Health Risk Management Practices in Flood-Prone Public Elementary Schools in Caraga Region, Philippines

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Abstract: This study aimed to profile the flood-prone public elementary schools in Caraga region and identify their health and safety risk management practices. It utilized a descriptive research design whereby interview and survey techniques were employed to gather the data. The flood-prone public elementary schools in the region near Agusan River were the target locales of the study. Aside from surveys, a non-probability sampling design was also utilized particularly purposive sampling in determining the participants of the interviews. The school principals as the SDDR chairpersons, SDDR coordinators, School-Based Feeding Program (SBFP) coordinators, Wash in Schools (WISs), and school health officers were the participants in each FPPES. Butuan City, Bayugan City, Cabadbaran City, Agusan del Norte, and Agusan del Sur school divisions were included as division participants of the study. The data were gathered using a checklist developed based on the Health and Safety Induction Checklist by Safety Culture Staff (2017). Frequency distribution was utilized in identifying the demographic profile of the participants and in determining the health risk management practices of schools.

Based on the interviews, three challenges were identified by the informants, and they include diseases acquired during and after the flood, pest infestations during and after the flood and lack of comfort rooms with clean water supply. The spread of diseases such as respiratory, skin, mosquito-causing, and parasitic worm illnesses was among the health issues mentioned by the informants.

Keywords: Flood-Prone Public Elementary Schools, Health, Practices, Safety.

1. INTRODUCTION

Disasters may they be natural or man-made can affect a huge number of people globally every year. Historically, the world becomes a witness to a significant increase in the intensity and frequency of disastrous weather events such as earthquakes, floods, droughts, and tropical storms, which are expected to increase even further in a future warmer climate (Field et al., 2012). This poses a major humanitarian concern thus impedes the achievement of Millennium Development Goals especially the second goal of achieving universal primary education (UN Centre for Regional Development [UNCRD] 2009). Heavily exposed low- and middle-income countries, in particular, carry a large share of the human and economic burden. Undoubtedly, disaster risk reduction is a fundamental component in sustaining social and economic development (Hoffmann & Muttarak, 2017).

With an average of 20 storms per year, the Philippines is prone to destructive floods. It also earns a greater percentage of low and middle-income families who have less capacity to cope and even less capacity to plan and prepare for floods. Children of these families are particularly vulnerable, subjected to high rates of malnutrition and susceptibility to communicable diseases, psychological frailty, and risk for disrupted family environments (Shilkofski, 2017).

Reports on floods in the Philippines caused cancellation and disruption of regular classes, physical damage to schools, and adverse effects on teachers and school children at home and in school. Problems in teaching such as lack of time to finish all lessons, poor motivation and concentration of students, lack of classrooms, shortage of instructional materials, and difficulty in preparing lessons were encountered (Ardales, et.al., 2016). Atun & David (2016) reported that Philippine schools are used to getting flooded periodically during the year. In the National Capital Region (NCR) alone, 42.4% of elementary schools and 40.3% of high schools experienced floods at least once in 2013. In February 2017, over 30,700 people were displaced in Caraga Region particularly in Butuan City due to flooding triggered by a series of weather systems (Catoto, 2017). According to reports, Agusan River (the longest river in Mindanao) overflowed due to heavy rains brought about by a low-pressure area and the tail end of a cold front. Families were advised to seek shelters in public elementary schools. Palisada (2011) in ABS-CBN news, reported that children of these displaced families are already getting sick because of the scarcity of medicine and...
food supplies.

Flooding presents challenges on different fronts. A few of these risks are to children’s health and safety. Atun & David (2016) explained that when floodwaters take time to recede, school children have to wade through muddy water. Standing water becomes breeding grounds for mosquitos. Surfaces, where children walk, become slippery and dangerous to navigate. Children due to tender age and lack of experience are among the vulnerable groups that may be affected by flooding. Muyot in Torres (2019) posited that school children’s safety and security must be ensured as they spend six to eight hours in school while they are away from their parents and guardians.

Sujarwo, Noorhamdani & Fathoni (2018) elucidated that the low level of School-Based Disaster Preparedness of students in disaster risk reduction (DRR) can lead to increased vulnerability in facing disaster health and safety threats. These threats may seriously include health and malnutrition problems and other money-draining issues. Menne and Murray, 2013 in WHO (2017) enumerated the flood-related- risks factors which include fast-flowing water which may cause drowning, hidden hazards such as walking through the water of unknown depth, flood water contamination (by chemicals, sewage, and residual mud), exposure to electrical hazards during recovery and cleaning, unsafe drinking water, food shortages, and contamination, poor hygiene conditions, carbon monoxide poisoning, and lack of access to health services. Aside from these threats, the Department of Health’s Statement released in 2017 also identified flood-induced diseases such as leptospirosis, typhoid fever, cholera, and dengue fever.

Due to the forgoing health and safety risks, schools should then observe practices that may reduce the risks brought about by floods. School Health Risk Management is a process where the school minimizes the threats associated with the hazards. It aims to ensure that no one is injured or hurt by a hazard in school (The State of Queensland (Department of Education). As found in the study of Takahashi (2015), schools linked with sound school health management can provide good opportunities for DRR with a focus on the development of school health policy.

Since schools lying along the Agusan River in Caraga Region are prone to floods, thus, school managers should be familiar with the DRR plan and should implement practices on health risk management which may eventually mitigate the risks that may be encountered during floods. It is on this premise that the researchers will conduct a study on school health risk management practices of flood-prone public elementary schools in the region.

2. MATERIAL AND METHODS

2.1. Study Design

The study utilized a descriptive research design. It identified the health risks management practices of the flood-prone public elementary schools in the Caraga Region and based on the supposed findings of the study, the researchers aimed to craft school-based health risk management guidelines. The interview and survey techniques were employed in the study. Focus Group Discussions (FGDs), triangulation, and the use of a camera for picture-taking were also done to determine the challenges in the conduct of the health risk management practices of the flood-prone public elementary schools.

2.2 Sampling Design

The target population of the study were the flood-prone public elementary schools in the region near Agusan River. To be more reliable, the identification of such schools was based on hazard maps of the City Disaster Risk Reduction Management Offices or Provincial Disaster Risk Reduction Management Offices in the Caraga Region. Non-probability sampling design was utilized particularly purposive sampling technique in determining the participants. The school principals as the SDDR chairpersons, SDDR coordinators, School-Based Feeding Program (SBFP) coordinators, Wash In Schools (WINs), and school health officers were participants in each FPPES. The school heads were included in the study since they are the decision-makers of health risk management in schools. SDDR Coordinators were also identified as participants for they are the front-liners and the focal person in the
conduct of the school health risk management activities.

2.3 Site Of The Study

Based on the data provided by the Mines and Geosciences Bureau (MGB), Caraga has the highest percentage of municipalities and barangays where disasters such as floods will likely occur. Out of the region’s 73 cities and municipalities, 62 (85%) are prone to floods. Out of 1,310 barangays, 789 or 60% are susceptible to flooding. Among the 12 school divisions in Caraga, 5 of them were identified as flood-prone due to their proximity to Agusan River. They were Agusan del Norte and Agusan del Sur. City school divisions are under the aforementioned province divisions namely Butuan City, Bayugan City, and Cabadbaran City. Hence, the aforementioned city and province divisions will be included as division participants of the study.

2.4 Study Plan

Data Gathering Procedure: The data were gathered using a checklist developed based on the Health and Safety Induction Checklist by Safety Culture Staff (2017) as the primary research instrument. The modifications were made to suit the researcher’s objectives in conducting the research. The first part of the questionnaire contains the demographic profile of the flood-prone public elementary school which includes the location (topography and proximity to Agusan River); urbanization (rural, urban), and school type (central, non-central). The second part of the instrument is a checklist of the health risks management practices of the FPPES. Interview method, focus group discussion, triangulation, and a camera to get data on the challenges encountered in the conduct of school health risk management practices. It should be noted that this study was conducted at the onset of the pandemic. Given how suddenly schools were closed in months during the conduct of the study in 2020 (Cubillas & Cangke, 2023), the gathering of data was slowed down due to the pandemic. During the interviews, the researchers strictly followed the minimum health protocol.

2.5 Investigated Variables

2.6. Research Instrument

The instrument was adopted from the Health and Safety Induction Checklist by Safety Culture Staff (2017). Some parts of the instrument were modified in order to fit into the study. Disease Control and Prevention was added since this variable is deemed important according to WHO Briefing Notes on the Pandemic of H1N1 (2009).
3. RESULTS AND DISCUSSIONS

3.1. Demographic Profile of the Flood-prone Public Elementary School Participants

As displayed in the table, the majority of the FPPES are located in rural areas, classified as non-central schools, from the plains, and situated beyond 50—meter-radius of Agusan River. This shows that most of the flood-prone elementary schools are located in far-flung rural barangays which indicates that there might be a concern regarding the location where the schools were built. Also, most of the flood-prone schools are small schools which signifies that they have less MOOE compared to the central schools which further shows that most of the flood-prone elementary schools may lack or have no budget for proper drainage systems to prevent flooding in their schools. Shown in the table below is the demographic profile of the flood-prone public elementary schools.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Rural</td>
<td>88</td>
<td>85.41</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td>14</td>
<td>14.56</td>
</tr>
<tr>
<td>Type (specified location)</td>
<td>Central</td>
<td>16</td>
<td>15.53</td>
</tr>
<tr>
<td></td>
<td>Non-central</td>
<td>86</td>
<td>84.47</td>
</tr>
<tr>
<td>School Topography</td>
<td>Mountainous</td>
<td>8</td>
<td>7.77</td>
</tr>
<tr>
<td></td>
<td>Plain</td>
<td>95</td>
<td>92.23</td>
</tr>
<tr>
<td>Proximity to Water System</td>
<td>Within 50-meter radius</td>
<td>40</td>
<td>38.83</td>
</tr>
<tr>
<td></td>
<td>Beyond 50-meter radius</td>
<td>63</td>
<td>61.17</td>
</tr>
</tbody>
</table>

The schools located on plains, especially near rivers are vulnerable to floods. This is understandable since when rain falls, the surface runoff can move very quickly from mountainous or hilly areas to low-lying areas making the low-lying areas more prone to floods. In DRR, this is called "relief." Aside from "relief," urbanization is also a factor in why plains are more vulnerable to floods. Accordingly, urbanization leads to the replacement of permeable soil with a water-resistant layer of pitch and concrete, through which water cannot infiltrate. This results in increased surface runoff which leads to flash flooding. Moreover, those schools located near the tributaries of the Agusan River are more vulnerable to riverine, a type of flood that usually occurs when a river overflows its banks. It is usually due to the volume of water within a body of water, exceeding its capacity and overflowing its banks.

In line with the information above, Mukherjee and Singh (2020) identified using the Geographic Information System-based weighted multi-criteria analysis the characteristics of flood-prone areas which include the slope, elevation, soil type, rainfall intensity, flow accumulation, Land Use/Land Cover (LULC), Normalized Difference Vegetation Index (NDVI) and distance from river and distance from the road. In addition, basin topography, the behavior of flood flow, zonings of the alluvial plain, and estimated flood patterns are among the flood-susceptibility characteristics identified by Nagumo and Sawano (2016). These characteristics must be determined so that people can take effective measures to fight floods and sustain flood-adaptive lifestyles. People should be required to understand the local geographical characteristics and regional flood vulnerability (Nagumo & Sawano, 2016).

3.2. The Health Risks Management of the FPPES in Terms of Health and Safety Policy

3.2.1 Health Risks Management of the FPPES in Terms of Health and Safety Policy

Gleaned in the figure below is the frequency distribution of the health risks management of the flood-prone
public elementary school in terms of health and safety policy.

![Distribution of respondents on the Health and Safety Policy (n=511).](image)

**Figure 1.** Distribution of respondents on the Health and Safety Policy (n= 511).

As shown in the figure, in terms of health and safety policy, most flood-prone public elementary schools if not all agreed that their schools monitor and evaluate the guidelines on health policy, implement the guidelines on health policy, and adopt the minimum guidelines on health policy. These favorable results signify that the schools have their health and safety policy in place and the school heads made sure that the policy is regularly monitored, implemented, and they saw to it that they have included minimum health guidelines in their respective school policies.

In support of the data above, Jones, Fisher, Greene, Hertz, and Pritz (2007) proposed that policies set at school levels can enhance a healthy and safe school environment. Jourdan (2021) also pointed out that beyond educational benefits, schools are also important for health. Coherence between each school’s policies, structures and systems, human resources, and practices is required to advance both academic and health outcomes.

Jourdan’s view is also corroborated by Schalkwyk, Knai, Jackson, Maani, Petticrew (2021). They stated that the call by Didier Jourdan and colleagues for schools to become a foundation for healthy lives is therefore timely and welcome especially in this time of pandemic. Moreover, according to Schalkwyk, et al., schools and education are intricately linked to health, equity, and life opportunities.

The above data and literature indicate that schools have a critical role in the lives of the learners and that they need to adopt, implement, and evaluate guidelines in the school policies to better protect the lives of their stakeholders, particularly the learners.

### 3.2.2 Health Risks Management Of The Fppes In Terms Of Health Advisers, Representatives, And Committee

Viewed in the figure below is the frequency distribution of the health risks management of the flood-prone public elementary school in terms of health advisers, representatives, and committees.
As displayed in the figure, in terms of health advisers, representatives, and committees, most flood-prone public elementary schools agreed that they have health and safety committees in place and that the school health officers/personnel/representatives of the committees are aware of their roles. However, it is worth noting that 29.55% or 151 out of the 511 participants from the flood-prone public elementary schools do not agree that their schools regularly conduct periodic training on health risk management for the officers, teachers, and pupils. This result indicates that the teachers recognize the lack of regular health risk management training ought to be conducted by the schools; a startling observation that may put all schools’ stakeholders at risk if not properly addressed.

Parallel to the results above, Evans, Candace, Adams, and Peek (2021) revealed based on their study that training the emergency managers is necessary to advancing the field and ensuring health knowledge is better integrated into DRR. They further found that stakeholders' backgrounds are significantly associated with changes in both knowledge and skills. Hence, training can bring about changes on the level of knowledge and skills among its participants.

Furthermore, Naser and Saleem (2018) viewed that knowledge and training in emergency and disaster preparedness are important to give or render effective responses during health and safety situations. They recommended that training programs are urgently needed, with specific emphasis on key personnel such as health administrators, facility managers, medical teachers, first responders and public health providers. Thus, periodic training of the health advisers, representatives, and committee is needed particularly when health in school is concerned.

3.2.3 Health Risks Management of the FPPES in terms of Housekeeping

Seen in the figure below is the frequency distribution of the health risks management of the flood-prone public elementary school in terms of housekeeping.
**Figure 3.** Distribution of respondents on the Housekeeping \((n=511)\).

As gleaned in the figure, in terms of housekeeping, most flood-prone public elementary schools agreed that their schools maintain tidy or clean classrooms, offices, and school environment, especially after flooding and other calamities. They also have health and safety rules posted in the aforementioned areas. On the other hand, 31.31% or 152 out of 160 schools claimed that they do not have fire extinguishers placed in strategic areas; 32.88% or 168 out of 511 participants responded that they do not have signs, markers and cones for prevention of accidents such as trips and falls (e.g. “slippery when wet” sign or marker). This data suggest that the teachers acknowledge the absence of fire extinguishers and health and safety devices which are essential to disaster preparedness and prevention. This is an alarming observation on school housekeeping, thus, it should be addressed properly to heighten the level of health and safety risk management in schools thereby reducing the occurrence of risks and disasters among the school stakeholders.

To corroborate the statement above, Iran’s Ministry of Education in 2006 in Ostad, Mowafi, Ardalan (2013) stated that all schools have to be equipped with fire extinguishers and all teachers and students must be trained in their use by the Fire Department. In the same study, there were available fire extinguishers in the Iranian schools, but the problem is that teachers and school personnel are not equipped with knowledge on handling the same hence, the fire caused injuries among 26 children and two deaths. Although the situation in Iran is not entirely the same in the schools here in the Philippines, however, efforts on training and putting up school health policy would be in vain if fire extinguishers and other health and safety paraphernalia are not available in the school vicinity just as what the present study has revealed.

### 3.2.4 Health Risks Management of the FPPES in terms of Accidents and Abnormal Occurrences

Presented in the figure below is the frequency distribution of the health risks management of the flood-prone public elementary school in terms of accidents and abnormal occurrences.
As shown in the figure, in terms of accidents and abnormal occurrences, most participants from the flood-prone public elementary schools agreed that their schools have available contact numbers of emergency response agencies, and they have available first aid kits in their classrooms and offices. Meanwhile, it can be noted that 36.99% or 189 out of 511 schools do not effectively impose a smoking policy. The data suggest that the teachers observed that their schools did not emphasize the “smoking policy” which indicates that guests and stakeholders may have violated these schools’ basic health and safety policies without being noticed or acknowledged.

Compliance is essential for smoke-free policies to be effective, and enforcement of policies covering private or outdoor places such as schools. Despite these challenges on enforcing the smoking policy, which was also noted in the study of Radó, et al., (2021), health benefits could still be seen. Smoke-free policies introduced in enclosed public areas often gain support after implementation as they become customary. Therefore, emphasizing a smoke-free policy in schools may be hard at the onset but it will be easy as time goes by. Smoking, according to Koorsen Fire and Security (2020), is also a factor in some middle and high school fires but not in elementary school fires because elementary pupils have not developed smoking habits yet. But it should also be noted that parents and guardians who will fetch their children, may also cause careless smoking and which may result in fire.

Furthermore, during accidents and abnormal occurrences such as the spread of the COVID-19 virus in schools, schools abroad such as in the US consider reopening schools after the first wave of the pandemic, policymakers and administrators need to consider how to reopen in a way that keeps students and staff safe (Hanna & Hammond, 2020). Thus, proper protocol during the situations mentioned should be in place in schools to keep school children safe and healthy during classes.
3.2.5 Health Risks Management of the FPPES in Terms of Personal Hygiene

![Figure 5](image.png)

Figure 5. Distribution of respondents on the Personal Hygiene (n= 511).

Displayed in the figure above is the frequency distribution of the health risks management of the flood-prone public elementary school in terms of personal hygiene.

As shown in the figure, in terms of health risks assessment, majority of the participants from the flood-prone public elementary schools agreed that they promote among the personnel and pupils' personal hygiene, including the risk of cross-infection. Also, most of the schools observe that they maintain clean lavatories, dental troughs, comfort rooms, et cetera and they make sure that teachers report to proper authorities contact for notifiable diseases. These favorable results signify that flood-prone public elementary schools maintain and promote personal hygiene among their personnel. Furthermore, this data entails that schools give value to maintaining cleanliness and safety among their school stakeholders.

A bit of contrary to the claims above, there is strong and growing evidence from many countries of inadequate access to safe water, sanitation, and hygiene in schools in resource-scarce settings. Putting policy into practice in these areas demands stronger links between professional sectors such as education, health, water supply, sanitation, planning, and construction (WHO, 2009). As proposed by Cutler (2013), school hygiene continues to be an important issue, with organisms such as E. coli, norovirus, and swine flu posing a risk to children’s health. Michigan Department of Education (2022) elucidated that schools can play a major role in helping to reduce or prevent the incidence of illness among children and adults in the communities. Encouraging good hand hygiene, following cleaning recommendations, and adhering to the most up-to-date mask requirements and recommendations contribute to a safe and healthy learning environment for children.

It can be noted that 3.52 or 18 participants from the FPPES do not agree that their schools make sure that the teachers report to nurses or proper authorities contact for notifiable diseases such as Influenza-like-Illness (ILI), parasitic infection, sore eyes, Tuberculosis (TB), fever, colds, measles, coughs, dental problems, etc. This is concerning since teachers or school emergency managers should have devised protocols for reporting health issues such as the ones mentioned to prevent the spread of notifiable diseases in the vicinity. Michigan Department of Education (2022) claimed that when schools report the illness to their local health department (LHD), public health specialists can assist them with disease prevention and control guidance. Thus, it is imperative that teachers should have reporting protocols when health issues at school strike.

3.2.6 Health Risks Management of the FPPES in Terms of Health Risks Assessment

Presented in the figure below is the frequency distribution of the health risks management of the flood-prone public elementary school in terms of health risks assessment.
As displayed in the figure, in terms of health risks assessment, the majority or 81.02% of the participants agreed that the schools have documents on risks assessments and 79.84% claimed that they have general requirements/rules for health risks assessment which are made available to those who need them. However, 27.98% or 143 out of 511 do not agree that their schools have specific requirements/rules for the assessment of exposure to substances hazardous to health. This indicates that most of the FPPES indeed have documents available for health risks assessment, but some schools have to design specific requirements/rules for assessment of exposure to substances hazardous to health. This is startling data that has to be addressed the soonest. This result implies that if incidences of exposure to hazardous substances occur, these schools may have concerns in dealing with them since they do not have rules in place.

In view of the data above, Alarcon, Calvert, Blondell, et al. (2005) elucidated that exposure to hazardous materials like pesticides in the school environment is a health risk facing children and school employees. Despite efforts of several organizations and laws in several states to reduce pesticide use at and around schools, pesticides continue to be used in schools. Yet, there are no specific federal requirements on limiting pesticide exposures at schools.

### 3.2.7 Health Risks Management of the FPPES in Terms of Disease Control /Prevention

Gleaned from the figure is the frequency distribution of the health risks management of the flood-prone public elementary school in terms of disease control prevention.

As viewed in the figure, in terms of disease control/prevention, 76.52% or 391 out of 455 participants of the flood-prone public elementary schools agreed that they have vaccination plans in place. Meanwhile, it can be noted that 23.48%, or 120 out of 511 participants from the FPPES have no vaccination plan in place. The absence of the school vaccination plan is attributed to schools having no authority to conduct inoculation since, during the pandemic, the task is given to the Department of Health, and the pupils in schools are quarantined for quite some time, thus leaving the schools closed with no learners around. Vaccination in schools may be implemented in the new normal but this requires much effort on the part of the teachers and the health-care providers. Utilizing rigorous methodology, Klaiman, O’Connell, and Stoto (2013) defined and learned lessons from successful LHDs when conducting school-based vaccination clinics, which can be applied to future school-based vaccination campaigns. Among these are having a relationship with local school authorities, communicating effectively with parents, and ensuring clinic logistics allowed for an easy flow of students through the vaccination process.

Due to the COVID-19 pandemic, Centers for Disease Control (CDC) offers updated considerations for mitigation strategies that K-12 school administrators can use to help protect students, teachers, and staff and slow the spread
of COVID-19 and future health threats. These updated considerations for schools are intended to aid school administrators as they consider how to protect the health, safety, and well-being of students, teachers, staff, their families, and communities (Centers for Disease Control and Prevention, 2019).

![Figure 7. Distribution of respondents on the Health Risk Assessment (n= 511).]

### 3.2.8 Health Risks Management of the FPPES in terms of Electrical Equipment and Chemical Hazards

Presented in the figure below is the frequency distribution of the health risks management of the flood-prone public elementary school in terms of electrical equipment and chemical hazards.
As shown in the figure, in terms of electrical equipment and chemical hazards, 49.51 or 253 out of 511 FPPES do not agree that their schools have a circuit breaker for each classroom or office instead per the interview, circuit breakers are shared by all classrooms in a building. This is an alarming result since a circuit breaker is a safety mechanism that would prevent the flow of electricity when an unsafe condition occurs and sharing the circuit breaker for the whole building would mean that other classes may be interrupted though only one classroom experienced overload or short circuit since switching it off means switching off the power for the whole building.

Circuit breakers are required in each classroom as they are like the heart of the electrical system. Ahamed (2019) explained that once circuit breakers are installed, it will control the sudden rise of voltage and current. There are many cases where mishap takes place and these cases will lead to severe damage to building, offices, houses, schools, industries, etc. Trusting voltage and current are not correct, though safety measures are taken, will keep people away from any accident.

Aside from circuit breakers, handling chemical hazards should also be imposed in schools. Despite those who would suggest that serious incidents involving chemical hazards in schools are isolated and rare events, the data in the study of Sigmann (2018) indicate that fires involving chemicals like flammable solvents occur all too frequently in teaching venues to be dismissed. Seeing the incidents happening in schools should highlight the magnitude of the problem to the authorities if one considers that some incidents and many near misses may go unreported.

### 3.2.9 Health Risks Management of the FPPES in terms of Waste and Sharp Disposal

Displayed in the figure below is the frequency distribution of the health risks management of the flood-prone public elementary school in terms of waste and sharp disposal.
As seen in the figure, in terms of waste/sharp disposals, the majority or 88.65% or 406 out of 453 participants from FPPES agreed that their schools have a general waste/rubbish disposal system. This indicates that the schools indeed have a solid waste management system in place. But it is alarming to note that 23.87% or 117 out of 511 flood-prone public elementary schools did not agree that they have hazardous wastes/rubbish disposal systems such as batteries, paints, scraps from construction activities, tree studs, etc. This means that the teachers or other school personnel may experience difficulty in disposing of their hazardous waste system and which may implicate that they may have disposed of their waste and sharps improperly. Hence, an in-place system of hazardous waste and sharp disposal should be established and imposed.

In view of the data above, EPA gov. (2022) explained that improper storage of waste materials might cause spills, leaks, fires, and contamination of soil and drinking water. To encourage hazardous waste recycling while protecting health and the environment, EPA developed regulations to ensure recycling would be performed in a safe manner.

Furthermore, Duncan, Garg, and Chiu (2019) stated that there is a high quantity of discarded sharps that are present in children areas like playgrounds in schools and other public places. While adults do field sweeps, there are instances where they do not discover sharps or children go to such places unsupervised. Educating children with a standardized procedure on what to do when they encounter a sharp, it reduces their chances of a needle stick injury and their safety.

3.2.10 Health Risks Management of the FPPES in terms of Water Supply

Shown in the figure below is the frequency distribution of the health risks management of the flood-prone public elementary school in terms of water supply.
As browsed in the figure, in terms of water supply, 98.24% or 502 of the participants from FPPES agreed that their schools follow the food safety standards. This is a favorable finding since it indicates that the schools indeed see to it that children and the personnel are afforded with safe and healthy foods. However, it is disturbing to find out that out of the 511 participants from FPPES, 42.27% or 216 of them claimed that they have not subjected their water to potability tests. This result suggests that the water that the school stakeholders used and drank in schools may be unsafe since there are no tests suggesting otherwise. Thus, schools have to take measures to conduct such tests on their water supply.

The same finding was found by Rahman, Hashem, and Nur-A-Tomal (2016) in their study where they found that drinking water parameters of a certain district in Bangladesh did not meet the requirement of the World Health Organization drinking water quality guideline or the Drinking Water Quality Standards of the country. This poses a health threat among the learners since according to Lawani, et, al. (2014), the lack of potable water and sanitation facilities in schools may increase the absenteeism of both pupils and teachers through illness. Regarding sanitation facilities, Lawani’s findings revealed that of that more than half of the population in developing countries lack access to basic sanitation facilities which include excreta disposal facilities. The information implies that it is not only the FPPES in Caraga Region who face the same issue on water and sanitation, the literature shows that such issues are prevalent worldwide.

3.3 Challenges encountered by the FPPES in the conduct of health risk management practices.

Based on the key informant interviews conducted, three challenges were identified by the informants from the flood-prone elementary schools and they include diseases acquired during and after the flood, pest infestations during and after the flood, and lack of comfort rooms with clean water supply.

The spread of diseases such as respiratory, skin, mosquito-causing, and parasitic worm illnesses was among the health issues shared by the informants. This issue came out as School Head 1 shared:

"Mga sakit sa mga bata, hilanat, kalibanga, sip-on ubo, skin disease; hygiene problem: no clean CR, lack of drinking water are the problems we encountered in our school. Also, Schistosomiasis disease is also rampant in the area, especially during a flood." (Diseases like fever, diarrhea, colds, coughs, skin diseases, hygiene problems, dirty comfort rooms, and lack of drinking water are the problems encountered by schools. Schistosomiasis disease is also rampant in the area, especially during a flood).

Also, School Head 10 stated:

Figure 10. Distribution of respondents on the Food and Water Supply (n= 511).
“After the flood, the stagnant water will go to the areas in the school and the school is prone to Dengue, and skin diseases, dili malikayan ang mga bata mag dula sa tubig mao prone sila sa kani na mga disease.” (After the flood, the stagnant water is in different areas of school and schoolchildren are prone to dengue and skin diseases since they tend to play with water hence they are prone to these diseases.)

Pest infestations are also noted as one of the issues encountered by the schools during and after the flood. Rats, snakes, and frogs were among the pests that housed the schools. This issue is manifested by Teacher 23 who mentioned:

“Mapuy-an mi diri og mga baki, ilaga, ug halas kung mo-subside na ang baha. Ining panghinlo namo kay mag-ignay gyud mi kay delikado man ni na mga pests hilabi na ang mga halas.” (After the flood water subsides, frogs, rats, and snakes housed in our schools. When we clean after the flood, we are careful because pests are dangerous, particularly snakes).

Lastly, the lack of comfort rooms with clean water supply was among the issues that were identified during the interview. Although support from NGOs and local government exists among the schools, they are not sustained. This was manifested in the statement of Teacher 51 as she shared:

“Save the Children program donated deep wells, pero wala na sustain, they changed to other recipient school. They also donated water tanks, but it is also used by the community, naguba na karon.” (Save the Children Program donated deep wells to our school, but it was not sustained. They looked for another recipient school and they left water tanks. The tanks were also used by the community, but they are destroyed now).

Teacher 42 also mentioned:

“Infra need of the schools include additional CRs. Some of the schools have no CR.” (The school need infrastructure, especially additional comfort rooms. Some of the schools have no CR).

In view of the identified health and safety-related issues encountered by the flood-prone schools above, FEMA (n.d.) elucidated that existing flood-prone schools are exposed to damages, and such include site damage; structural and nonstructural building damage; destruction or impairment of service equipment; loss of contents; and health and safety threats due to contaminated floodwater.

The recognized immediate health effects of flooding include injury, drowning, skin infections, worsening asthma, outbreaks of gastroenteritis and infectious diseases, and respiratory infections (Okaka & Odhiambo, 2019; Bich et al. 2011; Baxter et al. 2001).

To counter the identified health issues, the World Health Organization (2020) proposed that since floods can potentially increase the transmission of water- and vector-borne diseases, such as typhoid fever, cholera, malaria, and yellow fever, among others, it is important for people to know the risk and protect the water sources. It has to be noted that the most common risks associated with flooding are the contamination of drinking-water facilities, and standing water, which can be a breeding site for mosquitoes, bring chemical hazards, and cause injuries.

CONCLUSIONS AND RECOMMENDATIONS

The flood-prone elementary schools are mostly located in far-flung rural barangays which indicates that there might be a concern regarding the location where most schools were built. Also, most of the flood-prone schools are small schools which signifies that they have less MOOE compared to the central schools, and which further entails that most of the schools may lack or have no budget for proper drainage systems to prevent flooding. The schools located on plains, especially near rivers are vulnerable to floods and this is understandable since when rain falls, the surface runoff can move very quickly from mountainous or hilly areas to low-lying areas making the low-lying areas more prone to floods thus called “relief. “Aside from “relief,” urbanization is also a factor in why plains are more vulnerable to floods.
It can be noted that the schools have their health and safety policies in place and the school heads made sure that the policy is regularly monitored, implemented, and they see to it that they have included minimum health guidelines in their respective school policies.

The teachers in the flood-prone public elementary schools recognize the lack of regular health risk management training that ought to be conducted by the schools; a startling observation that may put all schools’ stakeholders at risk if not properly addressed. Also, they acknowledge the absence of fire extinguishers and health and safety devices which are essential to disaster preparedness and prevention. This is an alarming observation on school housekeeping; thus, it should be addressed properly to heighten the level of health and safety risks management in schools thereby reducing the occurrence of risks and disasters among the school stakeholders. Furthermore, the teachers observe that their schools do not emphasize the “smoking policy” which indicates that guests and stakeholders may have violated these schools’ basic health and safety policies without being noticed or acknowledged.

Evidence shows that the schools maintain and promote personal hygiene among their personnel. Furthermore, the schools give value to maintaining cleanliness and safety among their school stakeholders. Also, most of the schools have documents available for health risks assessment but some of them have to design specific requirements/rules for assessment of exposure to substances hazardous to health. This is a startling issue that has to be addressed the soonest since this implies that if incidences of exposure to hazardous substances occur, these schools may have concerns in dealing with them since they do not have rules in place.

The absence of the school vaccination plan is attributed to schools having no authority to conduct inoculation since, during the pandemic, the task is given to the Department of Health, and the pupils in schools are quarantined for quite some time, thus leaving the schools closed with no learners around. Vaccination in schools may be implemented in the new normal but this requires much effort on the part of the teachers and the health-care providers.

Many schools have buildings without their own circuit breakers. This is alarming since a circuit breaker is a safety mechanism that would prevent the flow of electricity when an unsafe condition occurs. Sharing the circuit breaker for the whole building would mean that other classes may be interrupted though only one classroom experienced overload or short circuit since switching it off means switching off the power for the whole building. Aside from circuit breakers, handling chemical hazards should also be imposed in schools.

The schools indeed have a solid waste management system in place. However, some teachers or other school personnel may have experienced difficulty in disposing of their hazardous waste system and which may implicate that they may have disposed of their waste and sharps improperly. Hence, an in-place system of hazardous waste and sharp disposal should be established and imposed. When it comes to water supply, evidence shows that the water that school stakeholders use and drink in schools may be unsafe since there are no tests suggesting otherwise. Thus, schools have to take measures to conduct such tests on their water supply. The information implies that it is not only the FPPES in Caraga Region who face the same issue on water and sanitation, the literature shows that such issues are prevalent worldwide.

Based on the key informant interviews conducted, three challenges were identified by the informants from the flood-prone elementary schools, and they include diseases acquired during and after the flood, pest infestations during and after the flood, and lack of comfort rooms with clean water supply. The spread of diseases such as respiratory, skin, mosquito-causing, and parasitic worm illnesses was among the health issues shared by the informants.

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