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## **Physical vulnerabilities and problems-encountered among coastal and upland secondary school teachers in the implementation of school disaster preparedness measures**

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### **Abstract**

This paper contributes to the disaster literature by determining whether the coastal and upland secondary school teachers' extent of problems encountered in the implementation of school disaster preparedness measures has significant relationship to their extent of agreement on the school physical vulnerabilities. It also sought to test the significant difference between the coastal and upland teacher's responses in terms of the extent of problems they encountered and their extent of agreement on the school physical vulnerabilities. Findings reveal the moderate problems encountered by the teachers. Moreover, the teachers are generally not aware of the existing school physical vulnerabilities. However, four out of nine common school 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. This further suggests that teachers have to be more aware of the school physical vulnerabilities in order to come up with appropriate interventions. Furthermore, the results reveal the positive correlation between the teachers' extent of problems encountered in the implementation of school disaster preparedness measures and their extent of agreement on the school physical vulnerabilities. This suggests a strong linkage between the two variables. Finally, there is no significant difference between the coastal and upland secondary school teachers' responses in terms of the extent of problems they encountered and their extent of agreement of the school physical vulnerabilities. Thus, the same interventions can be done by the school management to address the physical vulnerabilities and reduce the problems encountered in the implementation of the disaster preparedness measures in both upland and coastal schools.

**Keywords:** Physical vulnerability, problems-encountered, disaster preparedness

### **Introduction**

The Philippines is highly prone to natural hazards. The schools are among those vulnerable sectors that often suffer the catastrophic impacts of disasters brought about by these natural hazards (Department of Education, 2012) [8]. Disasters greatly affect the academe in many ways with children having to leave school for long periods in the recovery period (Federal Emergency Management Agency (FEMA), 2007) [9]. The students deprived of their right to a continuous quality basic education in a safe environment (Department of Education, 2012) [8]. The Department of Education in the Philippines responded on the call for school disaster preparedness in the light of the recent natural calamities in the country. The Disaster Risk Reduction Resource Manual aimed to prepare school administrators, teachers and eventually the students on what to do before, during and after the occurrence of any hazard, in order to reduce its disastrous impact and damages was formulated and adopted (Department of Education, 2008) [7]. Further, the Department of Education has issued a memorandum circular entitled Creation of DRRM office which mandates the said office to initiate and spearhead the establishment of mechanisms to prepare, guarantee protection and resiliency of schools against disasters (Department of Education, 2015) [6].

Despite the various disaster preparedness efforts, initiatives, and reforms that have already instituted, there are challenges that need to be addressed. According to UNISDR (2014) [9], the first common challenge reported was the insufficient levels of implementation for each monitored activity because of a lack of government capacity or public awareness. Further,

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other common challenges are poor coordination between stakeholders, disaster risk reduction management policymakers have difficulty in obtaining political and economic commitment and lack of information sharing. The Commission on Audit of the Philippines (COA, 2014)<sup>[4]</sup> on the implementation of the disaster risk reduction and management in the local governments claims the mismatch between institutional responsibilities and capacities at the local level which has been identified as a major problem to effective implementation of disaster risk reduction and management. Further, other problems encountered include the lack of mechanisms on communication and warning, search and rescue, evacuation, relief operations, transportation and medical health services, lack of public awareness on the threats and impacts of all types of hazards and lack of awareness of the Philippine Disaster Risk Reduction and Management Act.

In addition, Gregorio and Kobayashi (2015)<sup>[11]</sup> disclose that lack of donor coordination during the response phase, no clear coordination at the school level in terms of management of donation, lack of communication within the Department of Education, and lack of resources (financial, human, infrastructure, supplies and equipment) are the main challenges encountered among the government schools in the Philippines.

Another factor affecting the school disaster preparedness is the existing physical vulnerabilities that increase the susceptibility of schools to the negative effects of disaster. 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 (United Nations International Strategy for Disaster Reduction (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 coastlines, fault lines, or unstable hills, make the area more vulnerable to disasters as compared to an area that is far away from the origin of the disaster, ("M&E Studies,"n.d.). Further, 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).

The Philippines is one of the most physically 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)<sup>[4]</sup>. 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)<sup>[9]</sup>.

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(UNISDR, 2013). The vulnerability assessment of buildings and settlements includes the building's vulnerability, the ground vulnerability and building occupant vulnerability (Arun & Yucel, 2012)<sup>[2]</sup>. 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&E Studies,"n.d.).

There is really a need to examine and address properly the problems encountered in the implementation of school disaster preparedness measures to improve school readiness in times of disaster. Further, the existing school physical vulnerabilities have to be identified and be given immediate interventions by the school authorities to minimize the negative effects of future disaster events.

It is in this light that the researcher felt the need to investigate the problems encountered by the secondary school personnel in the implementation of disaster preparedness measures in their respective school communities, their extent of agreement on the existing school vulnerabilities, and tests the significant relationship of the two variables. Further, the significant difference between the coastal and upland secondary school teachers' responses in terms of the extent of problems they encountered and the extent of agreement on the school physical vulnerabilities is also tested.

## 2. Materials and Methods

This is a descriptive-correlational study utilizing the survey method in the gathering of data. Survey questionnaire is the main research instrument used in this study. It is formulated from different sources. The first part on the extent of problems encountered by the respondents is formulated based on the problems cited by the school representatives during the Regional Conference on Education in Emergencies and Disaster Risk Reduction on December 10-12 2013 in the Philippines cited in Toolkit for Building Disaster Resilient Schools. The researcher categorized the problems encountered in the implementation of school disaster preparedness measures into 5 areas based on the parameters of disaster preparedness 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 (National Disaster Risk Reduction Management Plan (NDRRMP),2011). The survey questionnaire underwent pre-testing and reliability test.

The second part of the questionnaire on the respondents' extent of agreement of the vulnerability factors 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 survey questionnaire underwent pre-testing and reliability test.

The study was conducted in all 27 secondary schools offering Science, Technology, Engineering, and Mathematics Strand and General Academic Strand in their senior high school based on the database of the Department of Education in 2016 in the first congressional district of

Negros Oriental. The respondents of this study are the entire secondary school teachers who willingly participated in the survey. There are 582 respondents of this study. Spearman Rho was used to test the significant relationship of the secondary school teachers' extent of problems encountered in the implementation of the disaster preparedness measures in their respective school

communities and their extent of agreement of the school physical vulnerabilities. It is a statistical measure of strength and direction of association between two ranked variables. Mann-Whitney U-Test was used to test the significant difference between the respondents' responses from coastal and upland schools.

### 3. Results and Discussions

**Table 1:** Extent of Problems encountered by the respondents in the implementation of disaster preparedness measures

Problems Encountered		Coastal Schools (n=15)		Upland Schools (n=12)		Over-all w̄	Description	Rank
		w̄	Description	w̄	Description			
1	Awareness of the school community to the threats, impacts of hazards, risks, and vulnerabilities;	2.58	Minor	2.67	Moderate	2.62	Moderate	5
2	Skills of the school community to cope with the negative impact of a disaster	2.58	Minor	2.83	Moderate	2.71	Moderate	4
3	Capacity of the institution	2.84	Moderate	3.20	Moderate	3.02	Moderate	1
4	School disaster preparedness plans and policies	2.67	Moderate	2.91	Moderate	2.79	Moderate	3
5	Partnership among stakeholders	2.59	Minor	3.02	Moderate	2.80	Moderate	2
	Over-all w̄	2.65	Moderate	2.93	Moderate	2.79	Moderate	

#### Legend

Range of Values	Verbal Interpretation
4.21 - 5.00	Very Serious
3.41 - 4.20	Serious
2.61 - 3.40	Moderate
1.81 - 2.60	Minor
1.00 - 1.80	No Problem

Table 1 on the previous page shows the moderate extent of problems encountered by the teachers in the implementation of the school disaster preparedness measures in all aspects. However, it can be noticed that in upland schools all areas are rated moderate problems while in coastal schools most of the areas are rated minor problems. This suggests that more attention and interventions programs should be given to upland schools. The over-all result implies that problems are sometimes faced by the respondents in their disaster preparedness efforts. The school authorities have to find appropriate solutions to these problems to effectively implement disaster preparedness measures.

The finding of this study is strengthened by some related studies. Viloria, Mammon, Escudra, Anaya, and Landing (2014) show lack of proper information-based systems, the ignorance of the residents as factors to their unpreparedness to disasters and lack of budget. Another study of Mamogale (2011) in South Africa reveals that most of the educators lacked the knowledge on vulnerability assessment. Barrios,

Arboleda, Reloj, Rico, Terrado, and Sixon (2013) also show that barangay officials and constituents are not very capable in disaster preparedness due to lack of training and expertise in disaster preparedness. In contrast, the study Gregorio (2013) among Typhoon Yolanda stricken schools that Department of Education and local government officials show strong leadership in disaster preparedness.

Moreover, the result of this study is also supported by the study of Galindo, Villanueva, and Enguito (2014)<sup>[10]</sup> in Ozamiz City. It cited lack of training and lack of funds as problems encountered in disaster preparedness. Furthermore, Gregorio and Kobayashi (2013)<sup>[11]</sup> show that lack of financial and human resources is a factor that hinders effective policy implementation of school disaster preparedness and the proportion of budgets expenses in schools were inclined to response of disaster management not to preparedness. Janice (2011) also shows that majority of teachers lack of knowledge on the disaster plans and policies To overcome the challenges in disaster preparedness, there is a need for the cooperation and commitment of the various stakeholders. The national and local agencies which include the Department of Education can work closely together to address the gaps in the implementation school disaster preparedness measures. These gaps are further widened by the existence of school physical vulnerabilities which make the school more vulnerable to disasters.

**Table 2:** Respondents' extent of agreement of the school physical vulnerabilities

Physical Vulnerabilities		Coastal Schools (n=15)		Upland Schools (n=12)		Over-all w̄	Description	Rank
		w̄	Description	w̄	Description			
1	Clogged canals	3.50	Agree	3.44	Agree	3.47	Agree	2
2	Dilapidated school buildings	2.95	Neutral	2.79	Neutral	2.87	Neutral	5
3	Lack of trees in the school premises	2.62	Neutral	2.45	Disagree	2.54	Disagree	8
4	Prominent cracks on school building walls	3.42	Agree	3.44	Agree	3.43	Agree	3
5	Lack of water supply	2.31	Disagree	3.30	Neutral	2.81	Neutral	6
6	The school is near a body of water	2.69	Neutral	2.53	Disagree	2.61	Disagree	7
7	Big trees surrounding the buildings	4.25	Strongly Agree	3.44	Agree	3.85	Agree	1
8	Faulty electrical wiring	1.11	Strongly Disagree	1.28	Strongly Disagree	1.20	Strongly Disagree	9
9	The school is located nearby mountains	2.59	Disagree	4.25	Strongly Agree	3.42	Agree	4
	Over-all w̄	2.83	Neutral	2.99	Neutral	2.91	Neutral	

**Legend**

Range of Values	Verbal Interpretation
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

The data from table 2 on the previous page reveal that the respondent's extent of agreement on the school physical vulnerabilities is generally neutral. This suggests the teachers' lack of awareness whether the school physical vulnerabilities exist or not. It further implies the teachers' lack of initiative to identify and address the school physical vulnerabilities. However, it can be noticed that both coastal and upland secondary school teachers agree on the existence of clogged canals, prominent cracks on school building walls, and big trees surrounding the buildings in their respective school communities.

Moreover, the upland secondary school teachers strongly agree that school is located nearby mountains as their number one school physical vulnerability. On the other hand, the coastal school teachers strongly agree that big trees surrounding the buildings is their main vulnerability.

Some related studies support 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, Kamelifar, Ranjbarnia, and Pashaiifar (2014)<sup>[1]</sup> in Tabriz town, Northeastern Iran show that informal settlements of the study area 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 teachers can be responsive to the needs of the school community by reporting existing school vulnerability factors to the school authorities for immediate actions. Proper interventions have to be done to address the identified vulnerability factors that increase the susceptibility of schools to disasters.

**Table 3:** Correlation between the respondents' extent of problems encountered in the implementation of the school disaster preparedness measures and their agreement of the vulnerability factors

Respondent's Extent of Problems Encountered versus their Agreement of the Vulnerability Factors Criteria	rho	Verbal Interpretation	P-Value $\alpha=.05$	Decision	Remarks
A. Awareness of the School Community to the Threats and Impacts of Hazards, Risks, And Vulnerabilities	.359	Low Correlation	.066	Accept $H_0$	Relationship is Not Significant
B. Skills of the School Community to Cope with the Negative Impact of a Disaster	.678	High Correlation	.000	Reject $H_0$	Relationship is Significant
C. Capacity of the Institution	.601	High Correlation	.001	Reject $H_0$	Relationship is Significant
D. School Disaster Preparedness Plans and Policies	.561	Moderate Correlation	.002	Reject $H_0$	Relationship is Significant
E. Partnership Among Stakeholders	.486	Moderate Correlation	.010	Reject $H_0$	Relationship is Significant

As in shown in Table 3, the respondents' extent of problems encountered in terms of skills and capability of the school community to cope with the negative impact of a disaster, capacity of the institution, school disaster preparedness plans and policies, and partnership among stakeholders, and their agreement of the vulnerability factors have significant relationship with moderate to high positive correlation. This indicates that as the respondents' extent of problems

encountered in the four areas increases, their extent of agreement on the school physical vulnerabilities also increases. This suggests the strong co-occurrence of the two variables. To overcome the difficulties in school disaster preparedness, the school authorities have to address appropriately the problems encountered and school physical vulnerabilities

**Table 4:** The significant difference between the coastal and upland secondary school teachers' extent of problems encountered in the implementation of the disaster preparedness measures in their respective school communities.

Respondents' Extent of Problems Encountered in the Implementation of the Disaster Preparedness Measures in terms of:	Coastal Schools (Over-all $w\bar{x}$ )	Upland Schools (Over-all $w\bar{x}$ )	Test of Difference (Mann-Whitney U-Test Value ( $U_A$ ))	Lower Limit (LL)	Upper Limit (UL)	Decision	Remarks
A. Awareness of the School Community to the Threats and Impacts of Hazards, Risks, and Vulnerabilities	2.58	2.67	12.50	2	23	Accept $H_0$	No Significant Difference
B. Skills of the School Community to Cope with the Negative Impact of a Disaster	2.58	2.83	12.50	2	23	Accept $H_0$	No Significant Difference
C. Capacity of the Institution	2.92	3.10	18	5	31	Accept $H_0$	No Significant Difference
D. School Disaster Preparedness Plans and Policies	2.67	2.91	18	5	31	Accept $H_0$	No Significant Difference
E. Partnership Among Stakeholders	2.59	3.02	18	5	31	Accept $H_0$	No Significant Difference

Table 4 reveals that there is no significant difference between the coastal and upland secondary school teachers' extent of problems encountered in the implementation of the disaster preparedness measures in their respective school

communities. The same interventions can be done by the school management to reduce the respondents' extent of problems encountered in the implementation of the disaster preparedness measures in both upland and coastal schools.

**Table 5:** Significant Difference between the coastal and upland secondary school teachers 'extent of agreement of the school physical vulnerabilities

Significant Difference Between the Coastal and Upland Secondary School Teachers' Responses in Terms Of:	Coastal Schools (Over-all $w\bar{x}$ )	Upland Schools (Over-all $w\bar{x}$ )	Test of Difference (Mann-Whitney U-Test Value ( $U_A$ ))	Lower Limit (LL)	Upper Limit (UL)	Decision	Remarks
Agreement of the school physical vulnerabilities	2.83	2.99	40.5	17	64	Accept $H_{010}$	No Significant Difference

As shown in table 5, there is no significant difference between the coastal and upland secondary school teachers' extent of agreement of the existing school physical vulnerabilities. This suggests that the same courses of actions can be implemented in both coastal and upland secondary school to address the existing school physical vulnerabilities.

#### 4. Conclusions

Problems are sometimes encountered by the secondary school teachers in the implementation of disaster preparedness measures in their respective school communities. The teachers are unaware whether the school physical vulnerabilities exist or not which is an indication of lack of initiative to address the school physical vulnerabilities. Further, there is a strong positive correlation between the teachers' extent of problems encountered in terms of skills and capability of the school community, the capacity of the institution, school disaster preparedness plans and policies, and partnership among stakeholders; and their extent of agreement on the school physical vulnerabilities. This is an indication of the strong linkage between the two variables. Further, there is no significant difference between the coastal and upland secondary school teachers' responses in terms of the extent of problems they encountered and their extent of agreement of the school physical vulnerabilities.

#### 5. Recommendations

To overcome the challenges in disaster preparedness, there is a need for the serious cooperation and commitment of the various stakeholders. The Department of Education can work closely with other stakeholders to address the gaps in the implementation of school disaster preparedness measures. These gaps are further widened by the existence of school physical vulnerabilities which make the school more vulnerable to disasters. The same interventions can be done by the school authorities to address the physical vulnerabilities and reduce the problems encountered in the implementation of the disaster preparedness measures in upland and coastal schools.

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