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Online Typhoon Preparedness and Mitigation Program: Fitness-for-Purpose Process

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Abstract. Awareness, education, preparedness, predictive, and early warning systems can assist communities in mitigating the disruptive consequences of natural disasters like typhoons. Preparation for and mitigation of typhoons are vital to disaster risk management because they provide accurate and pertinent knowledge, skills, and attitude before, during, and after typhoon processes. This article summarizes an innovative, evidence-based strategy for creating an online typhoon preparedness and mitigation program anchored on Macroergonomics, Typhoon Adaptation, Typhoon Awareness, Risk Perception, and Perceived Preparedness. Moreover, the program was developed from the adapted and contextualized Community Disaster Preparedness Handbook, Weather Underground, the Tropical Cyclone and Typhoon Action, and the Philippines' National Risk Reduction and Management Plan. It examines potential future directions for analyzing, evaluating, and documenting the fitness-for-purpose procedure.

Keywords. Climate Change, Disaster Risk Management, Natural Disasters, Typhoons

1. Introduction

The impacts of climate change are enormous worldwide (Balogun et al., 2020). Its adverse effects include extreme weather, air pollution, health concerns, rising sea levels, warmer, more acidic oceans, and the endangerment of ecosystems (NRDC & Turrentine, 2021). Moreover, climate change effects such as typhoons substantially impact human life (Vos et al., 2020).

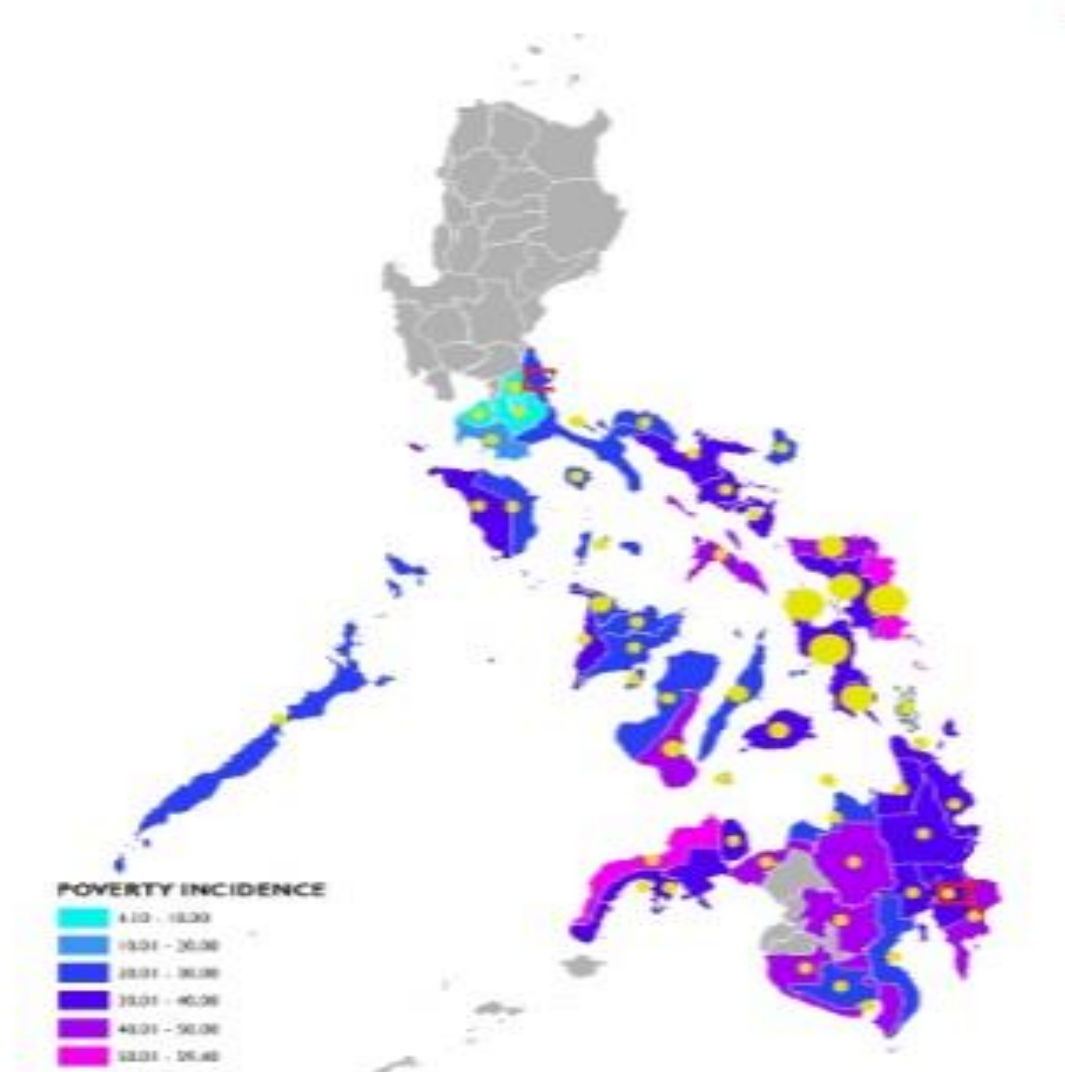
As a result of its location in the Western Pacific typhoon belt and the Pacific Ring of Fire, the Philippines are frequently struck by several natural disasters. Every year between June and November, typhoons often cause flooding, landslides, and storm surges, resulting in the loss of lives, homes, and livelihoods (Swarnali Chakma, Akihiko Hokugo, Md Atikur Rahman, 2022; USAID, 2020). Moreover, the Philippines are susceptible to the effects of climate injustice: provinces with the lowest socio-economic resilience and vulnerable populations, such as those with disabilities, are disproportionately impacted by extreme risks (Anticamara & Go, 2017).

An average of 20 typhoons land in the Philippines yearly (Acosta et al., 2016). The most catastrophic typhoons generated floods and landslides, which in turn caused severe loss of buildings and livelihoods and injuries and fatalities of people in the country since 1990. Not just the strength of typhoons but also the loss and damage have been increasing in the recent two decades. For example, the most devastating typhoon (i.e., Mike) that hit the Philippines in the 1990s harmed 5.5 million people and damaged 50,000 dwellings (Balogun et al., 2020). In 2012, Bopha was considered a 'super typhoon' with a Category 5 typhoon, the highest grade under the Saffir-Simpson Hurricane Wind Scale (Almazan et al., 2019). The winds had an average speed of 185 km/hr, and gusts reached 210 km/hr. It was considered the most powerful typhoon of over a century until 2012, affecting more than 6 million people, killing at least 1,000 people, damaging more than 200,000 houses, and destroying about 1 billion US\$ of agricultural products, infrastructure, and private properties in Eastern Mindanao (International Knowledge Centre for Engineering Sciences and Technology, 2019).

Super typhoon Rai, locally known as Odette, made its first landfall on the Visayas and Mindanao Islands on December 16, 2021, bringing severe rainfall, powerful winds, floods, and storm surges. Overnight, the storm left thousands of families with damaged homes. Some were even rendered homeless and relocated, jeopardizing some of the tremendous social and economic improvements made since recovering from the effects of the COVID-19 pandemic two years ago. According to an OXFAM assessment (Edjossan-Sossou et al., 2020; Hechanova et al., 2018), preparations and early warnings saved many lives, and enormous relief efforts had done well to aid millions of people to survive and recover. However, the implications of typhoon go beyond the immediate destruction because it has also pushed millions of poor people into deepening debt and destitution - rendering them more vulnerable to the next disaster (Anticamara & Go, 2017).

Moreover, mitigating or lowering the danger of natural hazards, such as typhoons that threaten life, property, social and economic activity, and natural resources, is the definition of disaster mitigation (Emergency Management, 2021). Awareness, education, preparedness, predictive, and warning systems can assist communities in mitigating the effects of a natural disaster. Post-disaster studies continue to demonstrate that community investment in disaster mitigation yields quick returns in the case of a disaster (Dutta et al., 2015; SDG-Disaster Risk Reduction, 2021). However, few studies on pre-disaster intervention were undertaken (Almazan et al., 2019; Holden & Marshall, 2018). Thus, this program fills a crucial void.

Figure 1. Location of the Regions that are mainly hit by Typhoons in the Philippines



Source: OML Center (<http://www.omlopezcenter.org>)

Purpose

To support and echo the National Disaster Risk Reduction and Management Council (NDRRMC) guidelines, an online typhoon mitigation program oriented towards the general public was developed to meet the rising demand. Moreover, improving the knowledge, awareness, and skills of local government officials and residents will play a crucial role in mitigating and reducing damages from typhoons, which are becoming more frequent and more devastating due to climate change due to global warming. Therefore, developing online educational materials for this purpose and evaluating the results is vital.

1.2 Advantages of Online Typhoon Mitigation Program over Traditional Offline Methods

An online typhoon mitigation program can provide accessibility, real-time updates, interactive learning, cost-effectiveness, greater reach, flexibility, and data tracking advantages over traditional offline methods (Hechanova et al., 2018; Holden & Marshall, 2018; International Knowledge Centre for Engineering Sciences and Technology, 2019). With an online program, participants can access information and instructions from anywhere with an internet connection, learn at their own pace and schedule, and potentially reach more people (Almazan et al., 2019). Online programs can also track participants' progress, collect program evaluation and data improvement, and be more cost-effective than traditional offline methods (Gumasing et al., 2022). Overall, an online typhoon mitigation program can be a valuable tool for reducing the impact of typhoons on vulnerable communities.

Table 1 Advantages of Online Platform compared to Traditional Methods

Advantages	Function
1. Accessibility	An online typhoon mitigation program can be accessed from anywhere with an internet connection. This means that people in remote or hard-to-reach areas can still benefit from the program.
2. Real-time updates	With an online program, real-time updates can be made, meaning that participants can receive the most up-to-date information and instructions.
3. Interactive learning	Online programs can incorporate multimedia, interactive quizzes, and other engaging learning tools to keep participants engaged and facilitate better learning.
4. Cost-effective	Online programs can be more cost-effective than offline methods since there is no need for physical materials or in-person training.
5. Greater reach	An online program can potentially reach a larger number of people compared to offline methods.
6. Flexibility	Participants can learn at their own pace and on their own schedule, which can be especially useful for those with busy schedules or limited availability.
7. Data tracking	Online programs can track participants' progress and collect data on how effective the program is in helping to mitigate the effects of typhoons. This can be useful for program evaluation and improvement.

1.2 Conceptual Framework

Disaster Risk Reduction (DRR) is a crucial part of social and economic development and is required for sustainable progress (SDG-Disaster Risk Reduction, 2021). As the first comprehensive worldwide framework for disaster risk reduction, the Yokohama Strategy and Plan of Action for a Safer World (1994) acknowledged the connection between sustainable development and Disaster Risk Reduction.

The 2030 Agenda for Sustainable Development of the United Nations recognizes and emphasizes the urgent need to reduce disaster risk. There are particular opportunities to achieve Sustainable Development Goals through lowering disaster risk and references to the Third United Nations Conference on Disaster Risk Reduction (Sendai Framework) conclusions. For instance, reducing the exposure and vulnerability of the poor to natural disasters and building infrastructure that is resistant to such events. Even though disaster risk reduction is not explicitly stated, several SDGs and targets, such as disaster mitigation programs and regulations, can assist in reducing disaster risk and enhance resilience (Emergency Management, 2021; SDG-Disaster Risk Reduction, 2021; R. T. H. Villarino, Villarino, Temblor, Bernard, et al., 2022; R. T. H. Villarino, Villarino, Temblor, Chabit, et al., 2022).

The Philippine Disaster Risk Reduction and Management (PDRRM) Act, or Republic Act 10121, was signed into law on May 27, 2010, establishing the requirement to "adopt a disaster risk reduction and management approach that is holistic, comprehensive, integrated, and proactive in reducing the socio-economic and environmental impacts of disasters, including climate change, and promote the involvement and participation of all sectors and all stakeholders concerned, at all levels."

The Act requires the development of policies and plans, as well as the implementation of actions and measures, for all aspects of disaster risk reduction and management, including good governance, risk assessment and early warning, knowledge building, and awareness-raising, reducing underlying risk factors, and preparedness for effective response and early recovery (Asian Disaster Reduction Center, 2021; Takashi Sugiyama, Katsuya Yamori, 2022).

Disaster preparedness is a collection of measures to ensure that the resources necessary for an effective response are available before a crisis occurs or can be rapidly obtained after a disaster strikes (Gumasing et al., 2022). According to Moe and Pathranarakul (Lin Moe & Pathranarakul, 2006), the number of individuals dying in a disaster can be significantly reduced if preparations are made beforehand. However, most individuals pay little attention to disaster planning and are ignorant of its significance until an emergency occurs. Consequently, the objective of disaster risk reduction is to alter human behavior. This necessitates using suitable ways to encourage individuals to change their behavior to reduce risks and enhance their capacity to respond to disaster consequences (Wang & Tsai, 2022). Critical to typhoon preparation (Chunlan Guo, Timothy Sim, Hung Chak Ho, 2020) are beliefs regarding the extent to which preparation and adaptability are required to avoid the danger and hazards of a typhoon. Given the frequency of typhoons in the Philippines, mitigating the risks and threats they provide is essential. Therefore, future research on policy development should concentrate on enhancing the community's preparedness for typhoons and knowledge of disaster risk (Gumasing et al., 2022).

Several protective behavior theories, including the Theory of Planned Behavior, have been created to explain the relationship between behavioral characteristics and disaster risk reduction (TPB). According to the TPB, attitude, subjective standards, and perceived behavioral control impact an individual's behavioral intentions (Ryan & Carr, 2010). Nonetheless,

understanding and capturing an individual's views are a problem for TPB measurement, a vital aspect during a disaster (Wang & Tsai, 2022).

Protection Motivation Theory (PMT) is another model used to define individuals' responses to perceived dangers; it employs threat and coping appraisal as motivated protection chances during a crisis (Heidenreich et al., 2020). However, the model does not account for all environmental and cognitive variables, such as the influence of social norms on individuals' adaptive behavior during disasters (Ong et al., 2021).

The Social Cognition Theory is another model used to predict individuals' behavior in response to a hazard, such as a natural disaster (SCT). This model considers the unique manner in which individuals acquire and sustain behavior and the social context in which individuals behave during a disaster (Wong & Monaghan, 2020). In this paradigm, it is assumed that cognitive, affective, and physiological qualities, behavioral patterns, and environmental events interact and impact one another.

People's desire to prepare in the context of disaster preparedness is a result of their cognitive and affective reactions to a natural hazard, according to Lee and Lemyre (Lee & Lemyre, 2009). However, except for references to prior experience, SCT theory does not emphasize emotion or motivation. As a result, these issues receive less consideration when evaluating studies connected to natural disasters.

Numerous behavioral theories have been produced as a strategic foundation for promoting the adoption of disaster preparedness measures. However, most models focused solely on cognitive and psychological variables influencing the adaptive behavior of individuals during a disaster. A comprehensive evaluation of the human aspects and ergonomic concerns affecting disaster management is essential for guaranteeing an efficient response during a major disaster. Consequently, additional study on disaster preparedness utilizing ergonomic domains such as physical, cognitive, and macro-ergonomics is imperative.

Ergonomics can assist in disaster preparedness at the system, organizational, community, and individual levels. Ergonomics also offers analytical tools and methodologies for identifying elements of resilient performance and practical disaster-related adaptations (Sasangohar et al., 2020). In addition, recent research has proved the importance of ergonomics approaches for facilitating proactive risk assessment and enhancing reaction readiness. Gurses et al. (Gurses et al., 2020) analyzed multiple system components to identify failure modes and hazards associated with tasks, physical environments, tools, and technologies and to identify confusing instructions, protocols, and procedures during disaster ergonomics.

Ergonomics addresses a work system's design's physical, cognitive, and macro-ergonomic components. Physical ergonomics is concerned with injury prevention through workplace design and evaluation. It explores how people's bodies interface with the devices they use daily. Cognitive ergonomics is centered on human performance inside a system. It examines the mind's capacity to process and relate information. In contrast, macro-ergonomics focuses on designing organization-system interactions by disseminating the necessary knowledge and methods for enhancing work systems.

Ergonomics also contributes to the construction of a safe and sustainable work system by addressing the interdependence of interpersonal, technological, and environmental variables and the possible effects of design changes on all system components. Since hazards interact with physical, social, economic, and ecological vulnerabilities to create these risks, ergonomics plays a crucial role in disaster preparedness.

Moreover, successful disaster preparedness approaches necessitate a comprehensive comprehension of the public's awareness of natural disaster risks (Shi et al., 2015). In recent

years, numerous studies have focused more on the public's awareness of natural disasters and risk perception (Gumasing et al., 2022). In disaster preparedness and response, governments, organizations, community groups, and individuals must possess the information, actions, and competencies necessary to foresee appropriately, respond to, and recover from potential, imminent, or actual hazardous events and situations (Chan & Ho, 2018).

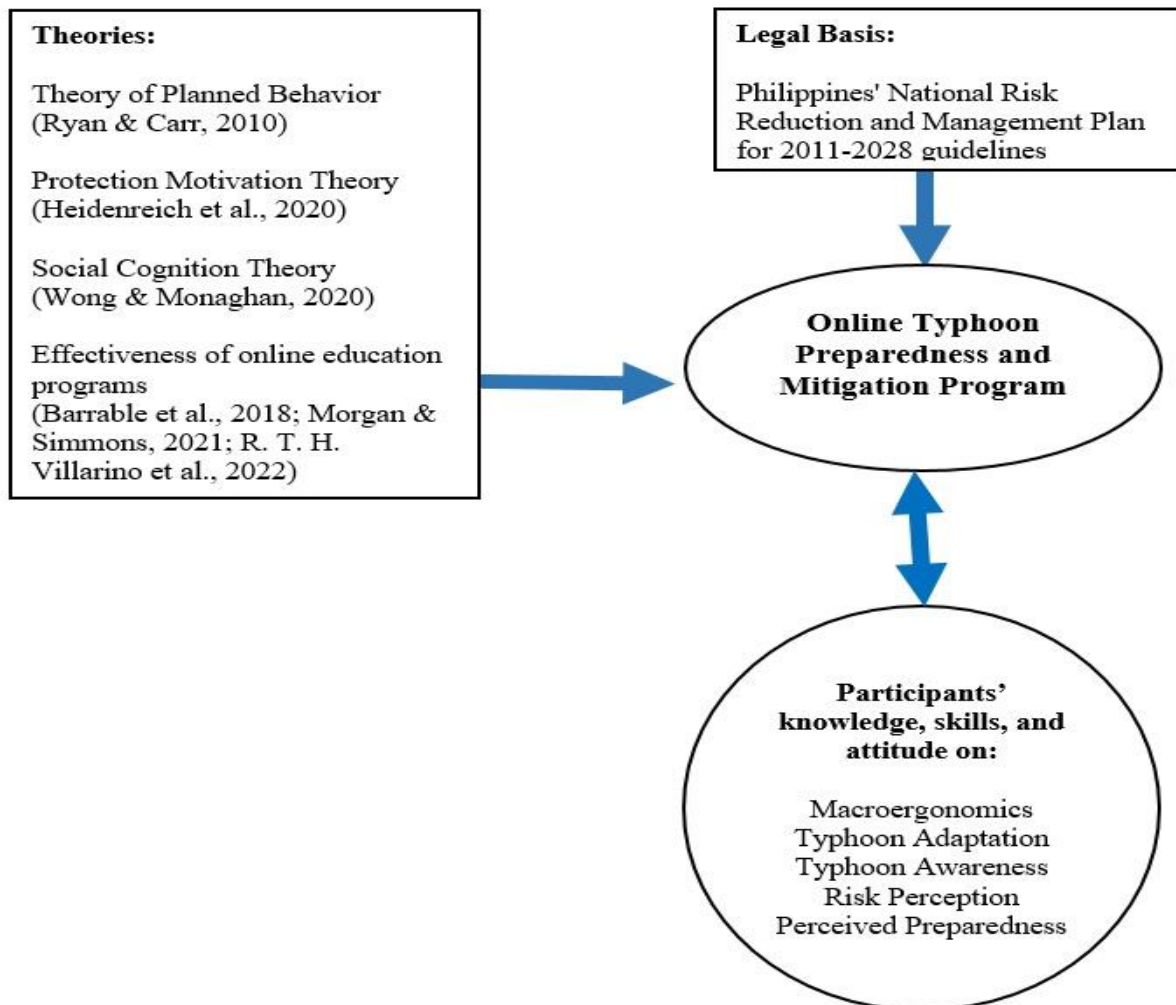
Multiple studies have emphasized the importance of ergonomics in emergency preparedness. In the U.S., Sasangohar et al. (Sasangohar et al., 2020) investigated the challenges significant to human aspects and ergonomics in disaster management. Nonetheless, the study focuses on the unique issues of disaster management during the reaction and recovery to the COVID-19 epidemic. In Australia, Horberry et al., cited by Gumasing (Gumasing et al., 2022), reported analogous studies in mining emergency management, stressing the contributions of human aspects and ergonomics to help develop a safe and efficient mining disaster management system. However, the study solely examined the difficulties connected with coal mine emergencies. In London, an evaluation of the ergonomics of emergency management had been conducted, but only concerning offshore oil platforms. In response to disaster preparation and management, four major areas of ergonomics were identified: safety management, interface design, training, and human behavior (Mallick et al., 2011).

Furthermore, every year hundreds of people are murdered by natural disasters such as typhoons. Rescue crews and assistance organizations rely on technology to undertake rescue missions and assist the injured. Over time, new technologies such as online media have been created to enhance the efficiency and efficacy of first responders, expanding technology's role in disaster aid relief and mitigation (Eastern Kentucky University, 2016).

When other sources of communication are rendered inaccessible by a natural disaster, social media will still exist and be readily available. If everything else fails — power, landlines, energy, computers, etc. — individuals still have cell phones with internet connection and downloadable programs. As a result, social media has gained importance in disaster preparedness, recovery, and relief efforts (Adjusters International, 2022).

Although there are numerous benefits to utilizing online media during a disaster (Adjusters International, 2022; Eastern Kentucky University, 2016), there are also risks. Rather than receiving verified information from official sources, anyone can now report on anything at any time. This indicates that not all information is confirmed before being disseminated to the public, resulting in the dissemination of false information. In this connection, providing correct and accurate information through education is a crucial component of a comprehensive typhoon mitigation program; it equips participants with the knowledge, skills, and attitude they need to be resilient during a typhoon or other natural disasters (Almazan et al., 2019).

Figure 2. Conceptual Framework



2. Materials

Development and Evaluation

The World Health Organization defines a disaster as "a serious disruption of a community's or society's functioning, resulting in widespread human, material, economic, or environmental losses that exceed the ability of the affected community or society to cope with its own resources, necessitating a request for external assistance at the national or international level" (WHO, 2019). Natural disasters cannot be prevented, but their life-threatening effects can be prevented or mitigated.

Consequently, local government officials who serve as community leaders and are accountable for Disaster Risk Reduction Management (DRRM) efforts must be knowledgeable about DRRM. Each of the four thematic areas of the National Disaster Risk Reduction Management Plan of the Philippines has its own set of objectives. Disaster prevention and mitigation, disaster response, and disaster rehabilitation and recovery are the four categories. The strategy aims to strengthen the capacity of national and local governments to make Filipino communities safer and more resilient (Varona et al., 2017). As a result, knowing the mandate and being willing to implement it may benefit communities by lowering the destructive effects of disasters and enhancing their capacity to respond in the case of a disaster.

In compliance with Republic Act 10121, the council established the National Disaster Risk Reduction and Management (NDRRM) Framework in June 2011, intending to create "Safer, Adaptive, and Disaster-Resilient Filipino Communities for Sustainable Development" (Asian Disaster Reduction Center, 2021). The NDRRM Framework reflects a paradigm change toward a proactive and preventive strategy in disaster management. According to the conceptual illustration, resources invested in disaster prevention, mitigation, readiness, and adaptation to climate change will be more effective in accomplishing the objective. The framework demonstrates that mitigating the potential effects of existing disaster and climate risks, preventing hazards and minor emergencies from becoming disasters, and being prepared for disasters will substantially reduce the number of fatalities and damage to social, economic, and environmental assets. It also underlines the significance of competent and coordinated humanitarian assistance and disaster response to save lives and protect the most vulnerable individuals during and after a disaster. In addition, improved reconstruction after a disaster will contribute to long-term growth following the recovery and reconstruction process (Badoc-Gonzales et al., 2021).

Typhoons can cause destruction hundreds of miles inland from the shore. They are capable of generating gusts of 155 mph (Takenouchi et al., 2018; Wunderground, 2021). Additionally, it can cause storm surges near the coast and substantial floods due to heavy rainfall. Floods and flying debris induced by strong winds are anticipated to be lethal, and devastation results from these meteorological events. Slow-moving typhoons that make landfall in mountainous regions are notorious for their precipitation output. Extreme precipitation can cause landslides and mudslides. Intense precipitation can produce flash floods (Kim et al., 2015). Consequently, the implementation of emergency management is vital for typhoon mitigation.

The foundation of emergency management is disaster preparedness. The efforts to reduce the effects of natural disasters on persons and property are never-ending. Among the mitigation efforts are removing homes from floodplains, constructing earthquake-resistant bridges, developing and enforcing appropriate building regulations to protect property from typhoons, and more (Anticamara & Go, 2017). According to the definition of mitigation, it is "a sustained action that reduces or eliminates the long-term threat to people and property from natural hazards and their effects." It refers to the ongoing federal, state, municipal, and individual efforts to reduce the impact of natural disasters on our families, homes, communities, and economy (Hechanova et al., 2018).

Implementing disaster mitigation policies and programs can reduce the number of communities affected by natural disasters (NRDC & Turrentine, 2021). Using mitigation techniques, for instance, we can reinforce our homes to protect better our families and assets against natural disasters such as floods, earthquakes, hurricanes, and other natural disasters. They can aid enterprises and industries in preventing facility damage and maintaining operations during a crisis. After a disaster, hospitals, fire stations, and other essential service facilities can deploy mitigation measures to remain open or reopen more quickly. Moreover, mitigation activities can reduce disaster-related losses and suffering, resulting in a lesser demand for funds and other resources (Emergency Management, 2021).

In typhoon mitigation, knowledge, attitude, and behavior are crucial (R. T. Villarino & Villarino, 2022; Zhang et al., 2017). Effective risk communication approaches necessitate knowledge of the public's awareness of natural disaster risks (Shi et al., 2015). Recent research has focused extensively on the public's comprehension and perception of natural disaster risk. According to a study by Thomas et al. (Thomas, 2014), people in typhoon-prone regions had a

higher disaster risk perception than the overall population. Furthermore, coping practices were associated with individuals' risk perception and preparedness knowledge (Kabir et al., 2016). Knowledge changes residents' attitudes and risk perceptions, impacting their coping behaviors (Zhang et al., 2017). Many people know about impending typhoons but are unaware of their intensity or predicted landfall location (Mahdaviazad & Abdolahifar, 2014). There is also a dearth of comprehension regarding cyclone preparation (Thomas, 2014; Varona et al., 2017).

Residents' awareness and coping behaviors after a typhoon disaster have been connected to socio-demographic characteristics, particularly educational status, and economic situations (Haque et al., 2012). Rural populations are especially vulnerable to typhoon disasters because they reside in relatively underdeveloped and destitute areas; their primary concern is the impact on their livelihood, which may result in inadequate protection measures (Zhang et al., 2017). Rural dwellers have a lesser risk perception and awareness of typhoons than their metropolitan counterparts, making them vulnerable (Richard Eiser et al., 2012). As a result, the government developed a customized plan based on a greater understanding of rural areas' risk perceptions and knowledge. Additionally, it is necessary to investigate the unknown factors that influence how rural populations cope (Shi et al., 2015).

It has been noted that the KAP gap (knowledge–attitudes–practices gap) hinders rural inhabitants' ability to apply practical adaptation measures (Thomas, 2014; R. T. Villarino, Villarino, Temblor, Bernard, et al., 2022). People may be aware of the coming disaster, but their desire to take preventative steps may be influenced by a diminished risk perception (Matyas et al., 2011). The vast majority of people in disaster-prone areas know that they should be prepared, yet evidence indicates that only a tiny fraction do so. Although residents generally felt ready for a typhoon disaster, it was determined that preparation was insufficient in some instances (Varona et al., 2017). Even people who have experienced a typhoon before may not have taken the necessary precautions, hence increasing population susceptibility (Zhang et al., 2017).

Strengthening the community's planning and methods for typhoon mitigation can give accurate, relevant, and actionable instructions for typhoon mitigation. The spread of knowledge begins in every society. As a result, the community should prioritize education on disaster mitigation, such as typhoons, so that the world can effectively address the abovementioned challenges.

Validation of the Typhoon Mitigation Program

Three specialists assessed the typhoon mitigation program (one university professor, disaster risk management expert, and nurse). The online typhoon mitigation program outline was initially sent to a university professor for review and possible amendment based on the topic's public interest, the content's relevance, and the information's ability to contribute to existing knowledge.

Minor alterations for enhancement were implemented. The revised document was sent to the expert in disaster risk management and the nurse for further revisions. A series of online meetings were held to discuss their concerns, followed by implementing their recommendations. The meetings of three experts and the researcher center on the inputs to be provided to the participants and the questionnaire questions. After applying the experts' comments, these three experts authorized the implementation of the online typhoon mitigation.

The approved topics includes: 1. The Rationale and Significance of the Typhoon Mitigation Program; and 2. Community Disaster Preparedness. 3.a. Pre-typhoon Operations (i.e., preparing an emergency kit, basic first aid, securing food, flashlights, and battery-operated

transistor radio), 4. Tropical Cyclone and Typhoon Action Plan Checklist. 3.b. During Typhoon Procedures (i.e., securing a safe place and avoiding things during the typhoon), 3.c. Post-disaster Procedures (i.e., preventing communicable diseases post-disaster scenarios, promoting health and well-being, and "bouncing back").

Online Typhoon Preparedness and Mitigation Program

The online typhoon mitigation program was created using the Communicable Disease Control Health Education Curriculum Analysis Tool (HECAT) and is based on Republic Act 10121 or the Philippine Disaster Risk Reduction and Management (PDRRM) Act. (Varona et al., 2017). The approved program topics are based on guidelines from the adapted and contextualized Community Disaster Preparedness Handbook, Weather Underground, and the Tropical Cyclone and Typhoon Action Plan by the Liberty Specialty Markets, as well as the Philippines' National Risk Reduction and Management Plan for 2011-2028.

In addition, the online typhoon mitigation program intends to give participants knowledge regarding the rationale and significance of a typhoon mitigation program and to discuss correct, relevant, and contextualized pre-, during-, and post-typhoon procedures (Table 2). Before the program begins, the participants will be notified that their participation is fully voluntary and free of coercion. They will also have sufficient time to determine whether or not to participate. If they have any questions, they will be instructed to email the principal investigator at any time. In addition, they will be notified that the data collected will be used exclusively for research.

The researcher will deliver four educational sessions with the assistance of a co-researcher through Zoom. During Zoom® instructional meetings, teaching strategies such as focus group discussions and dialogue sessions will be utilized. There will be PDF brochures and Powerpoint® slides available. Duration is between 45 - 60 minutes—one session per week. The schedule will be determined by the participants' agreed-upon date and time.

Individual Reflection Guides will be utilized to ensure that participants are implementing typhoon mitigation-based strategies. The guide is a detailed reflection tool that will aid participants in applying the study findings to their personal contexts. This document will be used to record their insights from the session activities, subjective evaluations, and reflection questions throughout the study. In addition, the guide will act as a permanent record of their education program learning and thoughts.

Table 2. Workplan of the Online Typhoon Preparedness and Mitigation Program

Objectives	Target Activities	Target Accomplishment
Orientation	<ul style="list-style-type: none"> • Orientation to the structure of the session • E-signing the informed consent • Completing the study instrument pre-typhoon mitigation program 	<p>Signed Informed Consent Form from the participants.</p> <p>A completed study instrument pre-typhoon mitigation program</p>
Start of the Online Typhoon Preparedness and Mitigation Program	<p>Lectures and exercises (synchronous and asynchronous) that will increase knowledge and improve practices and attitudes about typhoon mitigation.</p> <p>The 4-month typhoon mitigation program is based on the adapted and contextualized from the Community Disaster Preparedness Handbook, Weather, the Tropical Cyclone and Typhoon Action Plan by the Liberty Specialty Markets, and the Philippines' National Risk Reduction and Management Plan for 2011-2028 guidelines.</p> <p>Topics include:</p> <ol style="list-style-type: none"> 1. Rationale and significance of typhoon mitigation program 2. Community disaster preparedness 3.a. Pre-typhoon procedures (i.e., preparing an emergency kit, basic first aid, and securing food, flashlights, battery-operated transistor radio) 3.b. During typhoon procedures (i.e., securing a safe place and things to avoid during the typhoon). 3.c. Post-disaster procedures (i.e., avoiding communicable diseases post-disaster scenarios, promoting health and well-being, and 'bouncing back') 4. Tropical Cyclone and Typhoon Action Plan Checklist 	<p>Participants are interviewed for their learning insights after the PowerPoint presentation.</p> <p>All participants are instructed on how to receive support during the entire course of the program.</p>
Evaluation	Reviewing the previous typhoon mitigation program sessions.	A completed study instrument post-typhoon mitigation program.

Fitness for Purpose

The content of the typhoon mitigation program is accessible at the participants' convenience. The research instrument was adapted from the study of Gumasing et al. (Gumasing et al., 2022) on Determining Factors Affecting the Perceived Preparedness of Super Typhoon: Three Broad Domains of Ergonomics Approach. The instrument has five sections: Macroergonomics, Typhoon Adaptation, Typhoon Awareness, Risk Perception, and Perceived Preparedness, and is based on the National Risk Reduction and Management Plan for 2011-2028 of the Philippines. Part one focuses on the participants' socio-demographic information regarding age, sex, educational attainment, and socio-economic levels. Part two consists of questions about the participants' perception of their knowledge, skills, and attitude toward

typhoon mitigation in terms of Macroergonomics, Typhoon Adaptation, Typhoon Awareness, Risk Perception, and Perceived Preparedness. The questionnaire comprises a total of 26 items: Macroergonomics (7 items), Typhoon Adaptation (4 items), Typhoon Awareness (6 items), Risk Perception (4 items), and Perceived preparedness (5 items). The items will be rated on a 5-point Likert scale: Strongly Disagree (1.00-1.49), Disagree (1.50-2.49), Uncertain (2.50-3.49), Agree (3.50-4.49), Strongly Agree (4.50-5.00).

Using coherence and consistency tests, pilot research will be done on 30 students enrolled in a research subject of the researcher to ensure the questionnaire's clarity. Moreover, these students will also be excluded from the study. The questionnaire will then be amended based on the responses of the thirty students. The instrument will be translated forward and backward. A language expert will translate the English version of the scales into Cebuano (a local dialect in the Philippines), and then another expert will translate it back into English. The nurse, a language expert, and two university professors will finalize and review the translated items.

Figure 3. Study Instrument Target group and filtering processes

Factors	Items
Macroergonomics	<ol style="list-style-type: none"> 1. I think our Local Government Unit (LGU) has enough emergency responders for Typhoons. 2. I think our LGU is prepared to respond to Typhoons. 3. I think our LGU can properly allocate relief goods during Typhoons. 4. I think our LGU can maintain peace and order if we evacuate for Typhoons. 5. I think the LGU can secure our properties and assets if we evacuate for Typhoons. 6. I think I will receive financial support from the government during the Typhoons. 7. I think I will have access to healthcare services (hospitals, clinics) during the Typhoons.
Typhoon Adaptation	<ol style="list-style-type: none"> 1. I am fully informed about the evacuation system and plan in my area for Typhoons. 2. I think the government is ready to assist during Typhoons. 3. I am confident that reconstruction activities can be implemented after the Typhoons. 4. I have sufficient information about Typhoon adaptation from the government.
Typhoon Awareness	<ol style="list-style-type: none"> 1. I actively participate in Typhoon awareness campaigns. 2. I am aware of the proper emergency procedure for Typhoons. 3. I am aware of the shelter areas or evacuation centers for Typhoons. 4. I am aware of which government institutions need to be contacted after the Typhoons. 5. I do prioritize awareness at the local and national levels for Typhoons. 6. I am aware of the importance of building or infrastructure retrofitting for Typhoons.
Risk Perception	<ol style="list-style-type: none"> 1. I am sure that large-scale disasters like Typhoons will definitely happen in the next 10 years. 2. I think my locality is safe from Typhoons. 3. I know who are vulnerable members of my family and community for Typhoons. 4. I am informed about the possible risks of Typhoons.
Perceived Preparedness	<ol style="list-style-type: none"> 1. I know the significance of sharing knowledge and information about preparation for Typhoons. 2. I recognize the importance of preparing for Typhoons with family, friends, and relatives. 3. I have enough knowledge on how to prepare for Typhoons from experts in disaster reduction. 4. I think my house/shelter is well designed to withstand any disaster like Typhoons. 5. I think our assets are well protected from Typhoons.

The online program for typhoon mitigation is designed with the general people in mind. The program addresses the critical need for Community Disaster Preparedness based on the National Risk Reduction and Management Plan of the Philippines for 2011-2028.

The initiative targets persons who are vulnerable to and exposed to natural disasters like typhoons. Individuals who are not exposed to typhoons but seek to enhance their knowledge, attitude, and practices about typhoon mitigation may be attracted to the program due to its emphasis on practical methods and solutions. The curriculum is inclusive and accessible to individuals who wish to pursue these objectives.

Numerous filtering techniques have been devised to ensure that persons with greater assistance needs are directed to the right resources. Anyone can contact the researcher via email or phone when urgent assistance is required. Regular monitoring is essential to the effectiveness of the program. It ensured that individuals with difficulties were guided to more suitable sources

of assistance.

3. Discussion

Advantages for individuals

The World Health Organization defines vulnerability as the inability of a population, individual, or organization to predict, cope with, resist, and rehabilitate after a disaster. Vulnerable populations include children, pregnant women, the elderly, malnourished individuals, and people with disabilities (International Knowledge Centre for Engineering Sciences and Technology, 2019; Torani et al., 2019). Numerous studies have supported the significance of disaster education for all segments of society (Barmania, 2014; Hechanova et al., 2018). However, it should be noted that persons who are vulnerable due to their limits and circumstances require specialized training and care from qualified and professional individuals (Torani et al., 2019).

According to research conducted in numerous nations, including Japan, there is a direct association between education, a heightened perception of danger, and the risk mitigation activities of individuals. Encouraging individuals to recognize the significance of prevention and preparedness can reduce the gap between knowledge and action (SDG-Disaster Risk Reduction, 2021). Today, disaster education should be addressed to enhance resiliency and disseminate knowledge to decrease the risk of natural disasters striking their homes (Kwan, 2018).

Advantages of online interventions in general

Aside from the advantages described earlier, which are specific to this program, the majority of online programs share a number of benefits, such as accessibility via several devices such as cellphones, desktops, and laptops, and the convenience of the user's personal area and location (Papadatou-Pastou et al., 2019).

Online access to assessment and intervention options overcomes communication barriers (Goozée et al., 2018). In addition, the online typhoon mitigation program avoids a one-size-fits-all approach by allowing consumers to access educational materials at their own convenience.

Advantages to the Community-based disaster preparedness (CBDP) initiatives and the National Disaster Risk Reduction and Management Council (NDRRMC)

The program will echo the council's directives regarding the benefits to the CBDP and NDRRMCs. In addition, both agencies (CBDP and NDRRMC) might be assisted in enhancing the standard of teaching on typhoon mitigation. One can be achieved through various training methods, including this curriculum explicitly built for typhoon mitigation.

Community-based disaster preparedness (CBDP) initiatives are integral to vulnerability reduction and disaster management strategies (Allen, 2006; Bernard et al., 2022). They are related to a policy movement focusing on indigenous people's knowledge and capacities and capitalizing on indigenous resources, particularly social capital. CBDP may be essential in establishing local solutions for coping and adaptation and positioning them within broader development plans and debates. In line with CBDP initiatives, local policies were enhanced to conform to the criteria of DRRM legal frameworks. National policy guidelines were developed to ease the localization of the mandates of the Republic Act (R.A.) 10121 (Philippine DRRM Law of 2010). Project actions aided LGUs in establishing, institutionalizing, and strengthening

their local disaster risk reduction and management offices (LDRRMO) (UNDP in Philippines, 2020).

In addition, numerous activities can be performed to ensure proper planning, improve an individual's knowledge and skills, and assess an individual's performance in simulated environments. In addition, the maneuvers and exercises used with vulnerable individuals differ, and additional care must be taken with these individuals, even though these issues have gotten little attention. Although education on typhoon mitigation is beneficial at all stages of a crisis, its impact is greatest during the planning phase. As a result, there is a need for increased educational planning, which this curriculum will address.

Lastly, CDBP and NDRRMC can benefit from the statistical analysis of data collected through the online typhoon mitigation program. These statistics can shed light on monitoring and obtaining access to data on persons' knowledge, attitude, and practices toward typhoon mitigation. In addition, such analytics can strengthen the accountability of stakeholders for budgeting and resource allocation. Similar online interventions for disaster risk reduction are cost-effective (Asian Disaster Reduction Center, 2021; Emergency Management, 2021); thus, these data may lead to a more efficient allocation of resources among government agencies.

Innovative Features

Historically, innovation in typhoon mitigation, especially regarding the application of technology, has been encouraged (SDG-Disaster Risk Reduction, 2021; WHO, 2019). Utilizing evidence-based online programs as a supplement to face-to-face services has been recognized as a novel approach to meeting this demand (Emergency Management, 2021). The training will be provided via multimedia, setting it apart from other available programs. In contrast, the other applications rely mainly on text for their content. In addition, the participants' feedback will directly shape the program. Importantly, whereas other applications provide all users with the same pre-designed packages or modules for delivering online education sessions, this software tailors a solution to the specified educational needs of each individual.

4. Conclusion

This article intends to describe an online typhoon mitigation program based on the National Risk Reduction and Management Plan of the Philippines. The program is innovative explicitly because it focuses on meeting the unmet demands by focusing on realistic and practicable typhoon mitigation techniques. In addition, it prevents a one-size-fits-all approach and offers highly tailored teaching sessions. By delivering accessible, practical, and real-world typhoon mitigation strategies, the program meets multiple of the aforementioned goals.

It has been proved that the inception and development of the program are based on the robust evidence available. Additional empirical research should eventually contribute to developing a solid evidence base for the program's use in typhoon mitigation, resulting in widespread acceptance across all government sectors.

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Conflicts of interest

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References

- [1] Acosta, L. A., Eugenio, E. A., Macandog, P. B. M., Macandog, D. B. M., Lin, E. K. H., Abucay, E. R., Cura, A. L., & Primavera, M. G. (2016). Loss and damage from typhoon-induced floods and landslides in the Philippines: Community perceptions on climate impacts and adaptation options. *International Journal of Global Warming*, 9(1), 33. <https://doi.org/10.1504/IJGW.2016.074307>
- [2] Adjusters International. (2022). *The Importance of Social Media Before, During and After a Disaster*. Adjusters International. <https://www.adjustersinternational.com/newsroom/the-importance-of-social-media-before-during-and-after-a-disaster>
- [3] Allen, K. (2006). Community-based disaster preparedness and climate adaptation: Local capacity-building in the Philippines. *Disasters*, 30, 81–101. <https://doi.org/10.1111/j.1467-9523.2006.00308.x>
- [4] Almazan, J. U., Albougami, A. S., Alamri, M. S., Colet, P. C., Adolfo, C. S., Allen, K., Gravoso, R., & Boyle, C. (2019). Disaster-related resiliency theory among older adults who survived Typhoon Haiyan. *International Journal of Disaster Risk Reduction*, 35, 101070. <https://doi.org/10.1016/j.ijdrr.2019.101070>
- [5] Anticamara, J., & Go, K. (2017). Impacts of super-typhoon Yolanda on Philippine reefs and communities. *Regional Environmental Change*, 17(3), 703–713. <https://doi.org/10.1007/s10113-016-1062-8>
- [6] Asian Disaster Reduction Center. (2021). *Asian Disaster Reduction Center (ADRC)*. <https://www.adrc.asia/nationinformation.php?NationCode=608&Lang=en>
- [7] Badoc-Gonzales, B. P., Mandigma, M. B. S., & Tan, J. J. (2021). Resilience and sustainability interventions in selected Post-Haiyan Philippines: MSMEs perspective. *International Journal of Disaster Risk Reduction*, 57, 102162. <https://doi.org/10.1016/j.ijdrr.2021.102162>
- [8] Balogun, A.-L., Marks, D., Sharma, R., Shekhar, H., Balmes, C., Maheng, D., Arshad, A., & Salehi, P. (2020). Assessing the Potentials of Digitalization as a Tool for Climate Change Adaptation and Sustainable Development in Urban Centres. *Sustainable Cities and Society*, 53, 101888. <https://doi.org/10.1016/j.scs.2019.101888>
- [9] Barmania, S. (2014). Typhoon Haiyan recovery: Progress and challenges. *Lancet (London, England)*, 383(9924), 1197–1199. [https://doi.org/10.1016/s0140-6736\(14\)60590-0](https://doi.org/10.1016/s0140-6736(14)60590-0)
- [10] Bernard et al. (2022). *Climate change: The next game changer for sport and exercise psychology* | SpringerLink. <https://link.springer.com/article/10.1007/s12662-022-00819-w>
- [11] Chan, E. Y. Y., & Ho, J. Y. (2018). Urban community disaster and emergency health risk perceptions and preparedness. In *Science and Technology in Disaster Risk Reduction in Asia* (pp. 95–110). Elsevier. <https://doi.org/10.1016/B978-0-12-812711-7.00007-9>
- [12] Chunlan Guo, Timothy Sim, Hung Chak Ho. (2020). *Evaluation of risk perception, knowledge, and preparedness of extreme storm events for the improvement of coastal resilience among migrants: A lesson from Hong Kong—Guo—2020—Population, Space and Place—Wiley Online Library*. <https://onlinelibrary.wiley.com/doi/10.1002/psp.2318>

- [13] Dutta, R., Basnayake, S., & Ahmed, A. K. (2015). Assessing Gaps and Strengthening Early Warning System to Manage Disasters in Cambodia. *IDRiM Journal*, 5(2), 167–175.
- [14] Eastern Kentucky University. (2016). *4 Important Grant Programs for Emergency Preparedness and Relief*. EKU Online. <https://safetymanagement.eku.edu/blog/when-disaster-strikes-technologys-role-in-disaster-aid-relief/>
- [15] Edjossan-Sossou, A. M., Vuillet, M., Mehdizadeh, R., & Deck, O. (2020). Agent-based model for simulating households' self-evacuation decision in high-rise buildings under critical infrastructure failures induced by a slow-onset flood conditions – A case study in Paris. *IDRiM Journal*, 10(2), 35–65. <https://doi.org/10.5595/001c.18160>
- [16] Emergency Management. (2021). *Disaster Mitigation—Emergency Management—City of New Bedford Official Website*. <https://www.newbedford-ma.gov/emergency-management/emergencies-disasters/mitigation/>
- [17] Goozée, R., Papadatou-Pastou, M., Barley, E., Haddad, M., & Tzotzoli, P. (2018). Survey to Inform the Development of an Online Support System for Higher Education Students & Higher Education and Online Support. *Health*, 10(03), 351–364. <https://doi.org/10.4236/health.2018.103028>
- [18] Gumasing, Ma. J. J., Prasetyo, Y. T., Ong, A. K. S., Nadlifatin, R., & Persada, S. F. (2022). Determining Factors Affecting the Perceived Preparedness of Super Typhoon: Three Broad Domains of Ergonomics Approach. *Sustainability*, 14(19), 12202. <https://doi.org/10.3390/su141912202>
- [19] Gurses, A. P., Tschudy, M. M., McGrath-Morrow, S., Husain, A., Solomon, B. S., Gerohristodoulos, K. A., & Kim, J. M. (2020). Overcoming COVID-19: What can human factors and ergonomics offer? *Journal of Patient Safety and Risk Management*, 25(2), 49–54. <https://doi.org/10.1177/2516043520917764>
- [20] Haque, U., Hashizume, M., Kolivras, K. N., Overgaard, H. J., Das, B., & Yamamoto, T. (2012). Reduced death rates from cyclones in Bangladesh: What more needs to be done? *Bulletin of the World Health Organization*, 90(2), 150–156. <https://doi.org/10.2471/BLT.11.088302>
- [21] Hechanova, M. R., Docena, P. S., Alampay, L. P., Acosta, A., Porio, E. E., Melgar, I. E., & Berger, R. (2018). Evaluation of a resilience intervention for Filipino displaced survivors of Super Typhoon Haiyan. *Disaster Prevention and Management: An International Journal*, 27(3), 346–359. <https://doi.org/10.1108/DPM-01-2018-0001>
- [22] Heidenreich, A., Masson, T., & Bamberg, S. (2020). Let's talk about flood risk – Evaluating a series of workshops on private flood protection. *International Journal of Disaster Risk Reduction*, 50, 101880. <https://doi.org/10.1016/j.ijdr.2020.101880>
- [23] Holden, W. N., & Marshall, S. J. (2018). Chapter 24 - Climate Change and Typhoons in the Philippines: Extreme Weather Events in the Anthropocene. In P. Samui, D. Kim, & C. Ghosh (Eds.), *Integrating Disaster Science and Management* (pp. 407–421). Elsevier. <https://doi.org/10.1016/B978-0-12-812056-9.00024-5>
- [24] International Knowledge Centre for Engineering Sciences and Technology. (2019). *Benefits and disadvantages of typhoons and countermeasures—Disaster Risk Reduction Knowledge Service*. <http://drr.ikcest.org/tutorial/pef5d>
- [25] Kabir, M. I., Rahman, M. B., Smith, W., Lusha, M. A. F., Azim, S., & Milton, A. H. (2016). Knowledge and perception about climate change and human health: Findings from a baseline survey among vulnerable communities in Bangladesh. *BMC Public Health*, 16(1), 266. <https://doi.org/10.1186/s12889-016-2930-3>

- [26] Kim, H., Ahn, M. E., Lee, K. H., Kim, Y. C., & Hong, E. S. (2015). Disaster medical assistance in super typhoon Haiyan: Collaboration with the local medical team that resulted in great synergy. *Ulusal Travma ve Acil Cerrahi Dergisi = Turkish Journal of Trauma & Emergency Surgery: TJTES*, 21(2), 143–148. <https://doi.org/10.5505/tjtes.2015.54770>
- [27] Kwan, C. (2018). *Older People's Resilience in the Context of Climate-Disasters: A Single Instrumental Case Study of Older Women in Poverty who are Widowed, Head of Household, and Living in a Disaster-Affected Community in the Philippines*. <https://doi.org/10.11575/PRISM/32787>
- [28] Lee, J. E. C., & Lemyre, L. (2009). A Social-Cognitive Perspective of Terrorism Risk Perception and Individual Response in Canada. *Risk Analysis*, 29(9), 1265–1280. <https://doi.org/10.1111/j.1539-6924.2009.01264.x>
- [29] Lin Moe, T., & Pathranarakul, P. (2006). An integrated approach to natural disaster management: Public project management and its critical success factors. *Disaster Prevention and Management: An International Journal*, 15(3), 396–413. <https://doi.org/10.1108/09653560610669882>
- [30] Mahdaviyazad, H., & Abdolahifar, G. (2014). Assessing Household Natural Disaster Preparedness in Shiraz, Iran, 2011: Results of a Knowledge, Attitude, and Practices Survey. *Disaster Medicine and Public Health Preparedness*, 8(4), 349–352. <https://doi.org/10.1017/dmp.2014.61>
- [31] Mallick, B., Rahaman, K. R., & Vogt, J. (2011). Coastal livelihood and physical infrastructure in Bangladesh after cyclone Aila. *Mitigation and Adaptation Strategies for Global Change*, 16(6), 629–648. <https://doi.org/10.1007/s11027-011-9285-y>
- [32] Matyas, C., Srinivasan, S., Cahyanto, I., Thapa, B., Pennington-Gray, L., & Villegas, J. (2011). Risk perception and evacuation decisions of Florida tourists under hurricane threats: A stated preference analysis. *Natural Hazards*, 59(2), 871–890. <https://doi.org/10.1007/s11069-011-9801-0>
- [33] NRDC, & Turrentine, 2021 Melissa Denchak Jeff. (2021). *Global Climate Change: What You Need to Know*. NRDC. <https://www.nrdc.org/stories/global-climate-change-what-you-need-know>
- [34] Ong, A. K. S., Prasetyo, Y. T., Lagura, F. C., Ramos, R. N., Sigua, K. M., Villas, J. A., Young, M. N., Diaz, J. F. T., Persada, S. F., & Redi, A. A. N. P. (2021). Factors affecting intention to prepare for mitigation of “the big one” earthquake in the Philippines: Integrating protection motivation theory and extended theory of planned behavior. *International Journal of Disaster Risk Reduction*, 63, 102467. <https://doi.org/10.1016/j.ijdrr.2021.102467>
- [35] Papadatou-Pastou, M., Campbell-Thompson, L., Barley, E., Haddad, M., Lafarge, C., McKeown, E., Simeonov, L., & Tzotzoli, P. (2019). Exploring the feasibility and acceptability of the contents, design, and functionalities of an online intervention promoting mental health, wellbeing, and study skills in Higher Education students. *International Journal of Mental Health Systems*, 13(1), 51. <https://doi.org/10.1186/s13033-019-0308-5>
- [36] Richard Eiser, J., Bostrom, A., Burton, I., Johnston, D. M., McClure, J., Paton, D., van der Pligt, J., & White, M. P. (2012). Risk interpretation and action: A conceptual framework for responses to natural hazards. *International Journal of Disaster Risk Reduction*, 1, 5–16. <https://doi.org/10.1016/j.ijdrr.2012.05.002>

- [37] Ryan, S., & Carr, A. (2010). Applying the biopsychosocial model to the management of rheumatic disease. In *Rheumatology* (pp. 63–75). Elsevier. <https://doi.org/10.1016/B978-0-443-06934-5.00005-X>
- [38] Sasangohar, F., Moats, J., Mehta, R., & Peres, S. C. (2020). Disaster Ergonomics: Human Factors in COVID-19 Pandemic Emergency Management. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 62(7), 1061–1068. <https://doi.org/10.1177/0018720820939428>
- [39] SDG-Disaster Risk Reduction. (2021). *Disaster risk reduction ∴ Sustainable Development Knowledge Platform*. <https://sustainabledevelopment.un.org/topics/disasterriskreduction>
- [40] Shi, J., Visschers, V. H. M., & Siegrist, M. (2015). Public Perception of Climate Change: The Importance of Knowledge and Cultural Worldviews: The Importance of Knowledge and Cultural Worldviews in Climate Change Perception. *Risk Analysis*, 35(12), 2183–2201. <https://doi.org/10.1111/risa.12406>
- [41] Swarnali Chakma, Akihiko Hokugo, Md Atikur Rahman. (2022). *Factors Affecting the Cyclone Preparedness Programme Volunteers' Performance in Early Warning Dissemination in Emergency Response in Bangladesh | Published in IDRiM Journal*. <https://www.idrimjournal.com/article/38750-factors-affecting-the-cyclone-preparedness-programme-volunteers-performance-in-early-warning-dissemination-in-emergency-response-in-bangladesh>
- [42] Takashi Sugiyama, Katsuya Yamori. (2022). *Analysis of Regional Response and Development of Disaster Prevention Teaching Materials for “Nankai Trough Earthquake Extra Information” | Published in IDRiM Journal*. <https://www.idrimjournal.com/article/36180-analysis-of-regional-response-and-development-of-disaster-prevention-teaching-materials-for-nankai-trough-earthquake-extra-information>
- [43] Takenouchi, K., Nakanishi, C., Yamori, K., Sawada, M., Takeuchi, K., & Fujiwara, H. (2018). Collaborative Community Weather Information for meteorological disasters: A case study of Nakajima School District, Ise. *IDRiM Journal*, 7(2), 1–24.
- [44] Thomas, V. (2014). Confronting Climate-Related Disasters in Asia and the Pacific. *Jahrbuch Für Wirtschaftswissenschaften / Review of Economics*, 65(2), 121–135.
- [45] Torani, S., Majd, P., Maroufi, S., Dowlati, M., & Sheikhi, R. (2019). The importance of education on disasters and emergencies: A review article. *Journal of Education and Health Promotion*, 8(1), 85. https://doi.org/10.4103/jehp.jehp_262_18
- [46] UNDP in Philippines. (2020). *Building Community Resilience and Strengthening Local Government Capacities for Recovery and Disaster Risk Management*. UNDP in Philippines. https://www.ph.undp.org/content/philippines/en/home/operations/projects/crisis_prevention_and_recovery/Resilience-Project.html
- [47] USAID. (2020, January 6). *Humanitarian Assistance | Philippines | U.S. Agency for International Development*. <https://www.usaid.gov/philippines/humanitarian-assistance>
- [48] Varona, R., IJAR, Bolla, D., Bolinget, M., & Illab., H. (2017). KNOWLEDGE, ATTITUDE AND PRACTICES ON DISASTER RISK REDUCTION AND MANAGEMENT OF THE BARANGAY OFFICIALS OF BALER, AURORA, PHILIPPINES. *International Journal of Advanced Research*, 5(7), 1395–1402. <https://doi.org/10.21474/IJAR01/4851>

- [49] Villarino, R. T. H., Villarino, M. L. F., Temblor, M. C. L., Bernard, P., & Plaisent, M. (2022). Developing a health and well-being program for college students: An online intervention. *World Journal on Educational Technology: Current Issues*, 14(1), 64–78. <https://doi.org/10.18844/wjet.v14i1.6638>
- [50] Villarino, R. T. H., Villarino, M. L. F., Temblor, M. C. L., Chabit, N. T., Arcay, C. A. L., Gimena, G. B., Bernard, P., & Plaisent, M. (2022). Evaluating an online well-being program for college students during the COVID-19 pandemic. *Journal of Health Sciences*. <https://doi.org/10.17532/jhsci.2022.1631>
- [51] Villarino, R. T., & Villarino, M. L. (2022). Designing an online typhoon mitigation program. *Academic Platform Journal of Natural Hazards and Disaster Management*. <https://doi.org/10.52114/apjhad.1187249>
- [52] Villarino, R. T., Villarino, M. L., Temblor, M. C., Bernard, P., & Plaisent, M. (2022). *Association between Physical Health and Well-being: A Quasi-experimental Study*. 21(03), 7.
- [53] Vos, T., Lim, S. S., Abbafati, C., Abbas, K. M., Abbasi, M., Abbasifard, M., Abbasi-Kangevari, M., Abbastabar, H., Abd-Allah, F., Abdelalim, A., Abdollahi, M., Abdollahpour, I., Abolhassani, H., Aboyans, V., Abrams, E. M., Abreu, L. G., Abrigo, M. R. M., Abu-Raddad, L. J., Abushouk, A. I., ... Murray, C. J. L. (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: A systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*, 396(10258), 1204–1222. [https://doi.org/10.1016/S0140-6736\(20\)30925-9](https://doi.org/10.1016/S0140-6736(20)30925-9)
- [54] Wang, J.-J., & Tsai, N.-Y. (2022). Factors affecting elementary and junior high school teachers' behavioral intentions to school disaster preparedness based on the theory of planned behavior. *International Journal of Disaster Risk Reduction*, 69, 102757. <https://doi.org/10.1016/j.ijdr.2021.102757>
- [55] WHO. (2019). *Emergencies: WHO's role*. <https://www.who.int/news-room/questions-and-answers/item/who-s-role-in-emergencies>
- [56] Wong, C., & Monaghan, M. (2020). Behavior change techniques for diabetes technologies. In *Diabetes Digital Health* (pp. 65–75). Elsevier. <https://doi.org/10.1016/B978-0-12-817485-2.00005-5>
- [57] Wunderground. (2021). *Prepare for a Hurricane or Typhoon | Weather Underground*. <https://www.wunderground.com/prepare/hurricane-typhoon>
- [58] Zhang, W., Wang, W., Lin, J., Zhang, Y., Shang, X., Wang, X., Huang, M., Liu, S., & Ma, W. (2017). Perception, Knowledge and Behaviors Related to Typhoon: A Cross Sectional Study among Rural Residents in Zhejiang, China. *International Journal of Environmental Research and Public Health*, 14(5), 492. <https://doi.org/10.3390/ijerph14050492>