RESILIENCY EFFORTS OF RESIDENTS IN DISASTER-PRONE COMMUNITIES: A PRE-PANDEMIC PERSPECTIVE

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ABSTRACT

Climate change is a major, global threat that needs to be addressed with heavy attention. The government is the backbone of decision-making and policy-crafting so strong political intervention in this context will be a leap toward sustainable development. Community engagement also weighs the same as that of the political aspect in mainstreaming climate change. The effects of climate change- increase in intensity and frequency of tropical cyclones, drive vulnerability and exposure of many people to climate-related hazards (Lasco, 2012). With these, this paper is aimed to explore the climate change adaptation and mitigation (CCAM) practices of residents in coastal barangays in Tacloban City- ways on how they adapt to and mitigate climate change. Using purposive random sampling and descriptive statistics, results showed that there were respondents who did not know the effects of climate change. While it could not suffice to conclude of their level of knowledge to climate change, it could be an indicator of a poor understanding of climate change. A more all-inclusive information and education campaign using local language and their most accessible media. Solutions to water scarcity, transport, and livelihood challenges should also be made to address the large number of respondents who were moving back to their original places from the relocation site. On another note, a high level of practice of climate change adaptation and mitigation was noted among them; most of them were aware of the existence of environmental protection ordinances while others had participated in and expressed the importance of the disaster drills.

Keywords: climate change, mitigation, resiliency, adaptations, practices

INTRODUCTION

Climate change is a major area that needs to be in the limelight to help the public make informed decisions in its adaptation and mitigation (Ochieng & Koske, 2013). As indicated in the report of China's National Climate Change Program (CNCCP), the developed countries have the greatest contribution to climate change indicating their greenhouses gases (GHG) emissions worldwide, while the developing countries have a relatively small amount of GHG emissions contribute to climate change. Though climate change has various effects in different parts of the world, a study shows that in the Philippines' the mean temperature rises between 0.90ºC to 1.40ºC in 2020 and between 1.70ºC to 2.40ºC in 2050. Approximately 6,300 deaths and 4.1 million people were displaced due to the

impact of the super typhoon (NDRRMC, 2013; USAID, 2016). Unimaginable mass destruction to life, property, homes, and the surrounding environment resulted from the extreme winds that reached about 315 kilometers per hour, heavy rain, and storm surge that reached about 7.5 meters high that drowned many of the people in the affected communities (Davidson, 2016). The effects of climate change, such as the increase in intensity and frequency of tropical cyclones, drive vulnerability and exposure of many people to climate-related hazards (Lasco, 2012). According to a study conducted by the Worldwide Fund for Nature and the BPI Foundation, the city of Tacloban was rated 6.74 out of 10 in terms of vulnerability to climate change risks. The location gives the city a front seat for every typhoon that may landfall in the eastern Visayas (Ranada, 2014).

Visayan youth leaders held a meeting to promote climate action plans and youth participation, which was held last August 24-25, 2018 at the Leyte Park Hotel, Tacloban City. The said meeting was initiated by the National Youth Commission together with the Climate Change Commission and partnership from the DENR and Plan International Philippines. This activity only highlights the importance of youth participation in climate change awareness, what can we do about it, and its cause and effects in myriad ways (CCC, 2018). Due to the vulnerability of our country to climate risks, the government had laid its plan against climate change. In 2009, Republic Act 9729, or the Climate Change Act was enacted into law, mandating "climate change (CC) considerations into government policy and planning". This law provided the foundation for the creation of the Climate Change Commission, the National Framework Strategy on Climate Change (NFSCC) for 2010-2022, and the National Climate Change Action Plan (NCCAP) for 2011-2028. The NCCAP was further expanded down to a local government level and is termed as Local Climate Change Action Plan. These policies mainstream climate change as one of the priorities in achieving a progressive nation, capable of facing the threats climate change has to offer.

It is in this light that conducting such study is deemed appropriate and timely. We cannot dent the fact anymore of the realities of climate change. Hence becoming more engaged in these topics will allow us to prepare for our future actions before it becomes too late.

OBJECTIVES OF THE STUDY

With all the data mentioned, it is in this regard that there is a need of exploring the mitigation and adaptation strategies for climate change among the residents of the coastal barangays in Tacloban City. In this light, the researcher sought to collate

1. the socio-demographic profiling of the respondents in terms of age, education, source of income and; years of residency in the barangay, and
2. the climate change mitigation and practices of the residents in selected coastal barangays of Tacloban City.

METHODOLOGY

Research Design. This study focused on the ways how the residents adapt to and mitigate climate change. The researcher used a descriptive approach as this study attempted to determine the adaptation and mitigation strategies of the residents living along the coastal barangays in Tacloban City. The use of descriptive research design is a good fit for a survey-type research questionnaire and useful in quantitatively generalizing ideas without concern of its causation, as this study needs. A descriptive survey was used in this study as it was deemed most appropriate in identification and description of people's opinion about a phenomenon. This study was done before the COVID-19 pandemic hit the whole world, hence the data-gathering procedure still followed the normal face-to-face interviews.

Research Locale. This study was conducted in two coastal barangays of Tacloban City. There are 46 coastal barangays in Tacloban City and two of them were chosen as the study area since these two coastal barangays recorded a high in vulnerability index as found in the study of Toda et al (2015). These are Barangay 88 in San Jose, Airport and Barangay 99 in Diit, both in Tacloban

City. These barangays have a population of more than 5,000 individuals, reaching a total of more than 11,000 individuals.

Research Respondents. There are estimated 71,657 residents living in the coastal barangays in Tacloban City based on the projected population given by Philippine Statistics Authority in the year 2018. This number is limited only to individuals aged 15 years old and above, which is the age range for this study's target respondents. The variability of the respondents' age will be of great significance to come up with a wider scope of responses. The researchers set the respondent's age to a minimum of 15 years old. Evenshaug & Hallen (2001) found out that children in late and early adolescence acquire abstract thinking, meaning they can think beyond the concrete situation. Holden (2007) also stated that many in this age group also start to show interest in different societal issues (Ojala, 2012). With the findings of the previous studies, the researchers established the 15 years old as a middle ground for which the respondents' age bracket must begin with.

Research Instrument. This study used a researcher-made survey questionnaire which was completed with the help of the researcher's instructor. The researchers had requested an expert to help put the questionnaire in good form and substance. The questionnaire was examined by an environmental science professor and a research expert. Part I of the instrument covers the respondent's profile, and Part II and Part III cover the respondent's adaptation and mitigation strategies, respectively. Part IV is the observed barangay ordinances and activities in the barangay that deal with environmental conservation and climate change. The instrument was translated to Waray-waray with guidance from an expert.

Research Procedure. The researchers made the survey questionnaire, patterned from the reviewed literature of the same area of interest, which is climate change adaptation and mitigation. Then, the researcher consulted an expert, a science professor, to assess the content of the questionnaire. After having the survey questionnaire in good form, the researcher translated the questionnaire into *Waray-waray* dialect so that it would be easy for the respondents to answer the survey. The translation was also guided by an expert in *Waray- waray* dialect to avoid improper wording. After approval of the translation, a letter of permission to the chairman of Barangay Candahug, a coastal barangay in Palo, Leyte, where the pilot survey was conducted, requesting permission to survey the residents in their jurisdiction. After the pilot survey was conducted, a letter of request was sent to conduct the actual survey to the chairmen of the study sites.

Statistical Data Analysis. The researchers used percentage and frequency counts. This is appropriate since this study is quantitative. The researcher assumed to have 20 individuals in each category (e.g. students, young professionals, housewives, fishermen, and the elderly). This would total to a sample size of 100. However, getting a 100 percent response from a sampled unit is rare. So, an assumption of a nonresponse rate is necessary (Israel, 1992; Pazzaglia, Stafford, & Rodriguez, 2016). According to Pazzaglia et al (2016), one approach to limit the risk of bias from nonresponse is to select 85 percent response rate. The final sample size would be 118. But during the actual survey, it was a challenge for the researcher to get the group of young professionals and student respondents. Thus, the original survey design was not met and the researcher employed purposive random sampling. The age bracket for each group was set by the researcher in a way that age will be distributed throughout. The researchers employed frequency and percentage counts to determine how many individuals have practiced a specific adaptation or mitigation strategy such as not burning plastics and planting trees. Each adaptation and mitigation option were computed for its frequency count and percentages. However, some items in the questionnaire required a qualitative answer. Data gathered was presented using statistical figures such as graphs.

RESULTS AND DISCUSSION

1. Climate change adaptation and mitigation practices

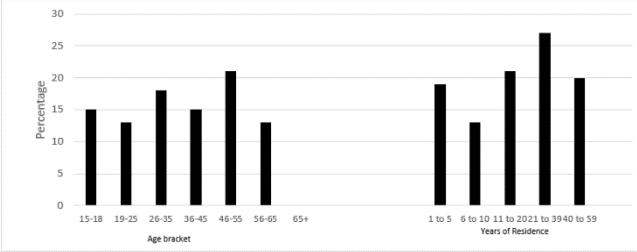

Figure 2. Age Group and Year of Residence of the Respondents

Figure 2 shows how long the respondents have been living in the barangay, and how old are they at the time of the survey. The average age is 34 years old while the average year of residence is about 23 years.

This data implies that most of the respondents were not originally from the barangay that they were currently residing. Moreover, 18% of the respondents were living for 1-5 years in the barangay. This is an indication of new settlers in the barangay more than a year but less than five years after typhoon Yolanda.

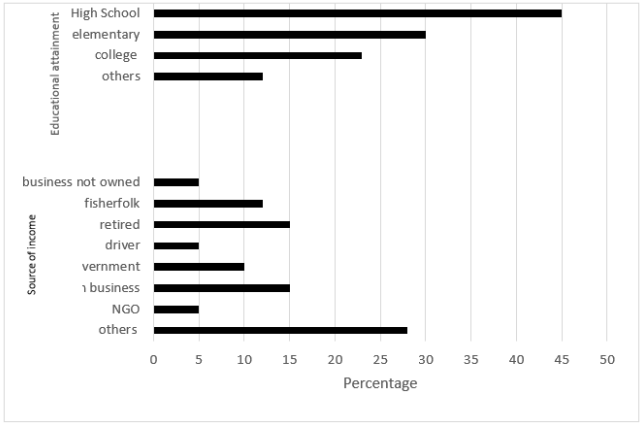

Figure 3. Education and Source of Income of the Respondents

Figure 3 shows the data on the respondents' source of income and educational attainment. Female respondents comprised seventy-five percent (75 %) of the sample. This was because females were the ones left at home attending to their children. It also shows that males were the ones who worked for their families. Often even when husbands or males were present, they shy themselves away and pass the task of entertaining to a female in the household. The majority of the respondents finished secondary education (38%). It also shows that most of the respondents did not have a stable job, and did not finish tertiary education. Housewives were the most in number, indicated as "others" in the figure.

2. Media, Climate Change, and Its Effects

Table 1

Media, Climate Change and Its Effects

Frequency		Percentage
Respondents Who Have Heard About Climate Change	78	66%
Media from Where They Have Heard about Climate Change		
Television	78	66%
radio	38	32%
residents	24	20%
social media	16	14%
family	12	10%
Brgy. Officials/	6	5%
others	12	10%
Respondents Who Have Not Heard About Climate Change	40	34%
Respondents Who Knew the Effects of Climate Change	76	64%
Effects of Climate Change		
Hot weather	62	53%
El Nino	58	49%
floods	56	47%
cold weather	54	46%
stronger typhoons	54	46%
La Nina	48	41%
liquefaction	40	34%
Sea-level rise	36	31%
storm surge	30	25%
tsunami	30	25%
others	10	8%
Respondents Who Did Not Know the Effects of Climate Change	42	36%

In Table 1, sixty-six percent of the respondents have already heard about climate change, while only 34 % have not heard about it. Most notably, they have heard about climate change through television (66%), radio (32%), and from the residents (20%), while only 5% reported that they have heard it from the barangay official. This implies that television and radio were the two most accessible media as a source of information regarding climate change while less has been heard of it from the barangay officials.

On the other hand, only 64 % of the respondents knew the effects of climate change. Among the top five responses were hot weather (53%), El Nino (49%), floods (47%), colder temperatures (46%) during the night, stronger typhoons (46%), and La Nina (41%). These top five responses are the obvious experience of the respondents, and thus may have influenced their knowledge on climate change effects. These are common in the Philippines since on average about twenty typhoons visit the country each year, with heavy rains resulting in moderate to severe flooding in flood-prone areas.

Moreover, the most observable one was hot weather because it can be experienced almost every day in a particular season. In Tacloban City, the average temperature for May 2019 (same as the time the survey was conducted) was 33 degrees Celsius (Accuweather, 2019). Seasonal variations should also be considered as this might affect the responses of the respondents. Should the survey be conducted during the rainy season, it could have produced a different response.

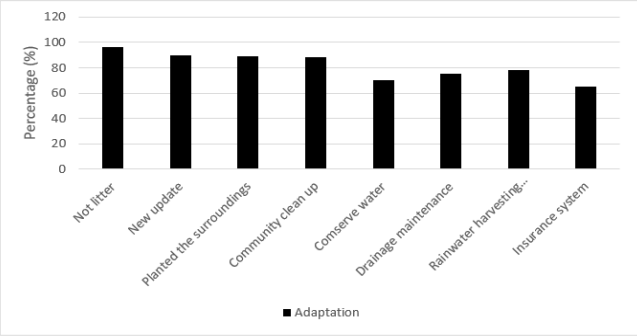

Figure 4. Climate Change Adaptation

The respondents reported that they were serviced by the city's garbage collection so they need not to throw their garbage elsewhere. This is in consonance with the report of the CPDO (2017) where garbage collection is preferred by most households in both barangays. Television and radio were the main sources of information for the respondents about climate change (see Table 1) and thus updating on the news comes as no surprise. Comparing data from Table 1 and Figure 4, it shows that adaptive responses most practiced were parallel from the most perceived climate change effects such as not littering, (as garbage may clog waterways), drainage maintenance to floods, El Nino and hot weather to conserving water and planting in the surroundings. The result also implies that the respondents were not seeing a sea-level rise as a future threat since they are more focused on short-term adaptation.

3. Dwellings, Willingness to Move Away from the Coast, and their Reasons

Table 2
Dwellings, Willingness to Move Away from the Coast and their Reasons

Frequency		Percentage
In a No Build Zone	68	58%
Not in a No Build Zone	50	42%
Willing to move away from the coast	92	78%
Reasons		
for safety	78	66%
so that evacuation will not be necessary	4	3%
availed of government housing	4	3%
if there is livelihood at the relocation area	6	5%
Not willing to move away from the coast	26	22%
Reasons		
livelihood is at the coast	20	8%
used to live here	2	2%
leave everything to God	2	2%
not in the No Build Zone	2	2%
we are already good	2	2%

In Table 2, almost half of the respondents have varied responses about whether they are in a No-Build Zone or not. According to Philippine Water Code, 40 meters away from the shore is considered a "No Build Zone". Looking at Google Map (2020), the study areas are already more than 40 meters away from the shore. However, the hazard map of Tacloban City revealed that these areas could still be affected by a 2-4-meter-high storm surge. The percentage of the respondents who were in a No-Build Zone (58%) was outnumbered by the percentage of those respondents who were willing to move away from the coast (78%), where it is safe from **storm-surges**. It should be noted that the main reason to their willingness to move away from the coast was their safety (against storm surge) (66%). This decision was probably influenced by their experience when Super Typhoon Yolanda struck through Eastern Visayas. In contrast, the survey interview revealed that problems concerning water scarcity, transportation challenges, and livelihood availability in the relocation site were among some of the common issues confronting the respondents, thus leaving them to go back to their former houses even though most respondents (in San Jose area) already benefitted the free-housing program by the government.

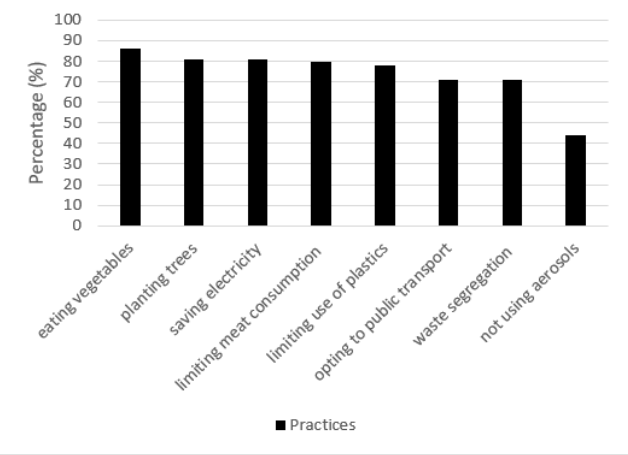

Figure 5. Mitigation practices

Figure 5 shows that eating vegetables (86%) was the most practiced mitigation option among the respondents, followed by planting trees (81%), saving electricity (81%), limiting meat consumption (80%), limiting the use of plastics (78%), opting to public transport (71%), and waste segregation (71%). These were the top five mitigation options that were prominent among the respondents. Questions on aerosols (44%) were only limited to insect repellents when the survey was conducted. It was quite alarming that over half of the respondents use insect repellent sprays for either mosquitoes or cockroaches. Similar to the present study, Lubus (2019) found out that residents along the Cagayan River moderately practiced CC mitigation. These mitigations were centered on themes about low-carbon product consumerism, energy conservation, waste management, and reforestation. It is obvious that the respondents have a high level of practice of mitigation options. The practice of climate change mitigation in an individual scale is relevant in reducing emissions of carbon. From the previous literature cited, opting to green diet alone saves an amount of 1854 kg of CO2 equivalent (Bjelle, Steen-Olsen, & Wood, 2017). This amount multiplies when the majority of the respondents opt for a green diet. Doing all the household actions listed in the study of Bjelle (2017) would save us a great deal of CO2 emissions.

On the contrary, the respondents failed to comment on the connection between their responses and climate change. Based on the survey interview, opting for a vegetable diet, saving electricity, and use of public transport were attributed to the desire of saving money. The respondents collected plastic bottles that were sold at a junkshop to generate income. Segregating wastes, not cutting trees, use of prescribed fishing nets, and planting trees (mangroves in this part) were consequences of the implemented ordinances. It can be deduced that many of the mitigation options were linked to other domains rather than climate change These unheralded intentions were sourced from the respondents during the conduct of the study. These findings were supported by Gatersleben et al (2002) as cited in Whitmarsh (2008) where they reported in their study that the concern of positive

climate action was not mainly on climate change but on other intentions such as Table 3 presents the observed barangay environmental protection ordinance.

4. Actions on Barangay Environmental Protection Ordinance

Table 3
Actions on Barangay Environmental Protection Ordinance

Frequency		Percentage
Respondents who knew of any environmental protection ordinance in their barangay	82	69%
Respondents who did not know of any environmental protection ordinance in their barangay	10	8%
Respondents who were unsure of whether there was environmental protection ordinance or there wasn't	26	22%
Respondents' observed barangay environmental protection ordinance*		
community clean-up*	32	39%
solid waste- management*	30	37%
tree planting*	12	15%
not burn garbage*	6	7%
plastic collection*	2	2%
not cut trees*	2	2%
Respondents who complied with the environmental protection ordinance*	74	90%
Reasons:		
for our own benefit*	18	22%
for community service*	30	37%
disease prevention*	10	12%
self-fulfilling*	5	6%
Mangroves helps*	5	6%
to provide shade (trees)*	6	7%
Respondents who did not comply with the environmental protection ordinance*	8	10%
Reasons:		
Busy in their jobs*	6	7%
burnt garbage*	2	2%

* *A total of 36 individuals were neither included in the item nor in the percentage computation because they were unsure or did not know of any existing environmental ordinance in their barangay.*

While it is better to have the ordinances in place, it is best to have it enforced among the constituents. The data about those who did not comply with the ordinances refer to those who knew there were ordinances. There was no data on whether those who did not know or were unsure if there were any barangay environmental protection ordinances have complied or did not. Sixty-nine percent of the respondents observed that ordinances were being implemented in their barangay. Community clean-up (39%), solid waste management (37%), and tree planting (12%) were the most observed ordinances by the respondents. Ninety percent (90%) of the respondents who knew of any environmental ordinance in their barangay were compliant to the ordinances and reasoned out that enactment on these is for their benefit (22%), their community (37%), disease prevention (12%), and self-fulfillment (6%). This result shows that the respondents were physically, as well as effectively engaged to the ordinances implemented in their respective barangays.

5. Disaster Drills Conducted in their Barangay and their Reasons for Participating

In Table 4, earthquake drill (56%) was the most activity noticed by the respondents. The respondents also considered the drills as important (94%) for disaster preparedness (63%). This number is greater than those who participated in the drill (78%). These reasons were the same as why they participated in the drill but with much smaller percentages. Busy in their daily jobs (10%), old-aged (7%), and not informed (5%) were the reasons why 22% of the ninety-two (92) respondents did not participate in the drill. Toole et al, (2016) stated that inaction can result from unintentionally imposed societal, political, physical, and psychological barriers, thus explaining the findings of this study. On the good side, there is a high level of participation and acknowledgment of the importance of the drill among the respondents.

Table 4
Disaster Drills Conducted in their Barangay and their Reasons of Participating

Disaster drills conducted in the barangays	Frequency	Percentage
earthquake drill	66	56%
evacuation drill	44	37%
fire drill	34	29%
others	26	22%
Respondents Who Participated in the Drill*	72	78%
Reasons:		
disaster preparedness*	32	35%
for own's benefit*	12	13%
4Ps-member (required)*	10	11%
for own's safety*	10	11%
job-required*	2	2%
to be rescue-capable*	2	2%
reduces risk in own's family during a disaster*	2	2%
Respondents Who Did Not Participate in the Drill*	20	22%
Reasons:		
Busy*	9	10%
old-aged*	6	7%
not informed*	5	5%
Respondents Who Considered the Drills as Important*	86	94%
Reasons:		
for disaster-preparedness*	58	63%
for own's safety*	44	48%
to be rescue-capable*	4	4%
Respondents Who Did Not Consider the Drills as Important*	6	6%
Reason:		
it wouldn't be followed when disaster happens*	6	6%

**26 individuals were neither included in these items nor in the percentage computation corresponding these items because they reported that there were no drills conducted in their barangay.*

CONCLUSIONS

This study concerns the engagement of the residents in climate change adaptation and mitigation. The questions that this study intends to answer were the demographic profiles of the respondents in terms of age, educational attainment, source of income, and years of residency in the barangay; the climate change adaptation of the respondents; and the climate change mitigation of the respondents. A 26-item survey was developed by the researcher to fulfill the research questions. Moreover, purposeful random sampling was employed due to time, labor, and resource difficulties encountered by the researcher.

A simple percentage and frequency count was utilized to come up with the representation of the data gathered. Individuals are the direct recipient of climate change effects and the government's relief operations and adaptation development as a result of these effects. Technically, adaptation development from the government upholds its mandate to safeguard the life of its citizens, but it is not always a complete package for all, sometimes it lacks something on the other side such as a loss of livelihood. Meanwhile, individual mitigation is also as significant as the energy, transport, and agriculture sector in lowering GHG emissions since they are the end-user of these sectors, they affect the supply-demand chain. The respondents moved back to their original dwellings despite there being free houses given by the government because there was no available sustainable livelihood at the relocation site. Water crisis and transportation mobility were also new challenge for them at the site. These motivated them to go back to their homes and ignore the government's warning about the hazard of storm surge for a time being while there is no typhoon. This is a major repercussion of a top-down approach to climate change.

Results showed that there was a considerable number of respondents who did not know the effects of climate change. While it could not suffice to conclude their level of knowledge to climate change, it could be an indicator of a poor understanding of climate change. This could be counteracted through a more all-inclusive information and education campaign about climate change through the use of local language and their most accessible media –television and radio. Providing solutions to water scarcity, transport, and livelihood challenges should also be made to address the large number of respondents who were moving back to their original places from the

relocation site. On the other side of the story, there was a high level of practice of climate change adaptation and mitigation among the respondents; most of the respondents were aware of the existence of environmental protection ordinances; most of them had participated in and expressed the importance of the disaster drills.

RECOMMENDATIONS

The local government could further strengthen these by giving incentives for positive environmental behavior and strictly imposing fines on those disobeying the ordinances. For future research suggestions, an increase in the number of respondents in a way that the result could represent the different social statuses could be significant, since the respondents of this study were mostly low-income families.

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AUTHORS' PROFILE

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