



KNOWLEDGE ON NATURAL AND ANTHROPOGENIC DISASTERS OF PEOPLE IN ISOLATED AREAS IN THE PROVINCE OF ZAMBOANGA DEL NORTE

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Abstract

The knowledge of individuals on natural and anthropogenic disasters is of prime consideration as to their preparedness if such phenomena occur. The study determined the knowledge on natural and anthropogenic disasters of people in isolated areas. The study utilized the descriptive method of research through the use of a questionnaire on disaster preparedness and documentary analysis. The questionnaire consisted of items on the natural and anthropogenic disasters and profile of the respondents. Secondary data were also gathered to strengthen the results of this study. The knowledge of 397 respondents in isolated areas in the Municipalities of Siayan, Sindangan, and Godod on natural and anthropogenic disasters was determined. People living in isolated areas of Zamboanga del Norte, Philippines are not mostly knowledgeable of the natural and anthropogenic disasters. The geographical boundaries separating these people from more civilized part of the community aggravated by their low monthly income could hinder their capacity to acquire other media as sources of information on these disasters. The dialect used to deliver information through radios, posters, warning signs coupled with their educational attainment also posed a barrier on their knowledge of the natural and anthropogenic disasters specifically those older ones who remained in their traditional beliefs and maintained the identity of their culture. Correspondingly, their beliefs and traditions are factors on the acquisition of knowledge towards these disasters since they believe on the manifestations of spirits in nature as the causes that would explain undesirable events in their surroundings. Inadequate knowledge placed these vulnerable people in the peril of risking their lives in the unpredictable occurrence of disasters.

Keywords and phrases: *knowledge, natural and anthropogenic disasters, isolated areas, Zamboanga del Norte*

Introduction

Disasters are often considered as events leading to environmental, material and human damages and losses. These events are beyond the capacity of the affected communities to control. The causes of disasters can be classified as natural or man-made (anthropogenic). Natural disasters generally include: geophysical disasters (e.g. earthquake, volcanic eruption, rockfall, landslide, avalanche, and subsidence); hydro-meteorological disasters (e.g. flood, drought, storm, extreme temperature, wildfire, and wet mass movement); and biological disasters (e.g. epidemic, insect infestation, and animal stampede). Likewise, anthropogenic disasters are classified into two groups: technological disasters (e.g. disasters due to engineering failures, transport disasters, and

environmental disasters); and sociological disasters (e.g. criminal act, riot, war, stampede, etc.) (Jha, 2010). With the technological advancement and increasing material and human resources on the causes and adverse effects of natural and anthropogenic disasters, people are becoming more conscious and knowledgeable of the ways to mitigate them. For instance, there were 357 natural triggered disasters registered in 2012 which was lowered than the average annual disaster frequency of 394 observed from 2002 to 2011 (Guha-Sapir, Hoyois and Below, 2013). Mitigation of these disasters is a shared responsibility of every individual. Usually the most affected part of the community when a disaster strikes are those minorities and less knowledgeable members.

Interest can be sparked by awareness, and attention can be used to compel action. Students and teachers can act as tools for creating a culture of prevention because schools are the finest place to spread values. In disaster-prone areas of the world like Bangladesh, Indonesia, Sri Lanka, and Thailand, awareness has been raised in a variety of ways among school students, teachers, and their communities, according to research (International Strategy for Disaster Reduction [ISDR] as cited in Nix-Stevenson [2013]). Diverse initiatives are being carried out in these parts of the world, such as training teachers, integrating disaster risk reduction into the classroom, structuring disaster curricula around knowledge of disaster risk reduction, advocating for disaster safety, and empowering students to act as catalysts and initiators (Nix-Stevenson, 2013).

The development of a culture of catastrophe prevention and risk reduction depends in large part on social capital, which may create both the environment for reciprocal care and support as well as the mechanisms needed for communities and groups to effectively influence public policy (Nix-Stevenson, 2013). According to Portes, referenced in Nix-Stevenson (2013), social capital refers to an actor's capacity to obtain benefits as a result of membership in social networks or other structures. Since any place in the world is not exempted from these disasters, extending the knowledge on these disasters down to the minor groups in the far flung and isolated communities could better prepare a larger group of people in mitigating natural and anthropogenic disasters regardless of natural boundaries. In this study, the knowledge on natural and anthropogenic disasters of people in isolated areas in selected municipalities in Zamboanga del Norte, Philippines is determined.

Materials and Methods

The study utilized the descriptive method of research through the use of a questionnaire on disaster preparedness and documentary analysis. The questionnaire consisted of items on the natural and anthropogenic disasters and profile of the respondents. Secondary data were also gathered to strengthen the results of this study. The knowledge of 397 people living in isolated areas of Zamboanga del Norte [in which 167 were from the Municipality of Siayan, 185 from the Municipality of Sindangan, and 45 from the Municipality of Godod] on natural and anthropogenic disasters was determined. The statistical methods used were frequency count and percentage to quantify the respondents' profile and their knowledge on natural-anthropogenic disasters.



In addition, Chi-square test was used to determine whether the profile of the respondents had a bearing to their knowledge on natural-anthropogenic disasters.

Results

The People of Zamboanga del Norte. The natives known as the "Subanens" have established their community along the river or "suba" banks, thus they were called the "People of the River". They may be found on the provinces of western Mindanao, Philippines – Zamboanga del Norte, Zamboanga Sibugay and Zamboanga del Sur. The Subanens, who only speak Subano, tend to wear brightly colored clothing and accessories. Their preferred hues are white, red, and black (Marquez n.d.).

After a few years, came the Zamboangueño merchants. Soon after, Spaniards came too followed by Cebuanos and Boholanos who became government officials in Zamboanga del Norte. Due to the different groups of immigrants, Subanen left the low lands and lived in remote areas like Piñan, Mutia and other mountainous municipalities.

Their cultural adaptation is upland and shifting cultivation. Their traditional settlement pattern is highly dispersed with a few residential structures on top of ridges near potable water sources, which are placed adjacent to cultivated fields. They are also engage in fishing after planting season. They preferred to be near the springs rather than streams. Due to land problems and degraded environment, some of them are forced to wet rice agriculture. Like their simple lifestyle, the houses of Subanens express their being reticent. Houses particularly to those living on highlands are made of light materials like cogon, round timber and rattan. They only have one room and a typical house has no window, if there is, it's very small.

A Timuay counterpart of the modern barangay captain makes up the tribal government. Cases involving crimes and moral turpitude are tried in the Timuay. The ultimate verdict is not rendered by the Timuay if he is unable to make a decision or if the case involves a serious crime. At home, the father is regarded as having the most power. He could move his family to be led by other Timuays if he is not happy with the leadership of a Timuay. The Timuay is in charge of guarding those who trust in his authority (Global Subanen Association, Inc., 2014).

Although some Subanens had previously turned to Christianity, paganism persisted among others. They had faith in gods or other supernatural beings. They presented them with the first crop's fruit. When these gods wish to be honored by sacrifices and offerings, they make people ill. Instead of money, they choose to eat and drink well. Sometimes they use the birds' noise, dreams, lightning, and other warning signs to convey their wishes, helping Subanens remember their responsibilities (Komisyon sa Wikang Filipino [KWF], 2011).

Today, the people of Zamboanga del Norte were of mixed culture due to the advent of other ethnicity from the different parts of Visayas. With this cross-cultural migration, the earliest people of the province started to be accustomed with the practices and beliefs of

the local immigrants and settled in the center of the communities. But with these cultural influences, some of them remained penetrated in remote areas and practiced traditional beliefs.

With the above cultural backgrounds, features of settlements and economic practices, this group of people may be considered as vulnerable to natural and anthropogenic disasters inherent in their place.

The table below shows the profile of the respondents. In terms of gender, there was a slight difference on the number of male and female respondents (200 or 50.38% and 197 or 49.62%). It is clearly seen that majority of the respondents belonged to adulthood (21-40 years old, 173 or 43.58%) and lived in their current place for 20 years and more (240 or 60.45%). With regard to their educational attainment, more than half of them reached elementary level only (206 or 51.89%) the possible reason that 286 or 72.04% were unemployed. According to Bishkek (2011), the lower the level of education, the more likely one is to be unemployed.

Table 1 Profile of the Respondents

	Number	Percentage (%)
Gender		
Male	200	50.38
Female	197	49.62
Total	397	100.00
Age		
20 years old and below	141	35.52
21-40 years old	173	43.58
41-60 years old	57	14.36
61-80 years old	16	4.03
81-100 years old	10	2.52
Total	397	100.00
Educational Attainment		
College Level	5	1.26
High School Level	142	35.77
Elementary Level	206	51.89
No	44	11.08
Total	397	100.00
Length of Residence		
less than one year	5	1.26
1-5 yrs	23	5.79
6-9yrs	14	3.53
10-19yrs	115	28.97
20yrs and more	240	60.45
Total	397	100.00
Occupation		
employed <i>Construction Worker (5 or 1.26%)</i> <i>Driver (5 or 1.26%)</i> <i>Farmer (101 or 25.44%)</i>	111	27.96



	Number	Percentage (%)
unemployed	286	72.04
Total	397	100.00

Focusing on the knowledge of people living in isolated areas regarding natural and anthropogenic disasters in Zamboanga del Norte, Table 2 shows a larger portion of the respondents who were not knowledgeable enough on natural and anthropogenic disasters. For instance, they were not knowledgeable as to the characteristics, causes, and nature of the natural disasters like earthquake, landslide, tropical cyclone, storm surge, floods, thunderstorm, and tornado (64%, 57.93%, 73.80%, 79.09%, 80.35%, 83.12%, and 91.18% respectively). They were not also knowledgeable in terms of human-induced hazards which include fire, structural failure, etc. (246 or 61.96%). Among the identified natural disasters, they were only knowledgeable on extreme climatic variability (218 or 54.91%).

Table 2 Knowledge of People in Isolated Areas on Natural and Anthropogenic Disasters

Disasters	Yes	%	No	%
Earthquake	142	35.77	255	64.23
Landslide	167	42.07	230	57.93
Tsunami	34	8.56	363	91.44
Volcanic Eruption	102	25.69	295	74.31
Tropical Cyclone	104	26.20	293	73.80
Storm Surge	83	20.91	314	79.09
Floods	78	19.65	319	80.35
Thunderstorm	67	16.88	330	83.12
Tornado	35	8.82	362	91.18
Extreme Climatic Variability	218	54.91	179	45.09
Human-Induced Hazards	151	38.04	246	61.96

Table 3 Test of Difference on the Knowledge of People in Isolated Areas on Natural and Anthropogenic Disaster When Grouped as to Age and Gender

Factor	Age (X ²)	df	C.V.	Interpretation	Gender (X ²)	df	C.V.	Interpretation
Earthquake	15.499	4	9.49	S	0.009	1	3.84	NS
Landslide	13.720			S	0.128			NS
Tsunami	1.691			NS	0.000			NS
Volcanic Eruption	2.088			NS	0.005			NS
Cyclone	5.380			NS	1.202			NS
Storm Surge	10.483			S	5.299			NS
Floods	5.088			NS	3.960			S

Factor	Age (X ²)	df	C.V.	Interpretation	Gender (X ²)	df	C.V.	Interpretation
Thunderstorm	15.330			S	1.801			NS
Tornado	3.186			NS	2.151			NS
Extreme Climate Variability	12.534			S	1.895			NS
Human-Induced Hazards	27.125			S	0.325			NS

df = degrees of freedom

C.V. = critical value

S = significant

NS = not significant

Table 3 shows whether there were differences on the knowledge of people in isolated areas on natural and anthropogenic disasters when grouped in terms of their age and gender. Evidently, there was a significant difference on their knowledge in terms of the natural disasters like earthquake, landslide, storm surge, thunderstorm, and extreme climate variability and anthropogenic disasters considering their age. It implies that those belonging to the age bracket of 21-40 years old have differences on their knowledge compared to those within the age of 41-60 years old. It is evident in the table as well that their knowledge on tsunami, volcanic eruption and tornado does not differ in terms of their age. These disasters do not usually occur in their areas. In terms of gender, there was no significant difference on their knowledge on these natural and anthropogenic disasters except for flood.

Table 4 Test of Difference on the Knowledge of People in Isolated Areas on Natural and Anthropogenic Disaster When Grouped as to Educational Attainment and Occupation

Factor	Educ'l Attainm ent (X ²)	df	CV	Interpretation	Occupation (X ²)	df	CV	Interpretation
Earthquake	4.349	3	7.82	NS	7.978	1	3.84	S
Landslide	3.039			NS	10.674			S
Tsunami	9.427			S	2.364			NS
Volcanic Eruption	1.457			NS	0.008			NS
Cyclone	7.883			S	1.221			NS
Storm Surge	11.802			S	0.898			NS
Floods	3.682			NS	4.406			S
Thunderstorm	3.301			NS	3.373			NS
Tornado	5.793			NS	0.469			NS
Extreme Climate Variability	14.542			S	0.212			NS
Human-Induced Hazards	5.025			NS	4.034			S



The knowledge of people in isolated areas on the natural and anthropogenic disasters can also be linked to their educational attainment and occupation. Table 4 presents the test of significant difference on their knowledge when grouped as to educational attainment and occupation. It is clearly seen that the respondents' knowledge on the natural disasters particularly tsunami, cyclone, storm surge, and extreme climate variability differed significantly as to their educational attainment. It reveals that the knowledge of those who reached elementary education is different compared to those who reached secondary education. However, they possess similar knowledge about disasters like floods, thunderstorms and landslides if educational attainment is to be considered. This can be justified to the fact that common disasters are experienced by people of any ages, thus similar knowledge can be yielded.

The same is true with their knowledge on the natural disasters particularly earthquake, landslide and flood as well as on anthropogenic disasters (human-induced hazards) which differed significantly in terms of their occupation. On the other hand, their knowledge on tsunami, cyclone, storm surge, thunderstorm, tornado, and extreme climate variability does not differ significantly whether they are employed as construction workers, drivers and farmers or unemployed.

Table 5 **Test of Difference on the Knowledge of People in Isolated Areas on Natural and Anthropogenic Disaster When Grouped as to Length of Residence**

Factor	Length of Residence (X^2)	df	CV	Interpretation
Earthquake	19.801	4	9.49	S
Landslide	9.136			NS
Tsunami	25.454			S
Volcanic Eruption	6.112			NS
Cyclone	16.207			S
Storm Surge	11.660			S
Floods	9.040			NS
Thunderstorm	12.155			S
Tornado	23.129			S
Extreme Climate Variability	23.196			S
Human-Induced Hazards	22.327			S

The differences on their knowledge on natural and anthropogenic disasters considering the length of their residence were also tested. Table 5 above shows that their knowledge on anthropogenic disasters differed as to the length of their residence. They also showed differences of their knowledge on the identified natural disasters like earthquake, tsunami, cyclone, storm surge, thunderstorm, tornado, and extreme climate variability. This can be inferred that their knowledge on the disaster particular in their place for a period of his residence is different compared to those living in areas which do not experience the same.

Discussions

The knowledge of individuals on natural and anthropogenic disasters is of prime consideration as to their preparedness if such phenomena occur. Earthquake, landslide, tropical cyclone, storm surge, floods, thunderstorm, and extreme climatic variability are common natural disasters experienced by people in Zamboanga del Norte except tsunami and volcanic eruption. Although the Province is part of a peninsula but tsunami has never been experienced by the residents the same is true of volcanic eruptions since there is no recorded active volcano in Zamboanga del Norte (Phivolcs, 2008). Even though these disasters were common to the residents of the province, people in isolated areas, separated by natural barriers do not have adequate knowledge on these common natural disasters. From the earliest times and until today, there were still people living on remote upstream or near the river. Their residence served as a geographical boundary that isolates them and limits their access to thickly populated and more advanced society, particularly in the center of the municipalities and cities. Due to climate change, variability or changes in the climate of the Province such as extreme heat and rain as well as undetermined wet and dry seasons have been experienced in the past years and prevalent in its geographical location. But with such years of experiences, it doesn't guarantee that people in isolated areas are already knowledgeable of these disasters. Trying to consider their beliefs and traditions on gods, they usually attribute undesirable phenomena in their surroundings as one way of making them aware that they forgot their obligations or done something disliked by gods. With this contention, people in isolated areas, particularly those who remained in paganism, have common explanation as to the nature and causes of these disasters nothing more than the manifestations of their gods.

As less expected, even in this fast changing society where communication could be delivered in various media (television, radio, cellular phones, newspapers, etc.), these people had no access to information regarding these disasters which placed them in a disadvantaged group in the province. Based on the interview, in case they acquired televisions and radios, their usage is more focused on entertainment not on the acquisition of knowledge about disasters. Communication occurred under the assumption that they accessed information through these media. However, these people speak in their native tongue while the information about these disasters has been spoken or delivered in the Cebuano/Bisaya dialect, which is spoken by the majority of the province's residents. It cannot be denied that the new generations of people living in isolated areas are already speaking Cebuano/Bisaya as it is dominantly used in the community center as well as in schools, but differences and barriers on the efficiency of communication transfer [regarding disasters] could still be a factor. Taking for instance those who are not still abreast with Cebuano language and those who already forgotten their original dialect could yield differences in interpretations and information transformation.

Barriers to language have the potential to drastically reduce the efficacy of disaster warnings immediately prior to an event. Messages contained in evacuation orders or other time-sensitive information concerning a threat are liable be ineffective. Disaster warnings, even if linguistically appropriate, hold little value if they fail to reach the Limited-English Proficiency (LEP – as in the case of United States) communities that are



linguistically isolated. Disseminating disaster information through multiple media outlets such as ethnic television, radio stations, or translated text messages are promising strategies for reaching LEP communities (Penuel, K.B. and Statler, M., 2011). This also holds true with those people in isolated areas. The language barrier took place since information in radio stations were being broadcasted mostly in Cebuano/Bisaya dialect and even warning signs and posters were written in Cebuano/Bisaya if not English.

The capacity of people to acquire resources necessary for disaster readiness is also dependent on their financial status. It is sad to note that people in isolated areas do not have enough finances to acquire resources and equipment that would give them access to information and enough time for preparation. All of them earned less than Php. 10,000.00 per month and only 27.96% (111) were employed (construction work – 1.26% or 5; driving – 1.26% or 5; farming – 25.44% or 101). Communications are central to the effort (for public education, early warning, evacuation, and post-disaster relief) of saving many lives and reducing human suffering, dislocation, and economic losses. Communication in its various forms underlies virtually all elements of the hazard-mitigation process. In fact, the advances in telecommunications and computer sciences are among the major contributors in exposing the origins, behaviors, and effects of natural hazards as well as mitigation process (Rattien, 1990).

Furthermore, the geographical feature of most of their settlements served as a barrier, thus making it as a factor in the transmission and dissemination of information necessary for disaster preparedness and mitigation. They mostly preferred to live on mountains and near the rivers since these are the sources of their living. This condition made it difficult for them to access the mentioned information. Being accustomed to these places proved favorable to them to settle there (115 or 28.97% lived there for 10-19 years and 240 or 60.45% lived for 20 years and more). Their residence would also limit their experiences on disasters like flood, tsunami, storm surge, and tornado for those living on mountains while those living near the seashore or river would seldom experience landslide.

According to the publication of the KWF (2011), *Ang Buklog*, the houses of people in isolated areas (including the native people in Zamboanga del Norte, the Subanens and other local immigrants) express their being reticent. Houses particularly to those living on highlands are made of light materials like cogon, round timber and rattan. They only have one room and a typical house has no window, if there is, it's very small. This proves that some of these people are somewhat isolating themselves from the community. The more they were distant from the center of community or civilization the more they will have inadequate knowledge on these disasters.

The educational attainment of these people is another factor on their knowledge on disasters when the accessibility of information is considered. Engaging in formal or non-formal education is one way of accessing information, acquiring experiences and living with the new trends in society such as preparedness on the natural and anthropogenic disasters. The knowledge on these disasters is increased as the individual go on to the higher level education. Since disasters are threat to human lives, these become part of the schools' program to orient the students on how to prepare in cases they unpredictably

occur. Unfortunately, among the surveyed people, only 1.26% (5) and 35.77% (142) reached College and High School respectively. There is a great portion who only reached elementary education (51.89% or 206).

According to the Effects of Educational Attainment on Climate Risk Vulnerability study conducted by Striessnig et al. (2013), there are several reasons to anticipate empowerment to occur through basic literacy and then secondary education to reduce vulnerability to climate change possible problems. Most obviously, improved education typically implies improved access to information, such as advisories for tropical storms or seasonal drought forecasting (Patt et al. & Moser and Ekstrom as cited in Striessnig, et al., [2013]). Second, there is evidence that education improves cognitive skills and increases the willingness to change risky behavior while also broadening the personal planning horizon. Third, there is scientific proof that education improves health and physical well-being at any age in almost every country. Fourth, more education leads to higher individual and household income as well as higher aggregate economic growth (Neisser et al.; Behrman & Stacey; Nisbett; Fuchs et al.; Becker; Schultz; & Lutz et al. as cited in Striessnig, et al., [2013]).

Likewise, the length of residence of an individual is commonly a measure of their knowledge on the nature of the place. For instance, the place which frequently experiences floods would make the person knowledgeable on the nature, characteristics, and causes as well as what to do in case such disaster may occur. The person acquainted and experienced on the place has more knowledge on floods than to those persons who experienced otherwise. Nevertheless, these people surveyed who stayed for 20 years or more in their residence did not guarantee their knowledge as to the nature and causes of these natural and anthropogenic disasters. In fact, the bulk of respondents belonged to the age bracket of 21-40 years old (173 or 43.58%) which also determined their years of residence. With the length of residence, ages also go with the span of experiences and knowledge of these people in isolated areas. It is said that older ones have wider experiences, thus making them more knowledgeable than younger ones. The test of significant difference on the respondents' knowledge on the natural and anthropogenic disasters when age is treated (Table 3) showed significant difference. Knowledge of young people is not similar with older ones. Indeed, in this modern society, younger ones have more access to current trends and updated information than older ones for the new generation are slowly adapting the culture of the lowlands as they go on schooling.

Differences on the knowledge among these disasters also touched gender. With strengthening views on gender equality, female and male composition of the population should learn things fairly as far as disaster is concerned. Yet, the knowledge of these people in isolated areas on floods differed significantly. It is evident that male respondents are knowledgeable on floods than female respondents (45 or 11.34% and 29 or 7.30%, respectively). In isolated and traditional areas of the community, men are recognized to have the highest authority at home. They are breadwinners while women stay at home to rear their children and do household task. This could be the reason why men are knowledgeable on floods since they kept on exploring the environment for a living. In their exploration there would be a high probability of encountering such



phenomenon. Men, as perceived to be the protector of the family are also expected to have knowledge on how to maintain the safety of their family. And since people in isolated areas have the beliefs on the spirits in nature, they attribute undesirable phenomena as manifestations of gods' wrath and warning for they might have done unfavorable practices. Men as the heads would make their way to appease gods and maintain peaceful and abundant life.

Conclusions

People living in isolated areas of Zamboanga del Norte are not mostly knowledgeable of the natural and anthropogenic disasters. The geographical boundaries separating these people from civilized part of the community aggravated by their low monthly income could hinder their capacity to acquire media as sources of information on these disasters. The dialect used to deliver information through radios, posters, warning signs coupled with their educational attainment also posed a barrier on their knowledge of the natural and anthropogenic disasters specifically those older ones who maintained the identity of their culture. Correspondingly, their beliefs and traditions are factors on the acquisition of knowledge towards these disasters since they believe on the manifestations of spirits in nature as the causes and explanations of undesirable events on their surroundings. Inadequate knowledge placed these vulnerable people in the peril of risking their lives in the unpredictable occurrence of disasters.

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