

Filipino Youth's Awareness of Climate Change Impacts: Basis for Program Development in Vulnerable Urban Communities

Andrian A. Caisip¹ and Ken Paul M. Espinosa²

¹College of Engineering and Information Technology, Colegio de San Juan de Letran-Manila, Philippines

²College of Liberal Arts and Sciences, Colegio de San Juan de Letran-Manila, Philippines

*andrian.caisip@letran.edu.ph

ABSTRACT

The research study aimed to determine the present level of climate change awareness among Filipino youth participants. There were 222 Filipino youth participants, ranging in age from fifteen (15) to thirty (30) years old, representing the twelve (12) urban vulnerable communities in the National Capital Region (NCR), Philippines, volunteered to participate in the study. The research instrument used in data gathering was researchers-made questionnaire based on the climate change impacts of the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) of the Department of Science and Technology (DOST), Philippines, and other related studies. The descriptive statistics revealed that, among the areas where climate change can have a negative impact, half of the Filipino youth participants from vulnerable urban communities were only moderately aware of its effects on agriculture, health, and water resources. Furthermore, it revealed that, according to the Filipino youth, coastal resources, forestry, and infrastructure were not given much attention. Similarly, Spearman's Rho revealed a significant relationship between the level of climate change awareness among Filipino youth participants and their parents' highest educational attainment, as well as the type of family they reside in. Thus, the context of the findings must be considered as a basis for program development to create a comprehensive, inclusive, and community-centered environmental literacy program to enhance Filipino youth's awareness of combating climate change.

Keywords

climate change, climate change impacts, vulnerable urban communities, youth's awareness

Introduction

Climate change is a critical concern in the twenty-first century because it increases the frequency of natural disasters that result in human casualties, property damage, and economic disruption. Climate change is causing problems in every aspect of human life (Dombrowski et al., 2016; Zeeshan et al., 2021). These effects have intensified leading to increasing intensities and frequencies of heatwaves, rainstorms, floods, and drought (Iturriza et al., 2020; Pilone et al., 2021), which greatly impacted the agriculture, coastal resources, forestry, health, water resources, and infrastructures not only the Philippines, but across the globe.

For decades, it has been a controversial and global concern and threat as it accelerates the increase of the global temperature. Moreover, it threatens both water sufficiency and food security as they are weather-dependent. This will also challenge our agricultural and fishing industries (Marshall et al., 2013). Food production and water availability will decrease caused by the variability of climate

that prominently impacts the amount and frequency of rainfall. Furthermore, temperature irregularities also play an important role in agricultural production (Asante et al., 2021).

Climate Change is Goal 13 of the Sustainable Development Goals (SDGs), also known as the Global Goals, which were established by the United Nations in 2015 as similar reasons for action to end poverty, protect the environment, and ensure that all people enjoy peace and prosperity by 2030.

Globally, around 1 to 2 billion people are experiencing severe water stress wherein millions more will be added for the coming decades. According to a report by the United Nations Food and Agriculture Organization, the Philippines has the highest prevalence of food insecurity in Southeast Asia from 2017 to 2019, with 59 million Filipinos experiencing a moderate-to-severe lack of continuous access to food.

Inspired by Greta Thunberg, young people led activism in response to the global climate crisis. Equipped with the knowledge needed about climate change predicates behavioral change. Despite the need, public understanding of the phenomenon's influence on a variety of human activities has not improved significantly (Bezirtzoglou et al., 2011). With this evidence, understanding the determinants of climate change views is a vital and relevant topic (Baiardi & Morana, 2021).

One of the most significant tools for combating climate change is youth education. Young individuals, particularly Filipino youth aged 15 to 30, as officially defined by the Youth in Nation-Building Act, also known as Republic Act No. 8044, play a critical part in ensuring that the earth has a greener, healthier, and more climate-resilient future. They have the greatest stake in preserving the earth from the environmental crisis since they are at the forefront of national efforts to mitigate the impact of climate change. In line with this, this study determined the level of awareness of climate change impacts among the Filipino youth from the partner vulnerable urban communities of Colegio de San Juan de Letran-Manila as a basis for program development to create a comprehensive, inclusive, and community-centered environmental literacy program guided by the institution's pursuit of quality community engagement. The study also explored the relationships between the participants' levels of awareness when grouped according to their respective profiles.

Specifically, the research study addressed the following questions:

1. What is the profile of Filipino youth participants in terms of:

- 1.1 age
- 1.2 gender
- 1.3 highest educational attainment
- 1.4 highest educational attainment of the parent; and
- 1.5 type of family where the participant lives in?

2. What is the level of awareness among the Filipino youth participants from the vulnerable partner urban communities of Colegio de San Juan

de Letran-Manila on climate change impacts in terms of the following:

- 2.1 agriculture;
- 2.2 coastal resources;
- 2.3 forestry,
- 2.4 health;
- 2.5 water resources; and
- 2.6 infrastructures?

3. Are there significant relationships between the participants' level of awareness on climate change impacts when grouped according to Filipino youth participants' profile?

Figure 1 depicts the study's research paradigm, which was designed to examine participants' level of awareness of climate change consequences in the institution's partner vulnerable urban communities. This research also attempted to create a program to raise Filipino youth's awareness of the impacts of climate change. Through this and the significant initiative of Filipino youth in the vulnerable urban communities, a comprehensive and community-centered environmental literacy program guided by the institution's pursuit to quality community engagement can be implemented in order to respond to the need of the community and other stakeholders. The development of the program can be revised and enhanced through community stakeholder's respond, feedback, and observation.

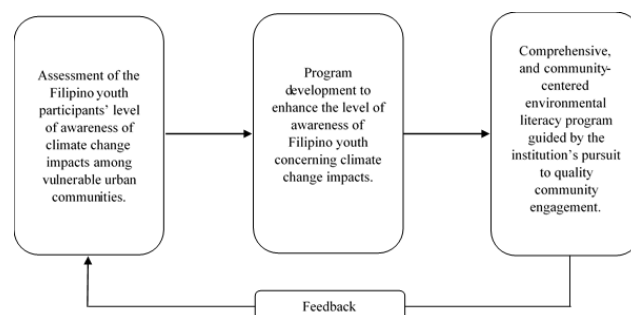


Figure 1. Research Paradigm of the Study

Methodology

Research Design

The researchers used a descriptive-survey research design wherein the study focused on determining the current level of awareness of Filipino youth

participants from vulnerable communities of climate change impacts without initiating any changes to their environment. The study also investigated the relationship between the Filipino youth participants' level of awareness when grouped according to their profile.

Research Local/Participants

The Filipino youth participants ages fifteen (15) to thirty (30) years from the twelve (12) partner communities of Colegio de San Juan de Letran-Manila belong to the urban poor groups in the National Capital Region (NCR) were involved in the study.

A total of two hundred twenty-two (222) participants coming from the vulnerable urban communities to the consequences of climate change located in Sitio Puting Bato and Sitio Sto. Nino in Barangay (Brgy.) North Bay Boulevard South (NBBS) Proper in Navotas; Brgy. 657, Intramuros, Manila; Brgy. 672, Paco, Manila; Brgys. 85 and 106, Tondo, Manila; and Brgys. 270, 272, 273, 274, 283, and 286 all situated in San Nicolas, Binondo, Manila were involved in the study.

Data Gathering Procedure

The research instrument used in data gathering was researchers-made questionnaire was based on the climate change impacts of the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) of the Department of Science Technology (DOST), Philippines, and other related literatures. This was used to determine how well-informed Filipino youth are about the impacts of climate change. The instrument included quantitative questions about the participants' profiles as well as the impacts of climate change on agriculture, coastal resources, forestry, health, water resources, and infrastructure.

The study's research instrument was validated by specialists and tested for Cronbach's Alpha reliability, obtaining a score of 0.89. Before the actual data gathering, a letter of permission to conduct a research study with the partner communities of Colegio de San Juan de Letran-Manila was given to the barangay officials in

coordination with the Community Extension Department (CED) of the institution. Approval from the Brgy. Chairman started the distribution of questionnaires. A letter of consent to the participant was affixed to the questionnaire to ask permission and to gain their cooperation to answer the items completely and honestly. The participants were also informed that they can contact the researchers if they have concerns or inquiries concerning the items on the questionnaire. The questionnaires were collected from the brgy and retrieved. It took a week for the officials to finish their task.

Ethical Considerations

All gathered data from the study was used only for the research endeavor and related studies. The study adhered to the principles of anonymity and confidentiality, with all personal information of participants and data collected from the study kept private. The participants' involvement in the study was voluntary, and they were informed that they could withdraw at any point. Informed consent was also given to the parents' participants under the age of eighteen. They were also told that their participation may help the institution improve its community engagement program, which could benefit them indirectly in the future. Upon the completion of the research project, all information obtained from the study was properly disposed of.

Data Analysis

A Weighted Mean was used to measure the level of awareness of Filipino youth on the impacts of climate change on agriculture, coastal resources, forestry, health, water resources, and infrastructure. The Mean Rank was utilized to compare the level of Filipino youth awareness based on their profiles. The relationship between two variables was determined using Spearman's Rho.

Results and Discussions

This section presents the results and discussion in three (3) areas of the research study; namely: profile of the Filipino youth participant and level of awareness when grouped according to their

profile; the Filipino youth participants' level of awareness on climate change impacts from the vulnerable urban communities; and the differences between the Filipino youth participants' level of awareness on climate change impacts when grouped according to their profile.

Filipino Youth Participants

The data acquired showed that 58.60% of the Filipino youth ages 15 to 30 years old from the institution's vulnerable partner urban communities were female, while 41.40% were male.

The gathered data showed that the majority of Filipino youth participants belonged to the age group of 15-20 years old, with a proportion of 64.40%, 24.80% belonged to the age group of 21–25 years old, and 10.80% belonged to ages 26–30.

In terms of the Filipino youth participants' educational attainment, the collected data revealed that 58.10% have not yet finished basic education, with 25.70% being secondary education graduates, 11.30% college undergraduates, and 5.00% being college graduates.

In terms of the parents' highest educational attainment, it was found that 40.10% of the Filipino youth participants' parents were not able to finish secondary education, with 38.80% being secondary education graduates, 13.10% college undergraduates, and 13.10% college graduates.

In terms of the family type in which the participant lives, it was found that the majority of Filipino youth participants live in a conjugal type of family (41.9%) and an extended family (40.10), while a small number of participants live in family types such as matrifocal, patrifocal, and avuncular (18.10%).

Filipino Youth's Awareness on Climate Change Impacts

Agriculture

In the area of agriculture, Table 1 demonstrates the level of awareness of climate change impacts among Filipino youth from vulnerable urban communities. The obtained data suggested that the Filipino youth participants were moderately aware

of climate change impacts on agriculture subitems, with a grand mean of 4.00. The table shows that among the implications of climate change on the aforementioned area, item no. 17, focused on the seaweed production that could possibly be harmed, which is currently being used to adapt to climate change in a number of impoverished and depressed coastal communities, obtained the least attention from the Filipino youth, while item no. 3, an agricultural concern such as water stress that has an impact on farmers and ranchers, received the highest level of awareness as determined by them. Overall, though, there is still a clear need to raise Filipino youth's awareness of climate change impacts on agriculture.

Table 1. Filipino Youth Participants' Level of Awareness on Climate Change Impacts in the Area of Agriculture

Agriculture	Filipino Youth Participants	
	W.M.	V.I.
1. Farmers and ranchers are affected by agricultural challenges such as an increase in temperature.	4.2	MA
2. Farmers and ranchers are affected by agricultural challenges such drought.	4.3	MA
3. Farmers and ranchers are affected by agricultural challenges such water stress.	4.4	MA
4. Farmers and ranchers are affected by agricultural challenges such diseases.	4.0	MA
5. Farmers and ranchers are affected by agricultural challenges such weather extremes.	4.2	MA
6. Stress due to heat and a temperature rise can harm livestock.	4.0	MA
7. A significant decrease in the amount of rainfall might limit agricultural production and affect the irrigation services of farmers, especially those in rain-fed areas.	4.0	MA
8. A longer drier periods might limit agricultural production and affect the irrigation services of farmers, especially those in rain-fed areas.	4.0	MA
9. Changes in temperature, as well as the difference in rain patterns and schemes, can greatly affect the agriculture in the country.	4.0	MA
10. Crops have been shown to suffer reductions in yields whenever the temperature exceeds threshold values and might result in spikelet sterility, as in the case of rice.	3.8	NA
11. An increase in temperatures favors agricultural pests, which in turn fastens the reproduction rates of insects and microbes that could eventually develop a resistance to control measures and drugs.	3.8	NA
12. An increase in temperatures favors diseases, which in turn fastens the reproduction rates of insects and microbes that could eventually develop a resistance to control measures and drugs.	3.8	NA
13. An increase in temperatures favors disease vectors, which in turn fastens the reproduction rates of insects and microbes that could eventually develop a resistance to control measures and drugs.	3.9	NA
14. In locations where rainfall patterns change or where extreme events such as floods or droughts occur more frequently, grain and other agricultural products may face shortages if effective and early measures are not implemented.	4.0	MA
15. Tropical storms will continue to put strain on agricultural productivity, especially if their numbers and/or intensity increase.	4.0	MA
16. In the fisheries industry, fish migration to cooler, deeper waters would push fishermen to go further away from the coastlines in order to catch more fish.	3.9	NA
17. Seaweed production, which is already being used as a climate change adaptation in a number of poor and depressed coastal communities, might even be impacted.	3.7	NA
18. Food security will be significantly affected, particularly if timely, effective, and efficient solutions are not implemented.	4.0	MA
19. Inadequate food supplies could lead to even more poverty, as well as increased social instability and conflict in certain parts of the nation, including among indigenous groups.	4.0	MA
GRAND MEAN	4.0	MA

Legend: 5 (Extremely Aware – EA); 4.0 - 4.9 (Moderately Aware – MA); 3.9 and below (Needs Attention – NA)

A study by Hundera et al. (2019) on Ethiopian farmers claimed that 92.1% of their respondents preserved that there had been a change in the climate. Moreover, 84.6% of them stated that for 30 years, they have experienced a decrease in the trend of rainfall. This is supported by a study conducted in Ghana (Asante et al., 2021), which found that 95.9% of survey participants have encountered water stress as a result of drought caused by climate change, and 97.5% have identified a decline in crop production as a result of irregular rainfall patterns, with 99.2% indicating that the reduction in crop production is due to the increased temperatures.

Coastal Resources

Table 2 shows the level of awareness of the impacts of climate change among Filipino youth participants from vulnerable urban communities in the area of coastal resources. The collected data revealed that there is an evident need (3.9 grand mean) to enhance Filipino youth participants' awareness with regard to the impacts of climate change on coastal resources. Among the impacts of climate change on the said area below, it can be seen on the table above those items 15 and 17 were the least given much attention by the Filipino youth, while items 7, 8, 9, and 10 got the highest level of awareness as assessed by themselves due to the possibility of flashfloods brought by heavy rainfall that can cause shutdowns of business areas and highways, and main roads brought by both heavy rainfall and thunderstorms.

Table 2. Filipino Youth Participants' Level of Awareness on Climate Change Impacts in the Area of Coastal Resources

Coastal Resources	Filipino Youth Participants	
	W.M.	V.I.
1. Coastal areas are greatly at risk of erosion due to the rising of sea levels caused by the melting.	3.7	NA
2. Coastal areas are greatly at risk of erosion due to the rising of sea levels caused by the melting of ice sheets.	3.8	NA
3. Coastal areas are greatly at risk of storm surges due to the rising of sea levels caused by the melting of glaciers.	3.7	NA
4. Coastal areas are greatly at risk of storm surges due to the rising of sea levels caused by the melting of ice sheets.	3.8	NA
5. The rise in sea level is highly caused by climate change, thereby causing permanent flooding in low-lying islands and areas in the future.	3.8	NA
6. Flooding is one of the pressing issues that our country is facing due to climate change.	3.8	NA
7. Heavy rainfall can cause flashfloods that shut down main roads.	3.9	NA
8. Heavy rainfall can cause flashfloods that shut down highways.	3.9	NA
9. Heavy rainfall can cause flashfloods that shut down business areas.	3.9	NA
10. Thunderstorms can cause flashfloods that shut down main roads.	3.9	NA
11. Thunderstorms can cause flashfloods that shut down highways.	3.8	NA
12. Thunderstorms can cause flashfloods that shut down business areas.	3.8	NA
13. Coastal residents' livelihoods will be jeopardized as fishing opportunities are increasingly strained.	3.7	NA
14. Coastal residents' livelihoods would be jeopardized due to the loss of productive agricultural fields.	3.8	NA
15. In terms of saltwater intrusion, coastal residents' livelihoods would be jeopardized.	3.6	NA
16. Because of the country's extensive coasts, its coastal resources are extremely vulnerable.	3.7	NA
17. Saltwater intrusion into coastal aquifers has a negative impact on water quality in the Philippines' coastal areas, which is expected to intensify as sea levels rise.	3.6	NA
18. The urban poor, many of whom live in temporary shelters, are the most vulnerable to coastal floods.	3.8	NA
GRAND MEAN	3.8	NA

Legend: 5 (Extremely Aware – EA); 4.0 - 4.9 (Moderately Aware - MA); 3.9 and below (Needs Attention - NA)

Less awareness of saltwater intrusion may be caused by less visibility on the area (Lagbas & Dl. Habito, 2016). Additionally, in a study of climate change impacts on Bangladesh, only a small percentage (35.7%) are aware of the increase of salinity intrusion on this study (Chowdhury et al., 2020).

Forestry

Table 3 shows the level of awareness of the impacts of climate change among Filipino youth participants from vulnerable urban communities in the area of forestry. The collected data revealed that there is an evident need to enhance Filipino youth participants' awareness of the impacts of climate change, particularly in the area of forestry, with a grand mean of 3.8. From among the impacts of climate change on the subitems below, it could be seen on the table that item 5, which

was centered on how acidification of the water has affected marine life, received the least attention from the Filipino youth, whereas items 3 and 7, which put emphasis on changes in coral reefs and forest ecosystems, received the highest level of awareness as assessed by themselves, with a verbal interpretation of "Needs Attention." With an overall assessment, there is a strong and evident need to augment the Filipino youth's awareness in terms of climate change impacts in forestry.

Table 3. Filipino Youth Participants' Level of Awareness on Climate Change Impacts in the Area of Forestry

Forestry	Filipino Youth Participants	
	W.M.	V.I.
1. Coral reefs are susceptible to the effects brought by climate change.	3.7	NA
2. Coral reefs are greatly affected in cases such as coral bleaching due to a rise in water temperature.	3.7	NA
3. Coral reefs are greatly affected in cases such as reef destruction caused by strong typhoons.	3.9	NA
4. Coral reefs are greatly affected in cases such as coral smothering as an effect of sea-level rise.	3.8	NA
5. Marine life is affected by the water becoming more acidic.	3.6	NA
6. Changes in the forests ecosystem might be experienced due to the changes in patterns and regimes in rainfall resulting in to increase in water use, specifically in areas where rainfall is inadequate, which can no longer provide sustainable habitat for highly sensitive species.	3.7	NA
7. Changes in the forests ecosystem might be experienced due to the changes in patterns and regimes in rainfall resulting in to decrease in water use specifically in areas where rainfall is inadequate, which can no longer provide sustainable habitat for highly sensitive species.	3.9	NA
8. Changes in the forests ecosystem might be experienced due to the changes in patterns and regimes in rainfall resulting into an increase in temperature, specifically in areas where rainfall is inadequate, which can no longer provide sustainable habitat for highly sensitive species.	3.8	NA
9. Forests could face the progressive death of trees and plants or die-backs.	3.8	NA
10. Drier periods and warmer temperatures, especially during the El Niño phenomenon, might lead to forest fires.	3.8	NA
11. Climate change affects forest growth and production both directly and indirectly through changes in temperature, rainfall, and other variables.	3.7	NA
12. In a future warmer world, negative consequences on forestry regions and resources are likely to increase.	3.8	NA
13. Climate change is impacting the forests and their ability to provide environmental services.	3.8	NA
14. The majority of grasslands in the uplands are prone to fires, especially during prolonged periods of dryness and lack of rainfall throughout the summer.	3.7	NA
15. Drought conditions, which are considered to be aggravated by climate change, are making wildfires more prevalent.	3.8	NA
16. Forest disturbances, such as insect outbreaks, invading species, wildfires, and storms, have become more frequent and intense as a result of climate change.	3.7	NA
17. Natural and modified forests are expected to undergo significant changes as a result of changes in temperature and precipitation patterns, as well as rising carbon dioxide levels in the atmosphere.	3.7	NA
18. Climate change has the ability to provide new habitats for tree species while somehow deteriorating existing ecosystems.	3.8	NA
GRAND MEAN	3.8	NA

Legend: 5 (Extremely Aware – EA); 4.0 - 4.9 (Moderately Aware - MA); 3.9 and below (Needs Attention - NA)

Similarly, 50% of the participants in the study of Lagbas & Dl. Habito (2016) were familiar with the fact that climate change causes the destruction and degradation of coral reefs.

Health

In the area of health, Table 4 shows the level of awareness of the impacts of climate change among Filipino youth participants from vulnerable urban groups. With a grand mean of 4.0, the results indicated that Filipino youth participants were moderately aware of the implications of climate change on health. Among the impacts of climate change on the said area below, it can be realized on the table above that items 13, 15, and 17, relatively associated with cardiovascular

disease among the elderly, communities that rely heavily on trees for their natural services, and the spread of illnesses including dengue fever, malaria, cholera, and typhoid due to rise of temperature, were the least given much attention by the Filipino youth, while items 1, 2 and 10, relatively associated with exhaustion, heatstroke, and heart attacks, threat to life due to rise in temperature, and malnutrition, got the highest level of awareness as assessed by themselves.

Table 4. Filipino Youth Participants' Level of Awareness in Climate Change Impacts on the Area of Health

Health	Filipino Youth Participants	
	W.M.	V.I.
1. Health issues among humans such as exhaustion, heatstroke, and heart attacks might possibly be experienced.	4.1	MA
2. Coastal communities are vulnerable to threat to life due to the effects of a continued rise in temperature.	4.1	MA
3. Coastal communities are vulnerable to threat to life due to the effects of an accelerated rise in sea level.	4.0	MA
4. Coastal communities are vulnerable to threat to life due to the effects of changes in rainfall, as well as tropical cyclone occurrences, which include associated storm surges.	4.0	MA
5. Coastal communities are vulnerable to threat to life due to the effects of a continued rise in temperature.	4.0	MA
6. Coastal communities are vulnerable to threat to property due to the effects of an accelerated rise in sea level.	4.0	MA
7. Coastal communities are vulnerable to threat to property due to the effects of changes in rainfall, as well as tropical cyclone occurrences, which include associated storm surges.	4.0	MA
8. One of the most vital sectors that might be severely affected by climate change is human health.	4.0	MA
9. There is an increasing associated health risk due to lack of good air quality especially those in urban areas.	4.0	MA
10. Malnutrition is expected to be more prevalent, as well as extreme events that may disrupt food supply and allocation, and health services provision.	4.1	MA
11. Water-borne diseases might spread continuously as higher incidences of flooding occur.	4.0	MA
12. Incidences of outbreaks of plant and animal pests and diseases could greatly observe as effects of a rise in temperature along with the rainfall changes.	4.0	MA
13. Communities who rely heavily on the natural services offered by trees face the possibility of having to change their traditions and livelihoods.	3.9	NA
14. Increases in temperature and rainfall patterns might have a variety of negative consequences, including an increase in the prevalence of respiratory diseases in young children.	4.0	MA
15. Increases in temperature and rainfall patterns might have a variety of negative consequences, including an increase in cardiovascular disease among the elderly.	3.9	NA
16. Poor air quality, particularly in populated areas, might potentially pose a health concern.	4.0	MA
17. The spread of illnesses including dengue fever, malaria, cholera, and typhoid is aggravated by rising temperatures.	3.9	NA
18. Extreme weather events caused by climate change can have a variety of mental health consequences, including increased anxiety and post-traumatic stress disorder.	4.0	MA
GRAND MEAN	4.0	MA

Legend: 5 (Extremely Aware – EA); 4.0 - 4.9 (Moderately Aware - MA); 3.9 and below (Needs Attention - NA)

In the study by Chowdhury et al. (2020), 64.3% of participants were aware of the rise in temperature, and 100% agreed that the rapid rise was affecting their health. Similar to the study by Reismann et al. (2021), the majority of participants (84.3%) considered climate change as a source of worldwide health consequences.

Water Resources

Table 5 presents the level of awareness of Filipino youth participants in climate change impacts in the area of water resources. With a grand mean of 4.0, the outcomes specified that Filipino youth participants were moderately aware of the implications of climate change on water resources. From the table above, it can be seen that items 6, 7, 12, 16, and 17, which are related to insufficient energy production, the need for regular dam

revisiting, decrease in water quality, water deficit, and problems in water distribution, received the least attention from the Filipino youth, while item 1, which is related to drought and resulting in water shortage, received the highest level of attention. Overall, however, there is still a clear need to increase Filipino youth's knowledge of climate change's implications for water resources.

Table 5. Filipino Youth Participants' Level of Awareness in Climate Change Impacts in the Area of Water Resources

Water Resources	Filipino Youth Participants	
	W.M.	V.I.
1. Drought is one of the most common causes of water shortage.	4.2	MA
2. Water sources such as watersheds and dams are affected by large decreases in rainfall.	4.1	MA
3. Water sources such as watersheds and dams are affected by longer drier periods.	4.0	MA
4. In areas/regions wherein rainfall is expected to decrease, people might suffer from water stress in terms of quality.	4.0	MA
5. In areas/regions wherein rainfall is expected to decrease, people might suffer from water stress in terms of quantity.	4.0	MA
6. The energy sufficiency program of the country might be greatly affected due to the insufficient amount of energy production from the areas where the amount of rainfall received is projected to decrease.	3.9	NA
7. Regular revisiting of dams is necessary to ensure that these will not be severely affected by the projected longer drier periods.	3.9	NA
8. Climate change is causing water scarcity not just in the Philippines, but all throughout the world.	4.0	MA
9. Climate change is one of the Philippines' greatest concerns nowadays, and the susceptibility of our water resources to water scarcity can no longer be ignored.	4.0	MA
10. Extreme climatic phenomena such as droughts and floods have substantial negative consequences on the country's major water reservoirs.	4.0	MA
11. The country's water resources have been enduring supply and demand imbalances due to the uneven distribution of rain across time and space, as well as the occurrence of catastrophic events like floods and droughts.	4.0	MA
12. In locations where rainfall is excessive, water quality may decrease.	3.9	NA
13. Droughts will become more frequent and severe as a result of climate change, posing substantial management problems for water resource users.	4.0	MA
14. Climate change may have an impact on how we use water and how much we require. In many regions, higher temperatures and evaporation rates may raise the demand for water.	4.0	MA
15. Climate change challenges to the Philippines' water sectors have introduced a new dimension and difficulty to the pursuit of sustainable development.	4.0	MA
16. Floods and landslides are caused by heavy rainfall, which increases water flow, impairing water quality and destroying water supply supplies, resulting in a water deficit.	3.9	NA
17. Climate change impacts the water cycle by affecting when, where, and how much precipitation falls, resulting in water distribution problems.	3.9	NA
18. Climate change's impacts on water supplies, in turn, have an influence on all major economic sectors.	4.1	MA
GRAND MEAN	4.0	MA

Legend: 5 (Extremely Aware – EA); 4.0 - 4.9 (Moderately Aware - MA); 3.9 and below (Needs Attention - NA)

Climate change intensifies weather events, causing drought (Pandey et al., 2018). In this study, 48% reported increased severity of droughts.

Infrastructures

Table 6 shows the level of awareness of the impacts of climate change among Filipino youth participants from vulnerable urban communities in the area of infrastructures. The collected data revealed that there is an evident need to enhance Filipino youth participants' awareness of the impacts of climate change, particularly in the area of infrastructures, with a grand mean of 3.9. Among the impacts of climate change on the subitems below, it can be gathered from the table that item 18, associated with the damage to transportation infrastructure brought by extreme heat, was the least given attention by the Filipino youth, while item 8, relatively associated with the damage in public classrooms due to floods, got the

highest level of awareness as assessed by themselves.

Table 6. Filipino Youth Participants’ Level of Awareness in Climate Change Impacts in the Area of Infrastructures

Infrastructures	Filipino Youth Participants	
	W.M.	V.I.
1. Existing structures and facilities are greatly affected by extreme weather conditions such as heavy rains.	4.0	MA
2. Existing structures and facilities are greatly affected by extreme weather conditions such as floods.	4.0	MA
3. Existing structures and facilities are greatly affected by extreme weather conditions such as wind.	3.9	NA
4. Existing structures and facilities are greatly affected by extreme weather conditions such as changes in temperature.	3.9	NA
5. The increase in temperature will require more indoor cooling, which might put stress on the energy grid.	3.9	NA
6. Public infrastructures such as roads might be severely damaged by floods.	4.0	MA
7. Public infrastructures such as bridges might be severely damaged by floods.	4.0	MA
8. Public infrastructures such as classrooms might be severely damaged by floods.	4.1	MA
9. Public infrastructures such as evacuation centers might be severely damaged by floods.	3.9	NA
10. Public infrastructures such as hospitals might be severely damaged by floods.	3.9	NA
11. Severe rainfall in areas where rainfall is expected during wet seasons might pose danger to human infrastructure and settlements, in terms of mudslides/landslides, especially in geologically weak areas.	4.0	MA
12. Increased frequency of severe weather events might tremendously damage hospitals and clinics.	3.9	NA
13. Increased intensity of severe weather events might tremendously damage hospitals and clinics.	3.9	NA
14. Increased frequency of severe weather events might tremendously damage evacuation centers and settlement areas.	3.9	NA
15. Increased intensity of severe weather events might tremendously damage evacuation centers and settlement areas.	3.8	NA
16. Surveillance systems and infrastructure for monitoring and preventing epidemics may be severely strained due to climate change.	3.8	NA
17. Higher temperatures caused by climate change can soften and expand roadways, causing cracking and holes, especially in high-traffic regions, and putting stress on bridge joints.	3.8	NA
18. Extreme heat can cause damage to transportation infrastructure, including train lines and runways.	3.7	NA
GRAND MEAN	3.9	NA

Legend: 5 (Extremely Aware – EA); 4.0 - 4.9 (Moderately Aware - MA); 3.9 and below (Needs Attention - NA)

Similarly, 39% reported disruption in children’s education due to flooding in the study of Pandey et al. (2018).

Summary of the Filipino Youth’s Awareness on Climate Change Impacts

Table 7 depicts the level of awareness of the impacts of climate change among Filipino youth participants from vulnerable urban communities in agriculture, coastal resources, forestry, health, water resources, and infrastructures. The collected data revealed that among the areas where climate change can negatively affect the different sectors of society, it showed that half of the Filipino youth participants from the vulnerable urban communities were moderately aware of its impacts on the said areas. Coastal resources, forestry, and infrastructure were not given much attention by the Filipino youth, with mean scores of 3.8, 3.8, and 3.9, respectively, while agriculture, health, and water resources received the highest level of awareness, with a mean score of 4.0. With a grand mean of 3.9 and a verbal interpretation of "Needs Attention," there is an evident need to enhance Filipino youth’s awareness in terms of climate change impacts.

Table 7. The Summary of Filipino Youth Participants’ Level of Awareness on Climate Change Impacts

Areas	Filipino Youth Participants	
	W.M.	V.I.
1. Agriculture	4.0	MA
2. Coastal Resources	3.8	NA
3. Forestry	3.8	NA
4. Health	4.0	MA
5. Water Resources	4.0	NA
6. Infrastructures	3.9	MA
GRAND MEAN	3.9	NA

Legend: 5 (Extremely Aware – EA); 4.0 - 4.9 (Moderately Aware - MA); 3.9 and below (Needs Attention - NA)

This is substantiated by research by Bollettino et al. (2020) on the public view of climate change in the Philippines, which found that the majority of participants (59.9%) are unaware of climate change on a national scale. Moreover, their top three responses to the effect of climate change are as followed. 46.0% on temperature increase, 41.6% on season variability, and 23.4% on intensified rainfall.

Significant Relationships between Filipino Youth Participants’ Level of Awareness of Climate Change Impacts when Group According to their Profile

Filipino youth participants with college-graduated parents (147.38, Mean Rank—MR) tend to be more aware than the other groups, namely: elementary undergraduates (102.34, MR); elementary graduates (99.79, MR); secondary undergraduates (90.45, MR); secondary graduates (110.41, MR); and college undergraduates (127.91, MR). Similarly, the findings of the study also showed that there is a significant evident to reject the null hypothesis, testing it at a level of significance of 0.05. It presented that there is a significant relationship between Filipino youth participants’ level of awareness of climate change impacts and the highest educational attainment of their parents (rs = 0.189, p = 0.001).

This finding is similar to the study of (Fahad et al., 2020) which stated that with every additional year of education, climate change awareness increases. Furthermore, Combest-Friedman et al. (2012) found that household heads with a greater degree of education were more likely to be aware of climate change than those with a lower level of education. Education enriches ones’ perception of climate change, thus, Ali et al., (2021) have hypothesized it to have a positive impact.

Additionally, a direct correlation by Beilders et al., (2003) and Shiferaw and Holdem (1998) in Ali et al., (2021) between awareness and education about climate change has been made.

Furthermore, Filipino youth participants whose family type is extended (125.05, MR) tend to be more aware than the other groups, namely: Matrifocal (108.44, MR); Patrifocal (87.61, MR); Conjugal (103.60, MR); and Avuncular (96.93, MR). Also, an association among the groups has been observed to be enough to make significance. There is a significant relationship between Filipino youth participants' level of awareness of climate change impacts and the type of family where they live ($r_s = 0.1697$, $p = 0.011$).

This is substantiated by a study of Fahad et al. (2020), which found a link between the size of a family and climate change awareness. Additionally, according to Ali et al., (2021), the bigger the family, the more they can perceive, consider, and communicate observations associated with climate change, thus, having a direct impact on awareness.

Conclusions and Recommendations

The overall results showed that there is an evident need to enhance the Filipino youth's awareness of climate change impacts. The study found that half of the Filipino youth participants from vulnerable urban communities were only marginally aware of the implications of climate change on agriculture, health, and water resources. Among the areas where climate change can have a negative impact, it also revealed that coastal resources, forests, and infrastructure have received limited attention. Similarly, the study discovered a significant relationship between Filipino youth participants' level of awareness of climate change implications and their parents' highest educational attainment as well as the type of family they live in. As a result, the findings' context must be considered while developing a comprehensive, inclusive, and community-centered environmental literacy program to enhance Filipino youth's awareness of climate change.

Extreme weather events have limited absorption and coping capacity in poor urban areas (Pandey et al., 2018). As a result, they require support to bolster their resource base in order to increase their adaptive capacity to climate change. These stress-ridden communities desire programs that account for the household's adaption mechanism to the effects of climate change (Jha et al., 2017). Climate change impact awareness is seen as a critical component of adaptive capability and the beginning of climate change adaptation (Graziano et al., 2018). since low awareness will undermine the effort to improve disaster risk reduction (Valenzuela et al., 2020). Public outreach and education are important parts of adaptation toolkits that attempt to improve adaptive capacity through knowledge and awareness. Here are some recommendations for the development program: making room in the media for experts and science communicators (Tsagkaris et al., 2021); climate-specific health literacy to safeguard and enhance both individual and planetary health (Reismann et al., 2021); development of media outreach programs to inform the general public and health practitioners about climate change, diseases, and their negative consequences (Tran et al., 2021). Climate change impacts and epidemic occurrences are closely associated with each other. Hence, information on these issues must be presented and discussed together to boost the effectiveness of educational interventions; public education concentrating on clear language substance with data on extreme weather events and their association to illness (Tsagkaris et al., 2021); education on key issues such as biological diversity, community solid waste management, and sustainable approach (Lagbas & Dl. Habito, 2016); and participation in initiatives such as mangrove planting, wildlife viewing, and coastal cleanup and restoration to bring people closer to nature (Lagbas & Dl. Habito, 2016).

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