

prevention and mitigation, response, and recovery program. Based on the findings, there is high level of awareness on junior students with a significant difference that can attribute to the way DRRM programs are implemented to the locals. The assessment and awareness levels of junior students on the four themes found out that six hazard-prone barangays in Butuan City are prevalent and have inducted actions involving the students' knowledge on DRRM in their respective barangays involving themselves in local community participation, not just mere residents but rather active young citizens who truly submerge themselves into environmental hazards. Thus, becoming resilient will ensure public awareness as regarded to genuine learning to take actions to promote safety in their local communities.

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Disaster Risk Reduction Management (DRRM) Assessment and Awareness Level: A **Starter Preparedness Program for Junior High School**

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Abstract

Disaster Risk Reduction Management (DRRM) requires a collaborative effort that must involve every individual in the local community including the students for them to be aware the resulting health hazards such as flood, fire, drought, earthquake, typhoon, accidents, and the damage of infrastructures, lifelines, and critical facilities resulting in human, financial, and environmental losses. This study used cross-sectional descriptive study to determine the level of students' awareness on disaster risk reduction management on the six hazard-prone barangays in Butuan City. A selfadministered, 5-point Likert scale, survey questionnaire is employed to junior high school students who are residents of at least 3 years and beyond as an inclusion criterion to gather the data concerning on the four themes of the disaster risk reduction management such as disaster preparedness,

1. Introduction The Philippines is considered the fourth most at-risk country in the world in terms of climate-related natural hazards such as typhoons, floods, volcanic eruptions, earthquakes, and sea level rise due to its geographic location that lies along the unstable region between the Pacific and Eurasian Plate where typhoon belt and Ring of Fire were situated (Guha-Sapir et al.,

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2016)^[15]. Seyedin *et al.*, (2010)^[23] defined natural hazard as a threat of a naturally occurring event that have a negative effect on humans. In other words, when the hazardous threat actually happens and harms humans, we call the event a natural disaster (Frankenberg et al., 2011). Natural disasters have significant impacts on human society and the environment. The scale of the impact in turn, depends on the choices the people make for their lives and for their environment (Kreussler and Bitter 2007)^[17]. These choices relate to how the people grow their food, where and how they build their homes, what kind of government they have, how their financial system works and even what they teach in schools (Alcayna et al., 2016)^[2]. Each decision and action make the people more vulnerable to disasters or more resilient to them (Rogers 2011).

Being well-informed about disaster risk management is of paramount importance as it helps people in coping with hazards and even more so, for learners to have a deeper understanding of the various fundamentals of disaster risk management (Pasipamire 2011). Disaster risk reduction management is the concept and practice of reducing disaster risks through systematic efforts to analyze and reduce the causal factors of disasters such as reducing exposure to hazards, lessening vulnerability of people and property, wise management of land and the environment, and improving preparedness and early warning for adverse events (UNISDR 2014). The study is anchored on the idea of Vulnerability and Resiliency Theory (Matyas and Peling 2012)^[19]. As defined in the disaster context, vulnerability is a person's or group's capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard (Fothergill and Peek 2004)^[14], while resiliency is the adaptability to recover from a disaster. The theory accentuates that when people are vulnerable and exposed to hazards and disasters, they become adaptable and can successfully cope with, thus, becomes resilient (Alexander 2015)^[3].



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In addition, this adheres to the framework of the Philippine Disaster Risk Reduction and Management Act of 2010 (RA 10121) which considers the four areas of concern which include disaster preparedness, disaster prevention and mitigation, disaster response, and disaster recovery which involves every part of society and every part of government, particularly the local government units (LGUs). The impacts of disasters such as loss of life, injuries, property loss, loss of revenue, can be avoided by adopting preventive methods before the hazard takes place, being aware of preparedness and knowing how to respond to different natures of hazards (Banerjee and Gillespie 1994)^[6]. If people are well informed and motivated towards a culture of disaster prevention and resilience, which in turn requires the collection, compilation and dissemination of relevant knowledge (UNISDR 2015) and information on hazards, vulnerabilities and capacities, disaster will be minimized, if not totally avoided (Tierney et al., 2001)^[24].

So, when everyone in the community is conscious of the hazards that usually take place in their area, participate in limiting the effects, and change in behavior and attitudes at all levels then it can be said there is a culture of safety within that community (Campbell and Yates 2006) ^[10]. Students' active involvement in disaster response, preparedness and management is usually limited due to their age and capacity, but with the support from the parents, school administrators, teachers and the barangay councils, they will be guided on what to do, they can survive on risky situations and they can even save lives for others (Baker 2011)^[5]. The barangay council is the immediate government agency to reach out the local folks and plays a very significant role to cater the function of information dissemination and policy implementation on this matter. Nonetheless, failure to perform such functions will create a disaster that chooses no one (Ferdinand et al., 2009) but with proper implementation, collaboration, coordination and guidance, disasters can substantially be reduced. The local authorities are therefore, responsible to ensure that the

communities gain access to information that improves their safety (Bostrom 2003)^[8].

The presented perspective led to this study, which aimed to determine the level of awareness of the students in their respective barangays which are considered to be hazard-prone areas according to the Environment Management Bureau (2014). There are four themes included in the disaster risk reduction management, namely: disaster preparedness, disaster prevention and mitigation, disaster response, and disaster recovery. It also intends to examine if there are significant differences on the level of awareness of the students between barangays.

Site selection

The study area is in Butuan City, situated below sea level and vulnerable to flooding (EMB 2014). It is bisected by the long span of Agusan River, the longest river in Mindanao, which serves as a catch – basin of all the river waters from Davao de Oro and Agusan del Sur before flushing to Butuan Bay. Historically, records have shown that it has occurrences of destructive periodic flooding which happened every 20 years yet getting earlier as years passed by (CDRRMC 2016). It is also hit by numerous typhoons and tropical depressions such as Pablo and Agaton, which caused destructions of lives and properties due to non-stop rainfall, causing the Agusan River to overflow and flooding the whole city. Six major barangays are usually highly affected by frequent flooding. These barangays are Baan, Buhangin, Bading, Bayanihan, Obrero and Villa Kananga, aside from being traversed by the major fault line in Caraga Region. From the context, these places are engulfed with natural hazards such as flooding and earthquakes. Moreover, the abovementioned barangays are highly populated by more than 5,000 households (City Population Council 2017), in which majority of the students are enrolled in Agusan National High School as part of the city, hence, choosing it to be the pilot schools of this study.



Fig 1: Map of Butuan City, Agusan del Norte, Philippines. (Japitana and Paringgit, 2011)^[16]

2. Research design

The study is a cross-sectional descriptive study for it tries to delineate the level of awareness of the students as residents of the six hazard-prone barangays of Butuan City according to four disaster management constructs: disaster preparedness, disaster prevention and mitigation, disaster response and disaster recovery.

Sampling technique

The researcher employed a purposive sampling since the respondents were chosen according to the barangay where they reside. These barangays are Baan, Buhangin, Bading, Bayanihan, Obrero and Villa Kananga with at least 3 year-residency and beyond. The Grades 9th and 10th students were considered for they have broader understanding and exposures of the concepts on natural hazards and natural disasters based on the learning competencies and standards in the Department of Education (DepEd) K+12 Science Curriculum.

Instrumentation

A survey questionnaire adopted from the National Disaster Risk Reduction Management Council (NDRRMC 2016) was utilized to gather the data needed for the study. It is a 44-item questionnaire using a 5 - point Likert Scale to acquire responses according to the four theme/areas of Disaster Management (DM) that includes disaster preparedness, prevention and mitigation, response and recovery. Each area differs in its number of items, with 14 items in disaster preparedness and 10 items for the rest. The questionnaire also contained questions on basic demographic and socio-economic characteristics of the student's household. In addition, it is a self-administered survey questionnaire since it is completed by the students at their own pace in their science classes. A cover page is attached, stating the purpose of the study and clear instructions for them to answer correctly. The science teacher was the one who distributed the questionnaires to the student-participants. To observe ethical norms, a letter was sent to the school principal for permission to administer the questionnaires same as students' consent permission was also attached if they are willing and voluntarily participate in the conduct of the survey.

Statistical tool

An analysis of variance (ANOVA) was utilized in the analysis of data taking the barangay as the predictor variable and themes of disaster management as the dependent variables. Post hoc Scheffe test for multiple comparisons was also used to determine the differences of awareness level of the student-participants between barangays. Descriptive statistics was utilized to describe the results in the presentation of the data in tables. To determine the level of awareness of the student-participants in their respective barangays, a scoring function was used to assess the criteria listed in each indicator.

3. Results and findings

Table 1: Likert scale interpretation and distribution of values

Likert Scale	Likert Description	Value Allocation	Descriptive Equivalent for Level of Awareness
5	Strongly Agree	4.3-5.0	Very High
4	Agree	3.5-4.2	High
3	Neither Agree nor disagree	2.7-3.4	Average
2	Disagree	1.9-2.6	Low
1	Strongly Disagree	1.0-1.8	Very Low

Demographic profile of junior high students

There were 110 questionnaires administered to Grades 9th and 10th junior high school students from Agusan National High School, Butuan City, but only 82 were considered for analysis and 20 were excluded since the respondents were not qualify for the minimum requirement for residency of at least 3 years or more.

Table 2: Summary of students' demographics

Profile	Frequency	Percentage
Gender		
Males	49	59.8
Females	33	40.2
Total	82	100%
Type of House		
Wooden wall	7	8.5
Semi-concrete	43	52.4
Concrete	32	39.0
Total	82	100%
Monthly Gross Family Income		
10,000 pesos and below	18	22.0
11,000 – 20,000 pesos	27	32.9
21,000 – 30,000 pesos	20	24.4
30,000 pesos and above	17	20.7
Total	82	100%
Number of DRRM Trainings		
None	62	71.3
1-3	25	28.7
4 above	0	0
Total	82	100%
Number of DRRM Drills		
None	30	36.6
1-3	52	83.4
4 above	0	0
Total	82	100%
Attendance to DRRM Meetings		
None	60	73.2
1-3	22	26.8
4 above	0	0
Total	82	100%

The students' demographic profile is shown in Table 2. As presented in the table, this reveals that there are more males than females. In terms of the type of house, many of them lived in a semi-concrete (52.4%), with monthly family income ranges from 11,000 to 20,000 (32.9%). Majority of

the student-participants (71.3%) have no DRRM trainings attended, but more than half of them have experienced in drills (83.4%), and 73.2% of them have no attendance on DRRM meetings in their respective barangays as per required by the city Disaster Risk Reduction Management (DRRM) office.

4. Analysis on students' DRRM awareness

 Table 3: Means and Standard Deviations on the Level of Awareness of the Students in their Barangay on Disaster Risk Reduction

 Management (DRRM)

	N	DRRM Themes							
Barangay		Preparedness		Prevention a	Response		Recovery		
		Μ	SD	Μ	SD	Μ	SD	Μ	SD
Baan	17	4.71 ⁵	.470	2.94 ³	1.197	4.25^{4}	.577*	3.94 ⁴	.899
Bading	9	4.445	.527	2.94 ³	1.197	4.22^{4}	.667	3.89 ⁴	.928
Bayanihan	18	4.83 ⁵	.383	3.00^{3}	1.225	4.335	.767	4.17^{4}	.618
Buhangin	12	4.67^{5}	.492	3.42^{3}	.996	4.00^{4}	.953	3.92^{4}	.793
Obrero	13	4.69^{5}	.480	3.23 ³	1.166	4.15^{4}	.689	3.69 ⁴	.947
Villa Kananga	13	4.92^{5}	.277*	3.31 ³	.751*	4.00^{4}	.816	4.23^{4}	.599*
Total	82	4.735	.446	3.20^{3}	1.082	4.17^{4}	.738	3.99 ⁴	.793

Legend: Level of awareness: Very High (5); High (4); Average (3); low (2); very low (1)

As seen in Table 3, the level of awareness of the students on disaster preparedness in all barangays is Very High, N=82; M=4.73; SD=.446. Barangay Villa Kananga has the least standard deviation, N=13; SD=.277, which simply means that the students' responses from this barangay about disaster preparedness are in agreement with each other, as compared to other barangays.

In general, the level of awareness of the students on disaster prevention and mitigation in all barangays is Average, N=82; M=3.20, SD=.738 with barangay Baan and Bading, having the lowest means, N=17; M=2.94 and N=9, M=2.94, respectively. Further, these two barangays also have the largest standard deviations (SDs), both have SD= 1.197, which could mean that the students' responses about their barangay vary on this theme.

The level of awareness of the students on disaster response is *High*, N=82, M=4.17; SD=.738. Barangay Buhangin and Villa Kananga has the lowest means, N=12, M= 4.00 and N=13, M=4.00, respectively. The standard deviations of the barangays were as close to each other, which means that on this theme, the students' responses were quite similar to each other.

The general level of the awareness of the students on disaster recovery is High, N=82, M= 3.99, SD=.793. Among the barangays, Barangay Obrero has the lowest means, N=13; Mean=3.69; SD=.947 The standard deviations in all barangays were as close to each other.

Table 4: ANO	VA Results on the	he Level of	Awareness

Variables	Sum of squares	df	Mean square	F	Sig.	η2	
Disaster Preparedness	1.49	5	.297	1.547	.185	.092	
Disaster Prevention	2.33	5	.466	.383	.859	.025	
Disaster Response	1.43	5	.287	.516	.763	.033	
Disaster Recovery	4.90	5	.981	2.22	.061	.127	
* <i>p</i> < .05							

Table 4 shows the output of the ANOVA analysis, with a null hypothesis: there is no significant difference of the group means regarding the level of awareness. The data shows that the group means is p > .05, hence, accept the null hypothesis. It is shown that for disaster preparedness F(5,76)=1.55, p = .185, but with small effect size, $\eta 2 = .092$. It is also the same for the disaster prevention and mitigation, F(5,76)=.383, p = .859 with $\eta 2 = .025$. The theme for disaster response F(5,76)=.516, p = .763 with $\eta 2 = .033$. The last

construct on disaster recovery, F(5,76)=2.22, p =.061, with $\eta 2=.127$, medium effect size compare to the other themes. Further, group means is p >.05, hence, post hoc analysis is irrelevant.

5. Discussion

The analysis of data reveals that the level of awareness of the students to their barangays varies, which is expected for a survey since individual student perceives and interprets things differently (Nix-Stevenson 2016)^[20], particularly on this context that each student has different background as supported by the collated demographics. The four DRRM themes are discussed individually to have a clearer perspective on each area.

The disaster preparedness actions ensure resources necessary to carry out an effective response are available before a disaster, or they can be obtained promptly when needed (Bradley 2010)^[9]. It is also described by Levine (1989) ^[18] as an ongoing process of assessment, planning and training to prepare for a well- coordinated plan of action which will be used to minimize the impact of a hazardous event. The preparedness plan should contain information which ensures that all relevant individuals understand their responsibilities, such as evacuation routes, evacuation procedures, assembly points, during disastrous phenomenon. The level of awareness of the students towards their barangay is very high which indicates that their respective barangay has extended full effort in the dissemination of information on how, when, and what to prepare when floods, earthquakes and other hazardous phenomena occur. It is further believed that involvement of the community during disaster risk reduction campaigns can enhance their ownership of activities; build a culture of safety, thus building resilient communities (Groundwork 2003; Institute for Ocean Management 2007). Moreover, communities which have made disaster preparedness plans well in advance of the actual event can achieve quicker and better organized responses when an emergency arises (Levine et al., 1989)^[18].

In addition, disaster prevention and mitigation require concept and practice of reducing risks through systemic efforts (UNISDR 2017). The level of awareness of the students in this theme is only *average* which could imply that they still lack some inputs from their barangay and probably in school about some ways of prevention and

mitigation. This result is supported by Aghaei et al., (2018) ^[1], which underscored that one of the most important challenges in DRRM is the lack of disaster prevention literacy which requires knowledge, attitude, and skills on prevention and mitigation that involved authorities, officials, managers, teachers, students, and the general public. Apronti et al., (2015)^[4] added the lack of disaster prevention education in the formal curricula, which shows significant gaps between the education outlined in the syllabi and in real world-scenario that present a problem on disaster prevention. Furthermore Chen et al., (2015) also supplemented the lack of suitable and professional training for teachers on disaster education, inconsistency of education and the lack of communication between school, family and community due to consistent changes in organization.

Nevertheless, one has to keep in mind that schools are the best conduit for disseminating collective values, students and teachers can serve as vehicles for building a culture of prevention (Nix-Stevenson 2016)^[20].

The disaster response involves a mixture of plans, procedures, and improvisation after the occurrence of a disaster (Alexander 2015)^[3]. A degree of uniqueness present in each new disaster means that improvisation cannot be avoided, but foresight and preparedness can constrain it to a necessary minimum. This usually involves rescue operation, supply of rescue materials, health assistance, relocation and evacuation service, etc. constitutes disaster response. The level of awareness of the students on this theme is high, which can be attributed to their actual experience on natural disasters. They already have the knowledge, skills and enhanced coping mechanisms in dealing with disasters such as the earthquakes, landslides and frequent flooding of their place, especially when Agusan River overflow. Life in the evacuation centers, usually schools, is customary for them, where relief goods are available but pressured with congestion and discomfort. However, they become resilient due to their susceptibility and vulnerability to natural disasters (Matyas and Pelling 2012)^[19].

In order to have disaster recovery, safety is a primary issue, as well as mental and physical well-being (Alexander 2015)^[3]. It takes time to recover from the injury, destructed homes and properties, and anxiety or grief. The level of awareness of the students in this theme is high which indicates that they have coped-up the challenges of natural phenomena, both physically and mentally. Based on the item of the questionnaire, they were able to activate themselves for the barangay to reach to them, like helping their neighbors and responding to the program implemented by their respective places.

6. Conclusion

In conclusion, the assessment and awareness levels of junior students on the four themes of disaster risk reduction management found out that six hazard-prone barangays in Butuan City have inducted actions involving the junior high students. The students' knowledge on DRR management in their respective barangays implied that they are involving themselves in the community, not just mere residents but rather active young citizens who truly submerge themselves into climatic hazards. They are always vulnerable and susceptible to natural hazards, but embracing them is their choice, thus, becoming resilient. With this, the local government units will ensure public awareness which is regarded as genuine learning, that individuals will be prepared to take actions to promote safety. However, there are still some aspects of DRRM to be given attention by some barangays officials like in the theme of disaster prevention and mitigation where means are just average. One has to take into consideration that occurrences of natural hazards are unexpected, so the effort of this DRRM endeavor should be sustainable in all agencies, particularly in the disaster risk management education among schools in hazard prone barangays.

7. Conflict of interests

The authors declare no conflict of interest relevant in the conduct of the study.

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