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Correlation of secondary school personnel's extent of agreement of the physical vulnerabilities and their level of disaster preparedness in the congressional district I of Negros Oriental, Philippines

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Abstract

This paper contributes to the disaster literature by determining the secondary school personnel's extent of agreement of the physical vulnerabilities and their level of disaster preparedness in their respective school locales; and testing the significant relationship of the two variables. Descriptive-correlational method was used in this study with 582 respondents from the 27 secondary schools in the first congressional district of Negros Oriental. Spearman Rho was used to test the significant relationship. Findings reveal that secondary school personnel's extent of agreement of the existing physical vulnerabilities is generally neutral. It indicates the respondents' lack of awareness of the existence or non-existence of the physical vulnerabilities. But four existing physical vulnerabilities were identified namely big trees surrounding the buildings, clogged canals, prominent cracks on school building walls, and the school is located nearby mountains. Further, the respondents' level of disaster preparedness is satisfactory only with preparedness measures sometimes implemented. Furthermore, there is no significant relationship between the respondents' extent of agreement of the physical vulnerabilities and their level of disaster preparedness. This suggests that the respondents' extent of agreement or disagreement of the secondary school's physical vulnerabilities has no effect whatsoever to their level of disaster preparedness in all aspects. The school authorities have to address these physical vulnerabilities immediately to reduce the risks of future disasters.

Keywords: Physical Vulnerability; Disaster Preparedness; Secondary School Personnel

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1. Introduction

Hazards are potentially damaging physical events, phenomena or human activities that may cause the loss of life or injury, property damage, social and economic disruption, or environmental degradation (ISDR, 2007). They are considered as external factors that affect the society, whereas vulnerabilities are internal factors that affect the transformation of these hazards into disasters (Jones and Bartlett Learning, n.d.). Hazards that strike in places with low vulnerability will not become disasters. However, most disasters occur in areas with high vulnerability factors such as high population density, poor infrastructure, and a limited or no disaster preparedness plan (Du et al., 2015).

The concept of vulnerability has now become a cornerstone of natural hazard study (Muller, 2012). It received ample attention after Timmerman's conceptualization in hazard research in the 1980s (Timmerman, 1981). Vulnerability is defined as the characteristics of a person or group and their situation that influences their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard (UNISDR, 2002). Thus weakening the capacity of people to cope with disasters and their effects.

Physical vulnerability refers to the characteristics and circumstances of a community that make it susceptible to the damaging effects of a hazard due to the physical environment in which they find themselves (UNISDR, 2002). The physical vulnerability of an area depends on its geographic proximity to the source and origin of the disasters. For example if an area lies near the coast lines, fault lines, or unstable hills, it makes the area more vulnerable to disasters as compared to an area that is far away from the origin of the disaster (M and E Studies, n.d.). It relates to aspects such as access to suitable land, land use planning, housing design, building standards, materials used for building houses, engineering, accessibility to emergency services and other similar aspects (UNISDR, 2002).

In terms of physical vulnerability, the Philippines is one of the most vulnerable countries to natural hazards due to the country's geographical circumstances experiencing an average of 20 earthquakes per day or 100 to 200 earthquakes every year and an average of 20 to 30 typhoons per year (COA, 2014). These disaster events can cause tremendous impacts on societies, schools, environment, and economy of the affected countries. They greatly hamper the education process in many ways, with human loss and injury, school property damage, children having to leave school for long periods in the recovery period, and their families needing their help in meeting basic needs (FEMA, 2007).

To prevent damage of school buildings and infrastructure during disaster, assessing the vulnerability of the built environment to hazards is extremely essential in predicting potential consequences of hazard event and for mainstreaming disaster risk reduction into school development planning process. Understanding the conditions of the existing structures to potential hazards, such as ground shaking from earthquakes and wind from tropical cyclones, requires the knowledge of building materials and engineering practices (PreventionWeb, 2015). The vulnerability assessment of buildings and settlements includes the building's vulnerability, the ground vulnerability and building occupant vulnerability (Arun and Yucel, 2012). Furthermore, the lack of proper planning and implementation in *construction of residential and commercial buildings* results in buildings that are weaker and vulnerable in earthquakes, floods, landslides and other hazards (M and E Studies, n.d.).

Preparedness is always the best tool one can have in facing disasters (Smart Schools Program, 2012). It is one of the main priorities of the Philippine National Disaster Risk Reduction and Management Plan for 2011-2028. The main goal of disaster preparedness is to establish and strengthen capacities of communities to anticipate, cope and recover from the negative impacts of emergency occurrences and disasters. To achieve this goal, the National Disaster Risk Reduction and Management Plan has outlined five objectives which are as follows: increase the level of awareness of the community to the threats and impacts of all hazards, risks and vulnerabilities, equip the community with the necessary skills to cope with the negative impacts of a disaster, increase the capacity of the institution, develop and implement comprehensive national and local disaster preparedness policies and plans, and strengthen partnership among all stakeholders (NDRRMC,2011).

The Department of Education responded on the call for school disaster preparedness in the light of the recent occurrences of natural calamities in various parts of the country (Malipot, 2013). Every teacher or school official should recognize that the safety and welfare of the students in school is his first and foremost concern and responsibility. The educational facilities program should include adequate provisions for ensuring safety in school against natural and man-made hazards (Department of Education, 2010).

To intensify disaster preparedness in school, the Department of Education has created and adopted the Safer Schools Resource Manual also known as Disaster Risk Reduction Resource Manual to guide education officials, school administrators, teachers and eventually the schoolchildren on what to do before, during and after the onslaught of any hazard, in order to reduce its disastrous impact and damages. The ultimate goal of this resource manual is to protect the lives of the members of the school community and property (Department of Education, 2008).

The Department of Education further enhanced school disaster preparedness by issuing the memorandum number 83, series of 2011 on disaster preparedness measures for schools which directs the schools to implement the following mitigation measures for natural hazards such as typhoons, flooding, landslides, tornadoes, among others as follows: ensure that the school building can withstand heavy rain and strong winds; store textbooks, teaching manuals, school records and school equipment at a safe place; learn about typhoon and other weather disturbances, their signs and warnings, effects, and dangers, and how to protect the school children, records and school properties; educate school children on preparedness for tropical cyclones; regularly conduct school disaster response-drills or simulations; and observe strictly the Department of Education policies on the suspension of classes or invoke school-based decisions in coordination with the local government units (Department of Education,2011).

Recently, disaster preparedness has been integrated in the basic education curriculum of the k to 12 program, it is also offered in the senior high school as core subject in the Science, Technology, Engineering, and Mathematics Strand (STEM) and as specialized subject or as elective in the General Academic Strand (GAS) (Pineda, 2016). Its significance in classroom instruction is towards a more mainstream approach in disaster risk reduction (Abuso, 2015).

1.1. Background of the Study

The purpose of this study is to determine the secondary school personnel's extent of agreement of the physical vulnerabilities and their level of disaster preparedness in school, and test the significant relationship of the two variables. Identifying the physical vulnerabilities in school can help the school authorities formulate appropriate interventions and improve the level of school disaster preparedness. This can stimulate awareness to the school authorities and teachers to be responsive to needs of the school to become more prepared to future disaster events.

There has been few researches conducted on the correlation of Physical vulnerabilities and disaster preparedness in the school setting. This study can contribute significantly to disaster literature and become basis for disaster preparedness initiatives of schools and communities.

This study is limited only in the Congressional District I of Negros Oriental, Philippines due to financial and time constraints. Only secondary schools with senior high schools offering the Disaster Readiness and Risk Reduction subject in Science, Technology, Engineering and Mathematics (STEM) and General Academic Stand (GAS) were included in this study. Out of 31 secondary schools, only 27 were surveyed due to accessibility and security constraints. The results of this study were used in the formulation of a learning module in disaster preparedness. There were 582 teacher and school head respondents who participated in this study.

The findings of this study can be used as basis for further studies on other school vulnerabilities in terms of social, economic, and environmental factors in order to improve the school disaster preparedness. Further, this study can be conducted in the local government setting to come up with appropriate interventions to the existing vulnerability factors and minimize the negative effects of future disaster events.

1.2. Objectives of the study

Since the occurrences and severity of natural hazards cannot be reduced (Prevention Web, 2015), the best way to prepare for disaster is to address its underlying drivers called the vulnerability factors that increase the susceptibility of schools to disaster (Department of Education, 2013). It is in this view that the researcher intends to determine the secondary school personnel's extent of agreement of the physical vulnerabilities and level of disaster preparedness in their respective school communities; and test the significant relationship of the two variables.

This study tests the following null hypotheses:

H_{01} : There is no significant relationship between the respondents' agreement of vulnerability factors and their level of disaster preparedness in terms of awareness of the community to the threats and impacts of hazards, risk, and vulnerabilities.

H_{02} : There is no significant relationship between the respondents' agreement of vulnerability factors and their level of disaster preparedness in terms of skills of the community to cope with the negative impacts of a disaster.

Ho₃: There is no significant relationship between the respondents' agreement of vulnerability factors and their level of disaster preparedness in terms of capacity of the institution.

Ho₄: There is no significant relationship between the respondents' agreement of vulnerability factors and their level of disaster preparedness in terms of disaster preparedness plans and policies.

Ho₅: There is no significant relationship between the respondents' agreement of vulnerability factors and their level of disaster preparedness in terms of partnership among stakeholders.

2. Methods

This study utilized the descriptive- correlational method of research. It is descriptive since it is concerned with determining the secondary school personnel's extent of agreement of the physical vulnerabilities and their level of disaster of disaster preparedness in their respective school communities. It is correlational because it sought to test the significant relationship of the two variables.

Survey questionnaire is the main research instrument used in this study. It is formulated from different sources. The first part on the respondents' extent of agreement of the physical vulnerabilities in their respective school communities is formulated based on the official report of the top school vulnerabilities during DRRM Orientation and Planning Workshop on Disaster Risk Assessment of the Department of Education in Cebu City on Nov.10-12, 2014. The second part on the respondents' level of disaster preparedness was formulated based on the disaster preparedness checklists of Department of Education Disaster Risk Reduction Resource Manual. The researcher categorized the respondents' disaster preparedness into 5 areas based on the parameters stipulated in the Philippine National Disaster Risk Reduction and Management Plan which are as follows: awareness of the community to the threats and impacts of hazards, risk, and vulnerabilities, skills of the community to cope with the negative impacts of a disaster, capacity of the institution, disaster preparedness plans and policies, and partnership among stakeholders (NDRRMP,2011). The survey questionnaire underwent validity and reliability test.

The respondents of this study were the entire secondary school personnel composed of teachers and school heads from the 27 secondary schools of the first congressional district of Negros Oriental from the Municipality of Manjuyod to Canlaon City, Negros Oriental, Philippines. There were 582 respondents of this study. The statistical tools used in this study were Frequency Count, Ranking, Weighted Mean, and Spearman Rho or Spearman's Rank Correlation Coefficient.

Spearman's Rank Correlation Coefficient (Spearman Rho) is used to test the significant relationship of the respondents' extent of agreement of the physical vulnerabilities and their level of disaster preparedness. It is a statistical measure of strength and direction of association between two ranked variables.

3. Results

Table 1 shows that big trees surrounding the buildings, clogged, prominent cracks on school building walls, and the school is located nearby mountains are the top vulnerability factors identified by the respondents

with a rating of “agree”. But over-all, the respondent’s agreement of the vulnerability factors is neutral .This indicates that the respondents have no idea whether the vulnerability factors exist or not. The teachers can be responsive to the needs of the school community by reporting existing vulnerability factors in school to their school heads for immediate actions. Proper interventions have to be done by the school management to address the identified vulnerability factors that increase the susceptibility of schools to disasters.

Table 1. Respondents’ extent of agreement of the physical vulnerabilities in their respective school communities

Physical Vulnerabilities	Over-all Weighted Mean($w\bar{x}$) (n=27secondary schools)	Description	Rank
1. Clogged canals	3.47	Agree	2
2. Dilapidated school buildings	2.87	Neutral	5
3. Lack of trees in the school premises	2.54	Disagree	8
4. Prominent cracks on school building walls	3.43	Agree	3
5. Lack of water supply	2.81	Neutral	6
6. The school is near a body of water	2.61	Disagree	7
7. Big trees surrounding the buildings	3.85	Agree	1
8. Faulty electrical wiring	1.20	Strongly Disagree	9
9. The school is located nearby mountains	3.42	Agree	4
Over-all $w\bar{x}$	2.91	Neutral	

<i>Range of Values</i>	<i>Verbal Interpretation</i>
4.21 - 5.00	Strongly agree
3.41 - 4.20	Agree
2.61 - 3.40	Neutral
1.81 - 2.60	Disagree
1.00 - 1.80	Strongly Disagree

Table 2. Respondents’ level of disaster preparedness in their respective school Communities

Level of Disaster Preparedness Category	Over-all Weighted Mean($w\bar{x}$) (n=27secondary schools)	Description
1. Awareness of the school community to the threats, impacts of hazards, risks, and vulnerabilities;	3.20	Satisfactory
2. Skills of the school community to cope with the negative impact of a disaster	3.06	Satisfactory
3. Capacity of the institution	3.09	Satisfactory
4. School disaster preparedness plans and policies	3.20	Satisfactory
5. Partnership among stakeholders	3.16	Satisfactory
<i>Range of Values</i>	Over-all $w\bar{x}$	<i>Verbal Interpretation</i>
	3.14	Satisfactory

4.21	-	5.00	Outstanding (Preparedness measures are always done)
3.41	-	4.20	Very Satisfactory (Preparedness Measures are frequently done)
2.61	-	3.40	Satisfactory (Preparedness measures are sometimes done)
1.81	-	2.60	Fair (Preparedness measures are done as the need arises)
1.00	-	1.80	Poor (Preparedness measures are never done)

Statistics in Table 2 shows that the level of disaster preparedness of the respondents in secondary schools is satisfactory. It indicates insufficiency of preparedness since the disaster preparedness measures are only complied sometimes. The school officials have to work harder to implement strictly the disaster preparedness measures to prepare the school community to future disaster events.

Table 3. Correlation between the respondents' extent of agreement of the physical vulnerability and their level of disaster preparedness

Respondents' Agreement of the Vulnerability Factors versus their Level of Disaster Preparedness Criteria	rho	Verbal interpretation	P-Value $\alpha = .05$	Decision	Remarks
A. Awareness of the school community to the threats, impacts of hazards, risks, and vulnerabilities	.061	Slight Correlation	.763	Accept Ho ₁	Relationship is Not Significant
B. Skills of the school community to cope with the negative impact of a disaster	-.001	Slight Correlation	.995	Accept Ho ₂	Relationship is Not Significant
D. Capacity of the institution	-.232	Low Correlation	.244	Accept Ho ₃	Relationship is Not Significant
E. School disaster preparedness plans and policies	.099	Slight Correlation	.076	Accept Ho ₄	Relationship is Not Significant
F. Partnership among stakeholders	.244	Low correlation	.220	Accept Ho ₅	Relationship is Not Significant

Table 3 reveals that the P-values in all criteria of the respondents' agreement of the vulnerability factors and their level of disaster preparedness are higher than the significance level (α) of .05. Thus, accepting the null hypothesis which indicates no significant relationships. This indicates that the respondents' agreement or disagreement of the vulnerability factors in their respective school communities has no effect whatsoever to their level of disaster preparedness in all figure 1 aspects.

As shown in the schematic diagram of, there are two major concepts in this study. These include the respondents' extent of agreement of the physical vulnerability and their level of disaster preparedness in their respective school communities. The significant relationship of the two concepts was tested as shown by the left right arrows interconnecting them together.

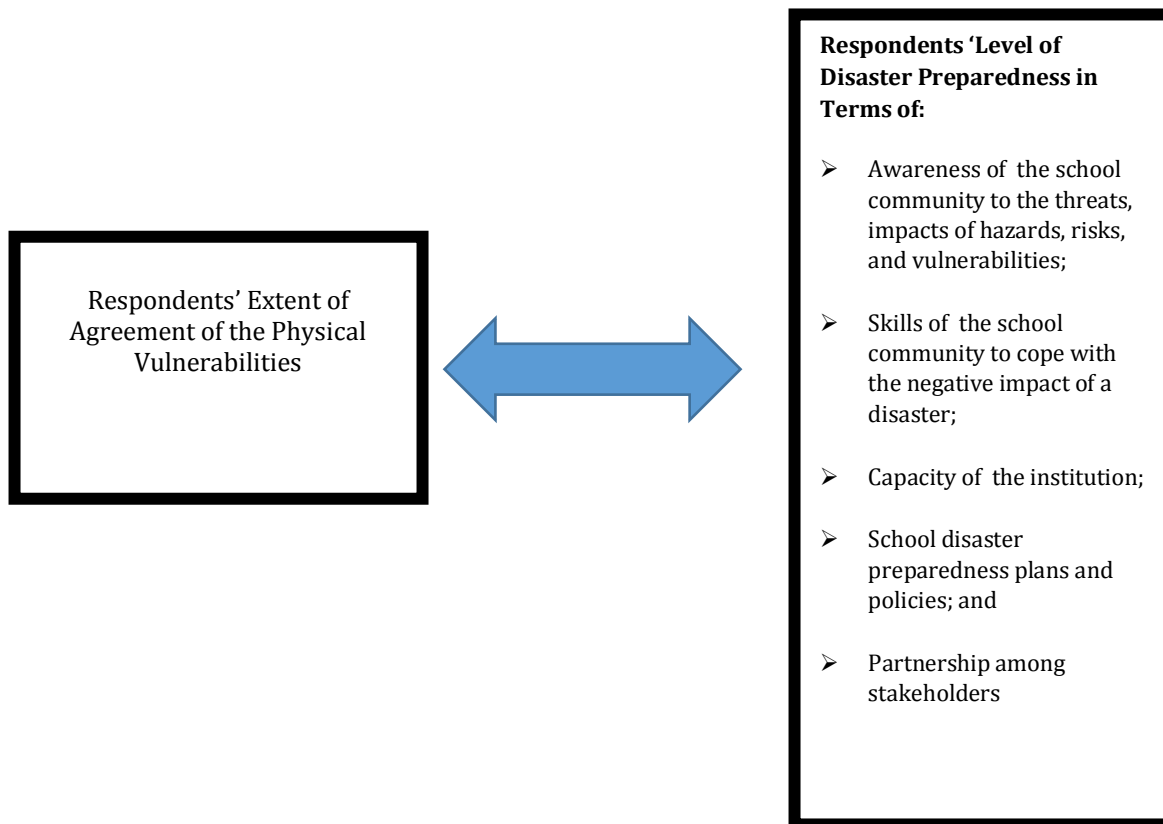


Figure 1. Research Framework of the Study

4. Discussions

Recently, there has been a welcome growth in the literature on disasters that recognises the importance of people's vulnerability to hazards rather than retaining a narrow focus on the hazards themselves (Mitchell, 1999). Since the occurrences and severity of natural hazards cannot be reduced, reducing vulnerability is one of the main opportunities for reducing disaster risk and become more prepared to future disaster events.

To reiterate, this study focuses on the secondary school personnel's extent of agreement of the physical vulnerabilities, their level of disaster preparedness in their respective school communities, and the significant relationship of the two variables.

This study shows that the respondent's extent of agreement of the school vulnerabilities is generally neutral. It suggests that the school personnel has no idea whether the vulnerability factors exist or not in school. Further, the big trees surrounding the buildings, clogged, prominent cracks on school building walls, and the school is located nearby mountains are the top vulnerabilities agreed to be existing by the respondents. This study further suggests that teachers have to be responsive to the needs of the school community by reporting existing vulnerabilities in school to their school heads for immediate actions. Proper

interventions have to be done by the school management to address the identified vulnerabilities that increase the susceptibility of schools to disasters.

Some related studies strengthen the results of this study. Arun and Yucel (2012) in Turkey reveals that physical vulnerabilities in Avcılar, Istanbul include its location in a high seismic risk zone which makes the area vulnerable to earthquake. The study further shows that the majority of the buildings were vulnerable in terms of structural system particularly having soft storey buildings make them vulnerable to earthquake. Another study of Ahadnezhad et al. (2014) in Tabriz town, Northeastern Iran shows that informal settlements of the study area (region 5) are in poor condition in terms of some criteria including land cover, building date, brick and iron structure and building density. In the context of land cover, more than 52% of the region is in the rate of +75 percent. In terms of building date, about 48% of the buildings of the region are more than 20 years old which is relatively undesirable. In case of material, near to 55% of the buildings have been made of poor materials which has made this region more vulnerable against earthquake.

The findings of this study indicate the importance of identifying the physical vulnerabilities of schools which can increase their susceptibility to disasters. With proper interventions from the school authorities, the effects of future natural hazard events can be reduced. But problems in the procurement process to address the school vulnerabilities is a common constraint in any Philippine public institutions which can delay the delivery of services.

This study further reveals that the level of disaster preparedness of the secondary school personnel is satisfactory only. It indicates the insufficiency of preparedness because the preparedness measures are only complied sometimes. The school officials have to implement strictly the disaster preparedness measures to prepare the school community to future disasters events.

The result of this study is confirmed by related studies which reveal that disaster preparedness in the Philippines is insufficient. Vilorio et al. (2013) found out that most barangays in Iligan City are unprepared to disasters due to lack of budget, lack of information, and ignorance of the residents which apparently resulted to negligence. The study of Galindo et al. (2014) showed that government and non-government organizations in Ozamiz City were not adequately prepared for natural disasters due to lack of knowledge, expertise, funds, equipment, leadership, and coordination. Labrague et al. (2015) revealed that nurses in Catbalogan, Samar were not sufficiently prepared for disasters nor were they aware of disaster management protocols in the workplace.

Furthermore, this study reveals that there is no significant relationship between the respondents' agreement of the physical vulnerabilities and their level of disaster preparedness. This indicates that the respondents' agreement or disagreement of the vulnerability factors in their respective school communities has no effect whatsoever to their level of disaster preparedness in all aspects. It suggests that the school personnel's level of disaster preparedness is not dependent on the school vulnerabilities. Existing vulnerability factors in school have to be addressed immediately to prevent the occurrences of disaster events

A related study of Bergstrand et al. (2015) finds a correlation between high levels of vulnerability and low levels of resilience, indicating that the most vulnerable counties also tend to be the least resilient. In contrary,

the result of this study shows no correlation between the respondent's extent of agreement of the physical vulnerabilities of the school and their level of disaster preparedness. There is no significant relationship between the two variables. The school authorities and teachers have to conduct regular mapping of physical vulnerabilities to increase the awareness of the people and become more prepared to disaster events.

5. Conclusions

In general, the secondary school personnel are unaware whether the physical vulnerabilities exist or not in school. But four existing physical vulnerabilities were identified such as big trees surrounding the buildings, clogged, prominent cracks on school building walls, and the school is located nearby mountains. The respondents' level of disaster preparedness is insufficient because the preparedness measures are only complied sometimes. There is no significant relationship between the respondents' extent of agreement of the physical vulnerabilities and their level of disaster preparedness in their respective school locales. The secondary school personnel's agreement or disagreement of the physical vulnerability factors in their respective school communities has no effect whatsoever to their level of disaster preparedness in all aspects.

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