particularly notable regarding the effects of climate change, especially among female respondents. Both sexes tend to favor consulting or referencing issues with the proper authority. Additionally, in terms of mitigation strategies, both groups express a willingness to engage in actions and spread awareness among their social circles.

This data provides insights into the awareness and concern of barangay (local community) residents in the Northeast of Catanduanes regarding climate change issues, potentially informing targeted interventions or awareness campaigns to further educate and engage the community in mitigating climate change impacts.

Statistically, female respondents show marginally higher concern, particularly in addressing the effects of climate change, compared to their male counterparts. The implication of the observed sex discrepancy in concern about the effects of climate change is significant for targeted interventions. Understanding that females express slightly higher concern in this regard suggests the need for tailored strategies in engaging and mobilizing women in climate change initiatives, leveraging their specific interests and priorities to foster more effective community awareness and climate action.

The significant findings of the present study aligns with these global findings, showcasing a similar pattern: women tend to show higher concern about the personal impacts of climate change compared to men. The study by Zainulbhai in 2015 discovered that in wealthier nations, women are notably more worried about how climate change will affect them personally compared to men. This trend is consistent across developed countries like the U.S., Canada, Germany, and South Korea, where women view climate change as a serious problem, express concerns about potential personal harm, and advocate for significant lifestyle changes to address it. This sex gap in climate change concerns, observed both globally and locally, emphasizes the need to recognize and address these differences in crafting effective strategies and interventions for local climate action plans.

Further, the present local study mirrors global trends on the women show slightly higher concern about climate change effects. Aligning with Desrochers et al. (2019) and McCarthy & Citizen (2020), this finding underscores the need for targeted strategies. Leveraging women's marginally greater concern can drive more effective climate initiatives. Tailored approaches, acknowledging this gender discrepancy, offer opportunities to engage and mobilize women, fostering community awareness and impactful climate action.

**Table 4.** The level of concern and common strategies about the messages of Climate Change among the Barangay respondents in Northeast Catanduanes in terms of A) Climate Change causes, B) Climate Change effects, and C) Climate Change mitigation according to their Age group

Item #	Item # in the Questionnaire	Type of pictures being communicated	Age 29 and below (n=79)			Age 30 to Age 59 (n=64)			Age 60 and above (n=11)		
			Weighed Mean	Qualitative Response	Common Strategies	Weighed Mean	Qualitative Response	Common Strategies	Weighed Mean	Qualitative Response	Common Strategies
<b>Climate Change Causes</b>											
1	3	Unsegregated garbage	4.52	Very much concerned	I will refer or consult it to the proper authority.	4.66	Very much concerned	I will refer or consult it to the proper authority.	4.27	Much Concern	I will tell it to my family and friends about the matter
2	4	Chopped wood	4.35	Much Concern		4.38	Much Concern		3.64	Much Concern	
3	5	Toxic gas emitted from industries	4.35	Much Concern		4.20	Much Concern		3.45	Little Concerned	
4	7	Burning of garbage	4.34	Much Concern		4.45	Much Concern		3.82	Much Concern	
		<i>Average Weighted Mean</i>	4.39	Much Concern		4.42	Much Concern		3.80	Much Concern	
<b>Climate Change Effects</b>											
5	1	Dry land due to drought	4.41	Much Concern	I will refer or consult it to the proper authority.	4.48	Much Concern	I will refer or consult it to the proper authority.	4.36	Much Concern	I will refer or consult it to the proper authority.
6	2	Flooding due to extreme weather	4.54	Very much concerned		4.80	Very much concerned		4.36	Much Concern	
7	8	Forest fire	4.44	Much Concern		4.39	Much Concern		3.55	Much Concern	
		<i>Average Weighted Mean</i>	4.46	Much Concern		4.56	Very much concerned		4.09	Much Concern	
<b>Climate Change Mitigation</b>											
8	6	Garbage Segregation	4.62	Very much concerned	I will tell it to my family and friends about the matter	4.66	Very much concerned	I will tell it to my family and friends about the matter	4.00	Much Concern	I will tell it to my family and friends about the matter
9	9	Coastal Clean-up	4.53	Very much concerned		4.59	Very much concerned		4.00	Much Concern	
10	10	Solar panel – renewable energy	4.15	Much Concern		4.06	Much Concern		2.73	Little Concerned	
		<i>Average Weighted Mean</i>	4.43	Much Concern		4.44	Much Concern		3.58	Much Concern	

Source: Author's elaboration

Table 4 presents the varying levels of concern and common strategies about the messages of Climate Change among respondents in different age brackets regarding climate change causes, effects, and mitigation strategies.

For Climate Change Causes, Across age groups, there is a consistently high concern for unsegregated garbage as a cause of climate change, with the highest concern among the 30 to 59 age group. Concern for chopped wood and toxic gas emitted from industries is relatively consistent, but the younger age group shows higher concern for toxic gas. The response "I will tell it to my family and friends about the matter" is notably more common among respondents aged 60 and above.

For Climate Change Effects: All age groups exhibit significant concern about the effects of climate change, particularly extreme weather-related issues like drought, flooding, and forest fires. Notably, respondents aged 30 to 59 express the highest concern across these categories.

For Climate Change Mitigation, Garbage segregation and coastal clean-up garner high concern across all age groups. However, the younger age group shows more heightened concern for solar panel usage as a form of renewable energy.

The data suggests that different age groups prioritize and perceive climate change causes, effects, and mitigation strategies differently. Younger respondents are more inclined towards specific mitigation strategies like renewable energy solutions, while the older age group leans towards interpersonal communication for addressing causes.

The implication of the notable prevalence of the response "I will tell my family and friends about the matter" among respondents aged 60 and above suggests a reliance on interpersonal communication and social networks within this age group. This highlights the potential for leveraging familial and social circles as essential channels for disseminating information and initiating collective action toward addressing climate change. Harnessing this inclination could be an effective means of spreading awareness and fostering community engagement among older generations.

Further, the research data illustrates notable distinctions in concerns regarding climate change across different age groups. Individuals aged 30 to 59 generally exhibit heightened levels of apprehension about the causes and effects of climate change compared to younger and older demographics. Moreover, the middle age group demonstrates a stronger inclination toward proactive strategies, particularly emphasizing concerns and actions related to mitigating climate change effects. Understanding these divergences is pivotal for implementing targeted interventions that resonate with the specific priorities of each age group optimizing efforts to address climate change concerns effectively.

The implications of these significant age-based differences in concerns about climate change are crucial. Understanding the varied priorities among age groups allows for more effective and targeted approaches to address climate change issues. Implementing age-specific programs and communication strategies could foster greater engagement and participation, as different generations have distinct inclinations toward causes, effects, and mitigation strategies.

Tailored interventions and communication strategies could enhance engagement, considering the varying priorities and concerns across different age levels. The said approach can maximize the impact of initiatives by aligning them more closely with the specific concerns and interests of each age demographic, thus facilitating a more comprehensive and impactful response to climate change challenges.

The present local study disparities in climate change concerns across age groups aligned with the insights of various authors in this field. Ballew et al. (2019) similarly note heightened worry among younger Americans (ages 18 to 34) compared to their older counterparts, aligning with the local study's findings of heightened apprehension in younger demographics. Moreover, Ballew et al. highlight the uncertainty surrounding younger individuals' engagement with climate change, paralleling the local study's identification of uncertainty regarding younger age groups' active involvement. Frumkin et al. (2012) underscore the diversity of attitudes among older individuals, mirroring the local study's recognition of varied concerns among different age brackets. Additionally, the emphasis on tailored interventions in the present study is in line with Frumkin et al.'s suggestion for customized strategies to engage older generations effectively. Funk (2021) accentuates political discrepancies among younger age groups regarding climate change, which resonates with the local study's identification of political variances within younger demographics. The present study's focus on tailored interventions aligns with Funk's insights on the need for age-specific strategies in addressing climate change concerns across different generational groups.



**Table 5,** The level of concern and common strategies about the messages of Climate Change among the Barangay respondents in Northeast Catanduanes in terms of: A) Climate Change causes, B) Climate Change effects, and C) Climate Change mitigation according to their Educational Attainment

Item #	Item # in the questionnaire	Type of pictures being communicated	Elementary and Secondary Education (n=37)			Technical and Higher Education (n=101)			Advanced Education (n=16)		
			Weighed Mean	Qualitative Response	Common Strategies	Weighed Mean	Qualitative Response	Common Strategies	Weighed Mean	Qualitative Response	Common Strategies
<b>Climate Change Causes</b>											
1	3	Unsegregated garbage	4.24	Much Concern	I will refer or consult it to the proper authority.	4.61	Very much concerned	I will refer or consult it to the proper authority.	4.94	Very much concerned	I will refer or consult it to the proper authority.
2	4	Chopped wood	4.03	Much Concern		4.40	Much Concern		4.44	Much Concern	
3	5	Toxic gas emitted from industries	3.95	Much Concern		4.29	Much Concern		4.50	Very much concerned	
4	7	Burning of garbage	4.00	Much Concern		4.40	Much Concern		4.88	Very much concerned	
		<i>Average Weighted Mean</i>	4.05	Much Concern		4.42	Much Concern		4.69	Very much concerned	
<b>Climate Change Effects</b>											
5	1	Dry land due to drought	4.27	Much Concern	I will refer or consult it to the proper authority.	4.44	Much Concern	I will refer or consult it to the proper authority.	4.81	Very much concerned	I will refer or consult it to the proper authority.
6	2	Flooding due to extreme weather	4.59	Very much concerned		4.61	Very much concerned		4.88	Very much concerned	
7	8	Forest fire	4.00	Much Concern		4.47	Much Concern		4.50	Very much concerned	
		<i>Average Weighted Mean</i>	4.29	Much Concern		4.50	Very much concerned		4.73	Very much concerned	
<b>Climate Change Mitigation</b>											
8	6	Garbage Segregation	4.19	Much Concern	I will tell it to my family and friends about the matter	4.67	Very much concerned	I will tell it to my family and friends about the matter	5.00	Very much concerned	I will tell it to my family and friends about the matter
9	9	Coastal Clean-up	4.14	Much Concern		4.58	Very much concerned		5.00	Very much concerned	
10	10	Solar panel – renewable energy	3.57	Much Concern		4.09	Much Concern		4.56	Very much concerned	
		<i>Average Weighted Mean</i>	3.96	Much Concern		4.45	Much Concern		4.85	Very much concerned	

Source: Author's elaboration

The Table 5 dataset presents a compelling correlation between levels of educational attainment and attitudes toward climate change, delineating distinct variations in the levels of concern and perceptions of efficacy across diverse educational groups.

Regarding Concerns about the Causes of Climate Change: The data indicates that individuals with varying levels of education exhibit differing degrees of concern. The respondents with Basic Education display an average concern weighted mean of 4.05, while Technical and Higher Education present a higher average concern weighted mean of 4.42. Notably, Advanced Education records the highest average concern weighted mean of 4.69. The discernible disparity in concern levels, particularly the higher averages within the more advanced educational qualification, suggests a clear relationship between higher education levels and heightened apprehension regarding the causes of climate change. This means a potential implication: individuals with advanced educational backgrounds tend to demonstrate greater sensitivity and concern toward the multifaceted causes of climate change compared to those with basic education levels.

On the Perception of Climate Change Effects: A similar pattern in concern levels emerges across educational strata. The respondents with Basic Education report an average concern weighted mean of 4.29, while those with Technical and Higher

Education demonstrate a slightly higher average concern weighted mean of 4.50. Respondents with Advanced Education exhibit the most elevated concern with an average concern weighted mean of 4.73. This consistent trend implies that individuals with higher educational achievements are inclined to manifest increased concern regarding the effects of climate change. This suggests a potential implication: those with more advanced educational backgrounds are more mindful of and responsive to the potential impact and consequences of climate change.

Regarding Climate Change Mitigation: Regarding the perceived effectiveness of mitigation strategies, the data delineates varying perspectives across educational strata. Respondents with Basic Education record an average effectiveness weighted mean of 3.96, while those with Technical and Higher Education report a slightly higher average of 4.45. Advanced Education reflects the highest average weighted mean of 4.85. This trend implies that individuals with advanced educational backgrounds tend to perceive climate change mitigation strategies as more effective compared to those with basic educational levels. The finding suggests that higher Education may contribute to a more favorable evaluation of potential solutions for addressing climate change issues.

The data underscores a clear positive correlation between higher educational attainment and increased concern for, as well as the perceived effectiveness of, strategies related to climate change. This underlines that educational initiatives to raise awareness and knowledge about climate change could lead to a more informed and responsive populace, particularly among those with higher educational achievements. Furthermore, policy interventions and educational programs tailored to address climate change concerns may benefit from targeting individuals across various educational levels to ensure an inclusive and comprehensive approach to combating climate change.

The present local study highlights a strong link between higher Education and increased concern for and perceived effectiveness of strategies related to climate change. This aligns with insights from Ambasz, Gupta, and Patrinos (2023), who reviewed the interconnection between human development, especially Education, and its impact on pro-environmental behavior concerning climate change. They emphasize the role of Education in fostering environmentally conscious behaviors but note the challenge of establishing a clear causal relationship between Education and pro-environmental attitudes.

Zaval and Cornwell (2017) emphasize the critical role of Education and behavioral science in promoting pro-environmental action, aligning with the local study's focus on the importance of educational initiatives to raise awareness about climate change. They highlight the impact of behavioral approaches, such as appeals to social norms, in influencing environmentally responsible actions. Similarly, Ledley, Rooney-Varga, and Niepold (2017) underscore the vital connection between Education and addressing climate change, advocating for an education approach that transcends scientific knowledge and integrates various disciplines. They stress that Education is crucial in fostering knowledgeable and responsible leadership across sectors and empowering proactive citizen engagement. These studies collectively support the local study's emphasis on the need for educational programs tailored to address climate change concerns across various educational levels to foster an informed and responsive populace.

**Table 6,** The level of concern and common strategies about the messages of Climate Change among the barangay residents and officials in Northeast Catanduanes in terms of: A) Climate Change causes, B) Climate Change effects, and C) Climate Change mitigation

Item #	Item # in the questionnaire	Type of pictures being communicated	Barangay Officials (n=25)			Barangay residents (n=129)		
			Weighed Mean	Qualitative Response	Common Strategies	Weighed Mean	Qualitative Response	Common Strategies
<b>Climate Change Causes</b>								
1	3	Unsegregated garbage	4.76	Very much concerned	I will refer or consult it to the proper authority.	4.52	Very much concerned	I will refer or consult it to the proper authority.
2	4	Chopped wood	4.44	Much Concern		4.29	Much Concern	
3	5	Toxic gas emitted from industries	4.04	Much Concern		4.26	Much Concern	
4	7	Burning of garbage	4.52	Very much concerned		4.32	Much Concern	
		<i>Average Weighted Mean</i>	4.44	Much Concern		4.35	Much Concern	
<b>Climate Change Effects</b>								
5	1	Dry land due to drought	4.56	Very much concerned	I will refer or consult it to the proper authority.	4.41	Much Concern	I will refer or consult it to the proper authority.
6	2	Flooding due to extreme weather	4.68	Very much concerned		4.63	Very much concerned	
7	8	Forest fire	4.32	Much Concern		4.36	Much Concern	
		<i>Average Weighted Mean</i>	4.52	Very much concerned		4.47	Much Concern	
<b>Climate Change Mitigation</b>								
8	6	Garbage Segregation	4.88	Very much concerned	I will refer or consult it to the proper authority.	4.53	Very much concerned	I will tell it to my family and friends about the matter
9	9	Coastal Clean-up	4.64	Very much concerned		4.50	Much Concern	
10	10	Solar panel – renewable energy	3.80	Much Concern		4.05	Much Concern	
		<i>Average Weighted Mean</i>	4.44	Much Concern		4.36	Much Concern	

Source: Author's elaboration

The presented data in Table 6 offers a comprehensive insight into the attitudes and common strategies related to climate change messages among respondent-barangay residents in Northeast Catanduanes, categorized by their roles as either Barangay Officials or Barangay Residents. The findings reveal varying levels of concern and responses towards three distinct aspects: Climate Change Causes, Climate Change Effects, and Climate Change Mitigation. The sample size of Barangay Officials, comprising 25 individuals, showcased higher concern levels across all three categories, often expressing a strong willingness to refer or consult relevant authorities regarding climate change causes and effects. On the other hand, the larger group of Barangay Residents (n=129) displayed slightly lower but still substantial levels of concern regarding these issues. There is a noteworthy convergence in concern levels between the two groups concerning the causes and effects of climate change. However, the approach to climate change mitigation strategies varied significantly. Barangay Officials tended to emphasize referring or consulting authorities, whereas Barangay Residents were more inclined to disseminate information within their social circles.

The data elucidates not only the disparities in concern levels and response strategies between Barangay Officials and Residents but also highlights the collective awareness and acknowledgment of the gravity of climate change issues within their locality. Despite differing approaches, both groups recognize the urgency of addressing climate change causes and effects, albeit with nuanced differences in the perceived efficacy of mitigation strategies. This variation underscores the importance of tailored communication and intervention strategies, particularly in the realm of climate change mitigation, to align with the differing preferences and priorities of these distinct groups. Such insights are pivotal in formulating and implementing community-specific initiatives aimed at effectively addressing and mitigating the impact of climate change within Northeast Catanduanes.

The local study identifies disparities in concern levels and response strategies between Barangay Officials and Residents regarding climate change in Northeast Catanduanes. Similarly, Siña et al. (2016) shed light on varying priorities and decision-

making within Lima's governing bodies, pointing to confusion about climate change causes and impacts, affecting decision-making processes. Tailored communication and intervention strategies are highlighted in both studies to address nuanced differences and align with the differing preferences and priorities of distinct groups.

Moreover, Alcantara et al. (2023) delve into climate change awareness and risk perceptions in the coastal marine ecosystem of Palawan, revealing varying levels of awareness and risk perceptions among different demographic segments. They note influences such as experiences of climate-related events, socio-demographic characteristics, and geographical contexts on individuals' awareness and risk perceptions, echoing the importance of understanding local contexts and demographic differences in addressing climate change concerns highlighted in both the local study and Siña et al. (2016).

**Table 7, The Barriers to Climate Change Communication.**

The Barriers	Frequency (n=154)
Lack of information	82
Cost/Financial expense	25
Lack of time	17
Inconvenience/discomfort	16
No idea	9
Lack of discipline	2
Close-mindedness of other people	1
Residents are given information but they take it for granted	1
Scared or afraid	1

*Source: Author's elaboration*

The researcher collected the research data from 154 respondents. From a quantitative perspective, the frequency distribution of reasons or barriers to effective climate change communication can be summarized as follows:

The data obtained from 154 respondents highlights a spectrum of reasons or barriers to effective climate change communication. Among the most prevalent obstacles, the primary hindrance identified by 82 respondents was the "Lack of Information." This denotes a critical need for more accessible, clear, and comprehensive information dissemination on climate change. The second most cited barrier was "Cost/Financial Expense," with 25 respondents expressing concerns about the economic implications of adopting sustainable practices. Additionally, "Lack of Time" was noted by 17 respondents as a barrier, signifying the challenge of time allocation for engaging with climate change discourse. Less frequently mentioned barriers included "Inconvenience/Discomfort" identified by 16 respondents, "No Idea" by nine respondents, "Lack of Discipline" by two respondents, and equally low frequencies of "Close-Mindedness of Other People," "Residents Taking Information for Granted," and "Scared or Afraid" each expressed by one respondent. These lower-frequency barriers imply varied individual and psychological obstacles that contribute to the challenge of effectively communicating the message of climate change.

The highest frequency of responses centered around "Lack of Information." This highlights a crucial aspect where individuals may need sufficient knowledge or a comprehensive understanding of climate change. It indicates the need for more accessible, clear, and accurate information on climate change. The lack of awareness might be due to the complexity of the subject, a shortage of credible sources, or ineffective communication strategies.

The second most cited barrier, "Cost/Financial Expense," indicates that some individuals perceive sustainable actions or eco-friendly practices as financially burdensome. This perception might discourage their engagement in climate-friendly behaviors. It reflects a need for policies or solutions that make sustainable choices more affordable and economically feasible for a broader demographic.

The lower frequency responses, such as "Inconvenience/Discomfort," "Lack of Time," "No Idea," "Lack of Discipline," "Close-Mindedness of Other People," "Residents Taking Information for Granted," and "Scared or Afraid," while fewer in number, also shed light on various personal and psychological barriers. These barriers could be individual-centric, reflecting the unique challenges individuals face in accepting, understanding, or acting upon climate change information.

From a comprehensive standpoint, the findings suggest a multifaceted nature of barriers to effective climate change communication. While lack of information and financial concerns dominate the responses, the diversity of reasons, even in lower frequencies, indicates a range of psychological, social, and economic barriers that impede effective communication on this crucial issue.

Strategies must be multifaceted, addressing not only the information gap but also the financial, psychological, and behavioral barriers to improve climate change communication. Crafting tailored communication approaches, promoting the

affordability of eco-friendly practices, and addressing individual concerns are critical steps toward more effective climate change communication and action.

## **The further details to explain the barriers to communicating Climate Change**

The study managed a qualitative analysis of respondents' perspectives on barriers to Climate Change Communication. Respondents were prompted with an open-ended query, seeking additional reasons supporting their chosen barriers to Climate Change Communication.

The results revealed several prominent themes. Firstly, the inadequacy of information and awareness emerged as a significant obstacle, encompassing factors such as insufficient knowledge of climate change consequences, limited access to information due to various reasons like time constraints, disinterest, or educational barriers, and inadequate communication channels. Financial constraints were identified as another crucial impediment, encompassing both personal and governmental levels, where a lack of funds hindered efforts to address climate change. Communication and education hurdles were evident, reflecting challenges in effectively relaying messages due to a lack of training or discomfort in addressing the issue, as well as limited time and overlapping responsibilities. Social and cultural factors played a role, with self-centered attitudes, fear of speaking out, and limited government dissemination except during crises, all contributing to the hindrance. Additionally, other factors, such as the "new normal" affecting routines, lack of monitoring due to personal engagements, and the need for more comprehensive educational programs, were identified. The findings underscored the issue's complexity, emphasizing the necessity for a multi-pronged strategy that integrates education, awareness, information accessibility, financial resources, and a transformative shift towards environmental consciousness to address the challenges of climate change communication effectively.

The findings of the present study emphasize the multifaceted nature of barriers to climate change communication, including information gaps, financial concerns, and psychological and behavioral obstacles. The tailored strategies are essential, addressing not only the information gap but also economic, psychological, and behavioral obstacles to enhance climate change communication. This comprehensive approach can improve climate change awareness and engagement.

In a related study by Ricart et al. (2022), the inadequacy of information and awareness was identified as a significant barrier to climate change understanding, which aligns with the findings of the present study regarding the "Lack of Information" barrier. Floranza's (2021) study on Barangay Governance emphasizes consistent monitoring and assessment of barangay performance that may indirectly lead to highlighting the need for a structured approach in addressing the "Lack of Information" barrier. This aligns with Markowitz and Guckian's (2018) assertion that ongoing progress in climate change communication involves exploring various communication strategies to engage diverse audiences effectively. Both perspectives indirectly address the need for comprehensive and tailored approaches to overcoming the "Lack of Information" barrier by emphasizing the importance of continuous evaluation and utilizing diverse communication strategies to bridge information gaps and effectively communicate climate-related concerns to the communities.

## **6. Discussion and conclusions**

Looking into the level of concern and common strategies to communicate Climate Change among the Barangay respondents in Northeast Catanduanes in terms of A) Climate Change causes, B) Climate Change effects, and C) Climate Change mitigation according to their A) Sex; B) Age; C) Educational Attainment; and Position in the Barangay. The Diffusion of Innovation Theory displays why specific demographics within a particular community might be more interested in communicating climate change and which communication strategies might be more successful grounded by their attributes.

Regarding the concern and strategies about Climate Change messages among Northeast Catanduanes barangay respondents by sex, covering causes, effects, and mitigation. Both females (93) and males (61) express notable concern. Females slightly prioritize effects, while males show comparable concern across causes, effects, and mitigation. Strategies involve consulting authorities and sharing information with family and friends. This gender discrepancy in climate concern aligns with global trends, emphasizing the need for targeted interventions to engage women effectively in climate initiatives. Tailoring strategies based on this gender difference offer opportunities for impactful community awareness and action.

When grouped by age, regarding climate change causes, effects, and mitigation. Younger respondents prioritize renewable energy, while the older group favors interpersonal communication to tackle causes. The prevalence of "I will tell my family and friends about the matter" among the older age group suggests using social circles to disseminate information. Individuals aged 30 to 59 show heightened concern for climate issues. Understanding these distinctions across age groups is pivotal for tailored interventions to address climate change effectively. The findings stressed the age-based disparities and emphasized the need for age-specific strategies in climate change initiatives.



This further illustrates educational attainment's correlation with attitudes toward climate change among Barangay respondents in Northeast Catanduanes. Higher education levels correspond to increased concern and perceived effectiveness of climate change responses. Individuals with advanced education display notably higher concern regarding climate change causes and effects, as well as a stronger belief in the efficacy of mitigation strategies compared to those with basic education. This signifies the potential impact of higher education in raising awareness and fostering more informed responses to climate change challenges. Insights from Ambasz, Gupta, and Patrinos (2023), Zaval and Cornwell (2017), and Ledley, Rooney-Varga, and Niepold (2017) support this, emphasizing education's pivotal role in promoting environmentally conscious behavior and addressing climate change concerns. They advocate for tailored educational programs across different educational levels to nurture informed and engaged communities.

The study further displays the concern and the common strategies toward climate change messages among Barangay Residents and Officials in Northeast Catanduanes. Barangay Officials (25 individuals) showed higher concern across Climate Change Causes, Effects, and Mitigation and were willing to consult authorities. The larger group of Residents (129 individuals) displayed slightly lower but still significant concern levels. Both groups aligned in concern for causes and effects, but Officials leaned towards consulting authorities, while Residents favored sharing information within their social circles for mitigation. This suggests a need for tailored strategies, acknowledging different preferences between these groups. Insights from this local study align with similar findings by Siña et al. (2016) and Alcantara et al. (2023), emphasizing tailored approaches due to differing priorities and demographics' influence on climate change awareness and strategies.

Further, the barriers to communicating Climate Change among the Barangay respondents and what further details explain the barriers to communicating Climate Change. The data from 154 residents reveals primary barriers to Climate Change Communication. "Lack of Information" is the most critical issue, indicating the need for more precise and accessible climate knowledge. "Cost/Financial Expense" follows, showing concerns about the financial burden of sustainable actions. Lower-mentioned barriers like "Inconvenience/Discomfort," "Lack of Time," and personal obstacles highlight individuals' diverse challenges. The present study's findings emphasize a need for varied strategies, not only addressing information gaps and financial concerns but also individual, psychological, and social barriers. Tailored approaches, affordable eco-friendly options, and addressing personal concerns are crucial for better communication and action on Climate Change.

The study further examined barriers to communicating Climate Change. Respondents highlighted several vital obstacles. Need for more information and awareness, financial limitations, communication and education challenges, and social factors emerged. The complexity suggests a diverse strategy, integrating education, awareness, accessible information, financial resources, and a shift in environmental consciousness. In enhancing the concern to communicate Climate Change, targeted approaches are necessary, addressing the information gap, financial matters, and psychological barriers. Similar findings in related studies stress the ongoing need for varied communication strategies to engage diverse audiences effectively, consonant with the Social Learning Theory where locals learn not just from their own experiences but also by observing others to enhance concern to communicate Climate Change.

## 7. Recommendation

The study furnishes practical and community-centric solutions to enhance the level of concern, strategies, and overcoming barriers associated with communicating climate change within the local community.

First, the study suggests a Sex-Focused Engagement by Organizing local meetings specifically for women and men, addressing their respective concerns about climate change. Encourage women-led programs and men's groups to take action on the issues they feel most passionate about.

Second, the researcher proposes Age-Specific Efforts by developing fun educational programs for younger individuals, promoting the importance of nature and environmental conservation through games and interactive activities. Encourage elders to share their wisdom in community meetings, highlighting the importance of protecting the environment based on their experiences.

Third, Educational Drive, through engaging advanced education students in hands-on projects, like tree planting or sustainable community gardens, to promote environmental consciousness. It is recommended to produce engaging, age-appropriate content, like comics or short videos, to distribute to local schools and libraries, educating various age groups about climate change.

Fourth, the study may offer customized Barangay Plans by facilitating regular meetings involving officials and community members, emphasizing shared solutions to address climate issues unique to their barangay. It is suggested to utilize multiple communication tools like local radio and community events to effectively convey climate concerns, tailoring messages for residents and officials.

Fifth, tackle communication Challenges by establishing community hubs offering information on sustainable living practices and local eco-friendly resources to increase awareness. It is suggested to create a system where community members can share eco-friendly goods, reducing costs and enhancing accessibility. Additionally, it will introduce support services for those facing mental health challenges due to climate anxiety.

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