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Knowledge of Residents and Barangay Officials on Disaster Risk Reduction and Preparedness in Oriental Mindoro, Philippines

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ABSTRACT

This study assessed the level of disaster risk reduction knowledge of residents and barangay officials in the disaster-prone municipalities of Oriental Mindoro on disaster preparedness and significant differences on the assessment of the two groups of respondents. Guided by research questions, a structured questionnaire was prepared. The respondents of this study were the residents and the barangay officials including the chief of barangay tanods from the disaster-prone areas of the selected municipalities of the province of Oriental Mindoro. This study was conducted in the calamity-prone areas of Baco and Naujan municipalities. For the resident respondents, a total of 379 residents were selected from the total population of 24,550 in DPA1 and DPA2. On the other hand, total enumeration of the participants was applied in soliciting information from the 180 barangay officials including the chief of barangay tanods of the disaster-prone areas. To determine the respondents' level of disaster risk reduction knowledge, weighted mean was used . To determine the significant differences in the assessment of the two groups of respondents, the one-way analysis of variance (ANOVA) and Scheffe test were used. Results revealed that barangay official and residents of the disaster-prone municipalities in Oriental Mindoro have a high level of disaster risk reduction knowledge signifying that the initiatives on information dissemination were effective. Moreover, there is a significant difference between the assessments of the residents and barangay officials on the extent of disaster risk reduction knowledge. barangay officials are more exposed to information because of their position.

INTRODUCTION

Since the dawn of ages, the world has been continually afflicted by countless disasters. Everyday there are disasters that afflict the different parts of the world such as typhoons, earthquakes, volcanic eruption, tornado, tsunami, flood and many more. Even the holy bible spoke about disasters such as the flood during the time of Noah and many others. By the passage of time, the world continued to be struck by disasters that took too many lives and destroyed unquantifiable amount of properties. The United Nations Office for Disaster Risk Reduction (Etinay *et al.*, 2018) estimated in a data collected from various sources, including UN agencies, non-governmental organizations, insurance companies, research institute and press agencies that since 1900 alone to the present, there were already about 18,000 mass disasters that afflicted the world. Specific disasters that took few lives and merely destroyed properties no matter what is the extent were not even included in this data.

In the study conducted by Ritchie *et al.* (2022), it was shown in a data presented that since the 1900 there was a tremendous surge in natural disasters that afflicted the world since the late 1990s until 2018 and still counting. The data also showed that flood at some point in time has claimed more lives than other disasters. The data however does not include other impacts of disaster such as mere injury, homelessness and displacement from place of residence. National and local governments have made several efforts to minimize the impact of natural disasters. However, Tripathi and Pandey (2022) indicated that there were many adaptative solutions that have been proposed locally and at the government level, with varying efficacy in different environment.

In 2015, the Global Facility for Disaster Reduction and Recovery has reported that the Philippines is at high risks from cyclones, earthquakes, floods, landslides, tsunamis, volcanic eruptions and wildfires. Further reports stated that since 1990, the Philippines has been affected by 565 natural disaster events that have claimed the lives of about 70,000 Filipinos and caused an estimated $23 billion in damages. At least 60 percent of the country's total land area is exposed to multiple hazards, and 74 percent of the population is vulnerable to their impact. The Global Facility for Disaster Risk Reduction (GFDRR) also claimed that an average of 20 typhoons make landfall in the Philippines every year and they kept stronger and more devastating since the last decade. An example of these is the typhoon Yolanda in 2013, the strongest typhoon ever recorded at landfall in history that caused over 6,000 reported fatalities and damaged 1.1 million homes in nine regions, most especially those that are along the coastline (UN Office for Disaster Risk Reduction, 2019).

The press release of the World Bank (2017) claimed that the Philippines ranks third in the world among the countries most at risk for disasters, including floods, storms and earthquakes. The report also claimed that in the past 30

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years, more than 360 major disasters struck the Philippines, with a total death toll of 33,000 people and affected 120 million people. According to their data, typhoons and floods are the most devastating in terms of their economic and social impact, accounting for 80 percent of all deaths, 90 percent of the total number of affected people, and 92 percent of the total economic impact.

According to Santos (2021) the Philippines is exposed to high incidents of hazards such as tropical storms, tsunamis, earthquakes, volcanic eruptions, landslides and droughts due to its geographical location. The Philippines is prone to earthquakes and volcanic eruptions, since that it is situated along a highly seismic area lying along the Pacific Ring of Fire where two major tectonic plates meet. It experiences floods and storm surges due to tropical storms or typhoons accompanied by heavy rains and strong winds.

Among the areas commonly hit by typhoon is the eastern part of the country in which Oriental Mindoro is one of the provinces being affected. The Manila Trench, an oceanic trench in the Pacific Ocean, located west of the islands of Luzon such as Mindoro, poses potential disaster in its provinces. An article written by Ravago (2018) discussed about the devastating effects of typhoon Nona, one of the latest destructive typhoons in the Oriental Mindoro province that caused infrastructure damage affecting roads, bridges, flood control projects, public buildings and other public works which was estimated at 1.5 billion. Losses and damage to agriculture was estimated at 2.9 billion; 2.7 million in crops, 267 million in livestock and 28.1 million in fisheries. The power sector suffered 290 worth of damage. This excludes a local mini hydro-power which may require 25 million to restore. The impact of the typhoon is significant both in agriculture and infrastructure losses.

A report in the inquirer by Sabillo (2013) recognizes the Mindoro earthquake as one of the natural phenomena in the Philippines that almost caught Mindoro off guard. The 1994 Mindoro earthquake generated a tsunami by a 7.1 magnitude earthquake that swept away 1530 houses in the coastal areas of Baco Oriental Mindoro. The tragedy also killed 78 people.

In 2013, another disaster that whipped and brought havoc with so much destruction to Oriental Mindoro is typhoon Yolanda affecting Pinamalayan, Baco and Roxas municipalities (ADRA, 2013). Yolanda flooded 90 % of Baco town and has been placed under state of calamity. The strong winds and heavy rain uprooted trees causing power communication lines almost down, ports closed, school offices, and shops.

As shown in the flood susceptibility map of the Mines and Geo-Sciences Bureau (MGB) MIMAROPA region, the province of Oriental Mindoro particularly the municipalities of Baco and Naujan are among the commonly flooded areas (MGB-MIMAROPA). The annual report of the Provincial Disaster Risks Reduction of Oriental Mindoro reveals that Baco and Naujan municipalities have been consistently inflicted by typhoons and floods and placed under state of calamity within the last five years such as during the super typhoon Yolanda in 2013, typhoon Nona in 2015, typhoon Nina in 2016 to name a few (PDRRMO annual accomplishment report).

The local councils of Naujan and Baco in Oriental Mindoro province have placed their respective towns under state of calamity as tropical storm "Vinta" (international name: Temblin) dumped rains over some parts of South Luzon (Virola 2017). In 2018, Virola reported that tropical depression "Agaton" flooded majority of the villages in Baco, Oriental Mindoro due to continuous rains spawned by the tail end of the cold front. Meanwhile, Datu (2018) reported that floods swamp at least 20 villages in Calapan City including nearby towns in which Baco has been placed under a state of calamity due to tropical depression Usman. These historical background on the experiences of the municipalities in the province of Oriental Mindoro showed that disaster resilience among these municipalities needs to be improved.

Environmental adversity are often attributed to shifts in climates, unpredictable typhoons and earthquake, rise in sea level, erosion of coastlines, major changes in river systems and heavy rainfall as in the case of Mindoro province. The fact that the Philippines ranks among the countries most at risk for disasters and the surging data of disaster casualties means that the country may still lack resilience to disaster at certain aspects. Thus the conduct of further research aimed at finding ways on how the country can effectively cope-up with disaster is imperative, also because disasters continue to claim the lives of people, which are the most important resources of the country. This is the main reason why this study is conducted. Hence, this study assessed the level of disaster risk reduction knowledge of residents and barangay officials in the disaster-prone municipalities of Oriental Mindoro on disaster preparedness and significant differences on the assessment of the two groups of respondents. This study would not end on understanding but rather a solution to the prevailing environmental problems frequently visiting the province of Oriental Mindoro and reduce the risk brought by disasters.

METHODOLOGY

This study used descriptive-quantitative method of research in which the level of disaster risk reduction knowledge were gathered and treated statistically. Guided by research questions, a structured questionnaire was prepared. The questionnaire contains the assessment on the extent of disaster risk reduction knowledge among the residents and barangay officials in the disaster-prone municipalities in Oriental Mindoro, Philippines. A draft questionnaire was presented to the evaluation committee and ethics committee for content validation and approval. The questionnaire was reprinted incorporating all the comments, suggestions and recommendations.

The respondents of this study were the residents and the barangay officials including the chief of barangay tanods from the disaster-prone areas of the selected municipalities

of the province of Oriental Mindoro. For the resident respondents, a total of 379 residents were selected from the total population of 24,550 in DPA1 and DPA2. On the other hand, total enumeration of the participants was applied in soliciting information from the 180 barangay officials including the chief of barangay tanods of the disaster-prone areas. They are selected primarily because they are of rich and first-hand experiences on disasters because their home locations are part of the disaster-prone areas in the province. The researcher explained well to the respondents the importance of giving an honest response because the data that will be gathered will be used for their own benefit so honest response is needed to determine the actual real situation that needs to be addressed. The data gathered was treated with utmost confidentiality. The respondents were assured of the confidentially of their information and the result of the study. Furthermore, the study is solely intended to address the need for a comprehensive resilience program vis-a-vis natural calamities that befall disaster prone barangays and to assess the management capability of the local disaster risk reduction management in which the result is intended to benefit the local community, hence there is no conflict of interest arising in the conduct of this study.

This study applied stratified proportional random sampling in selecting the resident respondents while total enumeration for the barangay officials including the chief of the barangay tanods in each barangays of the calamity prone areas in the island province under study. The sample size was determined using the 5% margin of error and 95% confidence level which was computed using the Raosoft sample size calculator. The ideal sample size of 24,550 population was taken from the identified calamity-prone barangays of Baco and Naujan. Based from the computation, the 379 residents were chosen through probability proportional to population size of each barangay. The respondents were selected through stratified random sampling because they were chosen from each of the barangays. The head of each family were chosen as the resident respondents. They were chosen because it is believed that they could provide sufficient information being the head of the family who are most responsible in times of disaster. The representative from each family were randomly selected by counting, starting from the first household nearest to the barangay hall of each identified calamity-prone barangays in which the odd-even scheme was applied. The household that falls in the odd numbers will be chosen as the respondents. For the second group of respondents, all barangay officials including the chief of barangay tanods were enumerated as respondents. Once selected, those respondents who are not available, or will withdraw or refuse from being respondents will be replaced to fill in the sample size of respondents.

This study was conducted in the calamity-prone areas of Baco and Naujan municipalities. Being geographically located in disaster-prone areas, the study site was selected. The study sites are selected based on the flood susceptibility map of the Mines and Geo-Sciences Bureau (MGB) MIMAROPA region. Another basis is the annual report of the Provincial Disaster Risks Reduction of Oriental Mindoro which reveals that these localities have been consistently inflicted by typhoons and floods and placed under state of calamity within the last five years such as during the super typhoon Yolanda in 2013, typhoon Nona in 2015, typhoon Nina in 2016 to name a few (PDRRMO annual accomplishment report). The news reports of Virola (2017 and 2018) and Datu (2018) stating that these municipalities are being placed under state of calamity are also considered as basis in selecting the sites of the study.

The researcher conducted preliminary survey and identified at least 20 disaster prone barangays in the two municipalities. Through which the residents and barangay officials were chosen as respondents of the study. Secondly, the researcher asked the permission of the authorities concerned such as the barangay chairman through a letter request for the floating of questionnaires and gathering of supplementary data needed in this study. Once the request was granted, the researcher floated the questionnaire and gathered supplementary data. There was also a letter of request attached to the questionnaire asking the consent of the respondents to participate in the study, assuring them that the data that gathered was kept confidential and asking them to likewise keep the confidentiality of the research. To ascertain that the local officials and respondent participation is voluntary, before the floating of questionnaires to the respondents, the researcher sought the approval of the Barangay Chairperson of each barangay through a letter request. Once the letter of request was signed, the researcher then proceeded with the floating of questionnaires.

To determine the respondents' level of disaster risk reduction knowledge, weighted mean was used . To determine the significant differences in the assessment of the two groups of respondents, the one-way analysis of variance (ANOVA) and Scheffe test were used.

RESULTS AND DISCUSSIONS

Level of Knowledge on Disaster Risk Reduction and Preparedness of Residents and Barangay Officials in the Disaster-Prone Municipalities of Oriental Mindoro. Table 1 presents the level of disaster risk reduction knowledge of the barangay officials and residents in the disaster-prone municipalities of Oriental Mindoro in terms of disaster preparedness.

The general composite mean of 3.94 indicates that the barangay officials have a high level of disaster risk reduction knowledge. Meanwhile, the residents earned a general composite mean of 3.67 which is described as High. In the overall tally, both the barangay officials and the residents possessed a high level of knowledge on disaster preparedness as to disaster risk reduction as justified by its overall composite mean of 3.81. These results signify that the level of risk reduction knowledge among the participants is high. Both the barangay officials

Table 1: Level of Knowledge on Disaster Risk Reduction and Preparedness of Residents and Barangay Officials in the Disaster-Prone Municipalities of Oriental Mindoro

Items	Barangay Officials		Residents		Overall	
	Weighted Mean	Verbal Interpretation	Weighted Mean	Verbal Interpretation	Weighted Mean	Verbal Interpretation
1. I am prepared to perform basic revival techniques like first aid for victims of disaster like my family member.	3.67	High	3.62	High	3.65	High
2. I can perform basic emergency rescue and transfer victims of disasters or endangered persons like carrying them to a safe place.	4.15	High	3.82	High	3.99	High
3. There are enough basic commodities readily prepared to be used in case of disaster like rice, and canned goods.	4.07	High	3.73	High	3.90	High
4. There are enough medical or first aid tools prepared for victims of disaster like band aid and bandages.	3.86	High	3.59	High	3.73	High
5. I know the identified safe areas to go when there is a disaster like the high places during floods or open zones in case of earthquake.	4.17	High	3.84	High	4.01	High
6. I am aware of the presence of various hazards and the possible impacts especially in high-risk areas.	3.83	High	3.78	High	3.81	High
7. I have participated in the conduct of drills to be aware of evacuation and other things to do during disaster.	3.82	High	3.57	High	3.70	High
8. I am aware of the emergency contact numbers of the local government agencies or offices to be contacted in case of disaster.	3.89	High	3.47	Moderately High	3.68	High
9. I am know the contact numbers of law enforcement authorities to report incidents of looting during disasters.	3.94	High	3.57	High	3.76	High
10. I am aware with the warning signs of when to evacuate during disaster.	4.04	High	3.74	High	3.89	High
Composite Mean	**3.94**	**High**	**3.67**	**High**	**3.81**	**High**

and residents are familiar with the basic revival and rescue techniques and are likewise capable of performing such practices when prompted with circumstances. This result may also be related to their previous participation on drills and series of training on the conduct of such measures. In addition, the respondents have also shown high level of awareness on the safe zones that they have to go during disasters. They were also aware of warning signs as well as emergency contact numbers which are crucial in the effective response to disasters. Muchanga

and Mzyece (2023) suggests regulating human activity on the immediate downstream to reduce the overall impact of a disaster risk such as dam breaking.

When the tabulated results are analyzed, it can be observed that the fifth item gained the highest weighted mean of 4.17, in the case of barangay officials, and 3.84 for the resident-respondents. Both of these weighted means are described as High. Therefore, in such construct, both groups of respondents signify a high level of knowledge. The item indicates their knowledge on the safe areas designated during disasters. These areas include high places during floods and open zones which are designated in the case of earthquake. As the key leaders of a barangay, the said item is expected to be familiar among the barangay officials. The designation of safe places is one of the significant actions that the leaders have to make to ensure that all citizens in their jurisdiction would be guided in terms of disasters. It should always be included in the plans of the barangay for the safety and security of the place and its people. Since the barangay officials are aware of the safe places, it cannot be denied as well that it will also eventually lead to the dissemination among the residents. Thus, they both shared the same level of knowledge.

Similarly, both groups of respondents responded to item number 1 with the lowest mean average of 3.67 and 3.62, respectively. While these means are the lowest among the ten constructs, they are still described as High. The item deals with the knowledge of the respondents in performing basic revival techniques like first aid for the victims of disaster including their family members. The Philippine government has stressed the importance of enhancing the knowledge on the basic revival techniques specifically among the lowest unit of political positions. Barangay chairmen are bestowed with the responsibility to ensure that the barangay has the capability for emergency response (Boysillo, 2017). Thus, several training and information dissemination drives were conducted to ensure that the barangay officials are given proper knowledge on disaster preparedness. These programs are particularly intended for the officials together with the members of the barangay justice who are also responsible of ensuring the peace and order as well as public safety. Barangays are likewise encouraged to establish their respective disaster preparedness and mitigation measures (Lomotan, 2014).

In these programs, the government also acknowledges the role of the residents on revival techniques. The citizens of the barangays are also encouraged to attend seminars and series of trainings intended for these practices to make them ready to respond to any emergency (Domingo and Manejar, 2018). However, the results show that the knowledge may be insufficient. Since the techniques for revival can only be learned through proper training and guidance of experts, the respondents may have the inhibition to claim that they are knowledgeable about such practices. It may be interpreted that they have little knowledge on revival techniques or lack confidence as they think that what they know are not enough to be used during disasters. The results may likewise be attributed to the fact that some of the respondents have not been prompted yet with situations which require them to apply their knowledge on revival techniques. They may already have received training on such emergency response, but their inability to apply such knowledge may have affected their assessment of their capacity to succeed in real-life situation.

Comparison of the Assessments Made by the Residents and Barangay Officials on the Level of Knowledge on Disaster Risk Reduction and Preparedness of Residents and Barangay Officials in the Disaster-Prone Municipalities of Oriental Mindoro. Table 2 presents the comparison of the assessments made by the residents and barangay officials on the level of knowledge on disaster risk reduction and preparedness of residents and barangay officials in the disaster-prone municipalities of Oriental Mindoro.

Table 2: Comparison of the Assessments Made by the Residents and Barangay Officials on the Level of Knowledge on Disaster Risk Reduction and Preparedness of Residents and Barangay Officials in the Disaster-Prone Municipalities of Oriental Mindoro

Variables	Residents	Barangay Officials	Computed t-value	Critical t-value	p-value	Result
	Mean	Mean				
Extent of disaster risk reduction knowledge	3.67	3.94	4.33	1.97	0.00	Significant

Level of Significance: 5% Degree of Freedom: 404

There is a significant difference between the assessments of the residents (Mean=3.67) and barangay officials (Mean=3.94) on the extent of disaster risk reduction knowledge since the computed t-value of 4.33 is greater than the critical t-value of 1.97 with a p-value of 0.00 which is less than the 5% level of significance. This implies that the two groups of respondents have a different level of risk reduction knowledge. It may be attributed to the reality that barangay officials are more exposed to information because of their position (Mohammed, 2018). They have more access to training and seminars on disaster risk reduction. On the other hand, the ordinary residents do not have this equal access to such. More commonly, only few of the residents were invited or have attended trainings and seminars because they are not obliged to do so.

CONCLUSIONS

Barangay official and residents of the disaster-prone municipalities in Oriental Mindoro have a high level of

disaster risk reduction knowledge signifying that the initiatives on information dissemination were effective. However, the moderate level of disaster resilience imply that knowledge on disaster does not guarantee improved resilience. Moreover, There is a significant difference between the assessments of the residents and barangay officials on the extent of disaster risk reduction knowledge. barangay officials are more exposed to information because of their position. They have more access to training and seminars on disaster risk reduction. On the other hand, the ordinary residents do not have this equal access to such. More commonly, only few of the residents were invited or have attended trainings and seminars because they are not obliged to do so.

The government may continuously enhance its initiatives to foster risk reduction knowledge and capability to maintain public order during disasters among barangay officials and residents to further improve their level of disaster resilience. Additional training and information-dissemination seminars may be conducted to further expose the respondents on risk reduction knowledge and disaster preparedness.

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