TOWARDS EFFECTIVE RISK COMMUNICATION: VALIDATING SOCIAL COGNITIVE THEORY THROUGH FARMERS' RESPONSE BEHAVIOR TO FLOOD WARNINGS

CHRISTINE MARIE P. ARREZA

Faculty of Information and Communication Studies
University of the Philippines
OPEN UNIVERSITY
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Christine Marie P. Arreza

Towards Effective Risk Communication: Validating Social Cognitive Theory Through Farmers' Response Behavior to Flood Warnings

Thesis Adviser:

ALEXANDER G. FLOR, PhD
Faculty of Information and Communication Studies

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BIOGRAPHICAL SKETCH

The author, Christine Marie Perez Arreza, was born on December 28, 1993 at Cagwait, Surigao del Sur and is currently residing in Carrascal, Surigao del Sur as the eldest daughter of two; Aniolo Rosit Arreza, Jr. and Amorel Perez Arreza.

Ms. Arreza took her basic and secondary education at Carrascal Central Elementary School and Carrascal National High School, respectively. She then took Bachelor of Arts in Communication Arts Major in Speech and Corporate Communication at the University of the Philippines Mindanao and graduated Cum Laude in 2014. She was given a Thesis Distinction for her undergraduate study on disaster management, of which was eventually published internationally and presented in the "Communication/Culture and the Sustainable Development Goals (CCSDG): Challenges for a New Generation" at Chiang Mai University, Thailand last 2016. She was also able to present the project titled 'Disaster Preparation and Measure: An Online Game" to the Japan government and Philippine officials in Tokyo, Japan last March 2013 through the Kizuna (Bond) Project Youth-Exchange Project with Asia-Oceania and North America. Aside from academics, she was also engaged in other fields in college such as dance and sports. She was a former member of the university team for Table Tennis and an alumna of the University of the Philippines Mindanao Dance Ensemble. She was also engaged in community service through the Communicators' Guild under her degree program and for being an alumna of the Kappa Epsilon Sorority UP Mindanao Chapter.

To date, Ms. Arreza is currently affiliated with LGU Carrascal and continues to extend services through various programs and interventions toward community development.

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I am always inspired to serve my community. My passion for public service has brought me to several places, meet new people, and realize interventions both from public and private institutions that may contribute to community development. This study is a reflection of my passion to help the at-risk communities in our locality and this would not be completed without the collaborative efforts of the people who I look up to for guidance and support. I thank Doc Alexander Flor, my thesis adviser, for his expertise and patience all throughout my thesis writing journey. I continue to aim for excellence because I have been inspired by your humility and intellect. I am also grateful to my panel committee, Doc Benjamin Flor and Doc Melinda Lumanta, for their unending guidance and support.

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Most importantly, to our Almighty God, for being my source of strength and wisdom, and for always fulfilling my heart's desires. All glory is yours in all my works and future endeavours.

DEDICATION

Dedicated to:

To all I dearly love and the flood-prone communities in Carrascal

ABSTRACT

Flooding is considered one of the most devastating natural disasters in the Philippines and greatly contributes to economic loss. It is even more critical as the country's economy is largely dependent on agriculture and its natural resources. Hence, the most affected among the sectors are the farmers who strongly depend on natural resources as their sole source of income. However, existing literatures on risk communication have given little focus on farmers' coping mechanism to flood events and understanding their behavior towards flood advisories.

From this perspective, this study discusses the factors that influence how farmers behave toward the Flood Early Warning System's (FEWS) warnings with validation from the premises and core concepts of the Social Cognitive Theory. Survey results from eighty-eight (88) farmer respondents revealed that 'non-tangible' results such as individual, social, and environmental factors should be considered in creating and disseminating flood advisories. The Chi-Square of Independence also showed that farmers have high risk perception to flooding with significant regard to their flooding experiences linked with cognitive biases. Furthermore, results revealed that farmers are more exposed to traditional media channels and take into account their social influences specifically with family/community members in seeking warning information. Finally, this study highlights discussion on administrative, technical, and policy development changes with integration on social cognitive processes to motivate and promote response behavior among farmers and forming part in disaster preparedness.

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Chapter I

INTRODUCTION

Background

According to the study on flood trends in Asia, "floods are by far the most frequent and devastating natural disaster in Asia" (Dutta & Herath, 2014). Asia stands as the hardest-hit continent in terms of flood disaster events at 41% with 71% total fatalities and 63% overall economic damages recorded since 2000 (Perera et. al., 2019). In fact, data from EM-DAT (emergency events database) (2018) states that a total of 50 flood disasters were recorded in Asia resulting in nearly 2,000 casualties and an estimated loss of USD 16 billion (as cited in Perera et. al., 2019) in 2018 alone. In Asia, China topped as the most frequently affected by floods and nine (9) other nations in top 10 including the Philippines, which placed fourth after China, India, and Indonesia in terms of the highest number of flood events within the last 28 years as compared to other natural disasters (Dutta & Herath, 2014).

Evidently, the Philippines is no stranger to natural disasters. According to the Global Facility for Disaster Reduction and Recovery, "since 1990, the Philippines has been affected by 565 natural disaster events that have claimed the lives of nearly 70,000 Filipinos and caused an estimated $23 billion in damages" (2017). An average of 20 typhoons make landfall in the country per year (Doroteo, 2015) and is also prone to other disasters such as flooding and typhoon/tropical cyclones. Its high vulnerability to these risks is due to the fact that the country is lying within the Pacific Ring of Fire and Typhoon Belt where large number of earthquakes, volcanic

eruptions, and typhoons frequently occur. In fact, according to the International Displacement Monitoring Centre (IDMC) (2019), a total of 3,802,000 million in 2018 and 484,000 more in just the first half of 2019 were displaced in the Philippines due to disasters and. Due to its geographical location, "throughout the history, the Philippines is considered as one of the most disaster-prone countries in the world" (Doroteo, 2015). Accordingly, the Philippines is also flood prone because "while some storms merely pass the country and barely leave any mark, others come with torrential rains and massive flooding that could devastate large swaths of land, causing billions of pesos in damages and casualties" (Villa & Generalao, 2019).

To address flood risks, the Philippines, along with several other nations, adopted the Flood Early Warning System (FEWS). Essentially, an Early Warning System (EWS) is a multifunctional system that "improves community preparedness for extreme weather events such as floods, in terms of both warning and increasing understanding of risks and appropriate flood responses" (Climate Change Adaptation Technologies for Water, n.d.). The country's effort to adopt FEWS was founded and supported by significant efforts made across the globe, as promoted by the Hyogo Framework for Action (HFA), to empower communities to become more active and responsive to disasters thru Early Actions (EA) and EWS with a people-centered approach in mind (IFRC, 2012).

In 2007, the German Technical Cooperation partnered with several local governments in Eastern Visayas, Philippines to install and set up a Local Flood Early Warning System (LFEWS). However, despite efforts in advocating the system and increasing its accessibility, only little information remains available regarding FEWS and how communities respond to its warnings. As quoted by Perera et al., "despite widespread recognition of the importance of FEWS for DRR, there's a lack of

information on their availability and status around the world, their benefits and costs, challenges and trends associated with their development" (2019). Moreover, despite considerable effort on public hazard education, disaster preparedness and response to warnings remain low (Paton, 2003) because of the lack of studies and reports on how at-risk communities respond to them.

Rationale

According to Perera et al., floods greatly contribute to severe monetary losses that impede the country's growth, especially in low-middle income countries like the Philippines (2019). This is critical for flood and other natural disaster prone countries like the Philippines as it causes massive negative economic and environmental impacts considering that its economy is largely dependent on agriculture and its environmental and natural resources (Israel & Briones, 2013).

Other developing nations susceptible to disasters are also experiencing similar effects. Based on Chapagain & Raizada, "developing nations are especially vulnerable to rural disasters as the majority of livelihoods (50-95% of the population) are based on farming" (2017). It is even worse in the rural areas of these nations where the most affected are farmers who solely and strongly depend on natural resources with no alternative source of income or employment (Chapagain & Raizada, 2017).

Meanwhile, in 2005, HFA emphasized that EWS should generally be people-centered with its primary focus being on *warning communication*, one of the key elements of EWS. Despite emphasis, several negative issues on the system still

emerged. In fact, case studies in Bangladesh and Cambodia reported the rise of three (3) main issues of setting up FEWS in their region; (1) warnings that often do not reach local stakeholders; (2) difficulties in understanding warning content by its recipients (van den Bergh et al., 2014); and (3) the ineffective interpretation of EWS warning information in Cambodia by people at-risk (Perera et al., 2019).

Apart from illiteracy, another issue on FEWS is the communities' low response rate. According to a survey, even when a warning was appropriately relayed, it was often disregarded, with only 52% of the people finding flood alerts credible enough to react and respond to (Perera et al., 2019).

Given the huge impact of floods on farmers in developing nations, warning communication issues and the lack of literature to understand the low response rate of at-risk communities receiving flood advisories, this study aimed to bridge the gaps by analysing the factors that influence how farmers behave toward flood advisories. This study is grounded on the fact that existing literatures have put little focus on the creation of interventions to help farmers cope during natural disasters, and instead focused more on post-disaster impacts on rural livelihoods, food and nutritional security, and soil-fertility, among others (Chapagain & Raizada, 2017). More importantly, studying the behavior of farmers may contribute to understanding how risk communication should be practiced today in the field of disaster management as "risk communication in disasters has historically been a one-way transfer of information from authorities to the public, rather than an interactive flow of information" (Bradley, McFarland, & Clarke, 2014).

With these identified gaps and the lack of data to understand the communities' behavior toward flood warnings issued, flood risk can possibly exacerbate. Thus, in order to analyse how communities respond, a case in point is

Carrascal, Surigao del Sur. Carrascal is one among several municipalities in the Surigao del Sur (SDS) Province, CARAGA Region that adopted LFEWS specifically Rain Gauge because the region in general is prone to extreme flooding due to its topography. Carrascal LFEWS was initiated because results from the geo-hazard mapping and assessment indicated that there is common flooding in the municipality mainly attributed to the overflow of its river channels.

The worst flooding incident in the municipality's history to date was when Tropical Storm (TS) Basyang badly hit Carrascal on February 13, 2018, with an estimated PHP 14.8M in damage to lifeline facilities due to extreme flooding. Nearly 21,000 individuals and over 6,000 families were affected with five (5) recorded deaths and 19 individuals injured. A total of 2,374 Internally Displaced People (IDPs) which amounted to 536 families were evacuated. And based on official reports, Agriculture was the hardest hit among all sectors, with a loss of over PHP 17M and 549 farmers affected.

Given these facts and since the downstream river for Carrascal LFEWS is located at Barangay Panikian where floods often occur, this study aimed to explain the factors that influence the response behavior of Barangay Panikian farmers when faced with flood advisories. Studying the behavior of farmers may also contribute to understanding their low response for early actions, and eventually saving their lives during disasters, and helping them cope with rural poverty in general. In addition, studying the farmers' behaviors is part of warning communication and disaster preparedness efforts which basically "focuses on changing human behaviors in ways that reduce people's risk and increase their ability to cope with hazard consequences" (Ejeta, Ardalan, & Paton, 2015).

Research Questions

According to Sauer (2011), while economic implications on flooding and extreme weather events are widely studied and investigated, implications for individual decision making are still widely neglected. Furthermore, FAO concluded that literature has been silent in terms of studying DRR measures on 'non-tangible' results such as social and environmental benefits at farm level (2019).

Thus, this study aims to better understand the factors that influence individual farmers' response behavior towards flood advisories by considering the 'non-tangible' results with the following research questions:

1. How do farmers respond to LFEWS warnings?
2. How do farmers perceive flood risks and warnings?
    2.1. To what extent do farmers find flood advisories credible?
3. How aware are farmers on issued flood warnings and flood risk information?
    3.1. What are the communication channels used to disseminate flood warnings to farmers?
4. What are the factors that influence farmers' behavior in responding to flood warnings?
5. In general, how do farmers treat flood warnings as a factor in promoting response behavior?

Research Objectives

In essence, FEWS is established to provide warnings to at-risk communities to evoke early actions. Where it is critical that communities must be able to respond immediately during flood, it is then significant to study how communities at-risk understand and behave based on FEWS warnings. That is why it is known that there is increasing awareness for flood management rather than prevention, with significant roles by the State, regulators, and individuals (Johnson & Priest, 2006, as cited in Soane et al., 2010).

Additionally, this study identifies and assesses the factors associated with farmers' risk perception, and their behavior towards flood advisories given that they already have prior flood experiences. Eventually, the study's results will provide crucial insights for disaster managers and local governments on how to convey flood warnings to farmers for a more effective warning communication in the sector that will reflect early and appropriate actions based on their warnings.

This study aims to:

1. Identify how farmers respond to flood warnings.
2. Determine farmers' flood risk perception and level of trust to flood warnings.
3. Determine farmers' awareness on issued flood risks and warnings
    3.1. Identify communication channels used in the dissemination of flood warnings
4. Discover factors influencing farmers' response behavior when faced with flood warnings.
5. Determine farmers' overall attitude to flood risk information as a factor in promoting response behavior.

Chapter II

THEORETICAL FRAMEWORK

Review of Related Literature

On the average, 20 typhoons make landfall in the Philippines with an average of 20 earthquakes observed per day (Doroteo, 2015). More or less 300 volcanoes are situated all over the Philippines, of which 22 are active and five (5) are considered to be highly active (Orallo, 2011). The country's 36, 289 kilometres of coastline makes it prone to tsunamis, sea-level rise, and storm surges with secondary phenomena such as landslides, tornadoes, drought, floods/flashfloods/flooding, and heavy monsoon/rain (Orallo, 2011). Because of this, the country has been tagged as the world's most disaster-prone country in 2009 by the Center for Research on the Epidemiology of Disasters (CRED) and second in the 2012 Climate Risk Index indicating high levels of exposure and vulnerability to extreme events (Acosta et. al., 2016).

Based on EM-DAT (n.d.), flooding ranked second on the most natural disaster occurring events in the Philippines after typhoons (as cited in Doroteo, 2015). According to the International Federation of Red Cross and Red Crescent Societies (2018), one of the widespread floods that occurred in the country was in July 2018 when nonstop monsoon rains left almost 400,000 people displaced with 10,000 finding shelter in evacuation centers and causing damage to sectors like infrastructure, farmlands and livestock. Due to this, the "Philippines is considered

among the most flood prone country in the world due to a variety of factors" (Natividad & Mendez, 2018).

To address the flooding problem, one of the listed priority projects which reflects the shift towards a proactive Disaster Risk Reduction (DRR) is the 'establishment of local flood early warning systems (through integrated and sustainable management river basins and water sheds) (NDRRMP, n.d.) which basically respond to flood hazards and risks. The Philippines first adopted LFEWS in 2007 and considered the most commonly adopted EWS in the country because it can be locally managed by local governments and communities at-risk and is considered affordable (GIZ, 2012). Basically, the system has a straightforward proposition:

"human vulnerability and suffering could be reduced by monitoring sources of floods, predicting where and when floods could possibly happen, identifying who would be affected and strengthening the capacity of local disaster risk reduction and management institutions to make informed decisions" (GIZ, 2012).

FEWS on a practical note involves series of activities such as monitoring rainfall and water level, recognizing and identifying flood vulnerability, forecasting imminent danger and events, and disseminating and relaying understandable warnings to key actors and the general public so they can take appropriate actions and decisions (Shrestha et al., 2016).

Efforts to mitigate floods and other disasters' damage are crucial for the Philippines being an agricultural country. Core findings from a FAO study indicated that between 2006 and 2013, over 6 million hectares of crops were damaged and total loss and damage to the agriculture sector is estimated at USD 3.8 billion caused by 78 natural disasters (2 droughts, 24 floods, 50 typhoons/tropical storms, 1

earthquake, and 1 volcanic eruption). This makes the agriculture sector susceptible to disaster events such as typhoons and floods which make up for the top two highest numbers of disaster events in the country, with similar critical conditions for other developing countries with limited to no available resources of coping up. Worse, the disaster's damage to the agriculture sector remains unreported. According to the Food and Agriculture Organization of the United Nations (FAO), there is no clear understanding of the impacts of natural hazards and disasters on the agriculture sector and subsector in developing nations (2015).

Accordingly, flood losses are considered a significant component in the Sustainable Development Goal (SDG) 11.5 which is to reduce the number of people affected by water-related disasters with focus on helping and protecting poor and vulnerable people (Perera et al., 2019). In such cases, farmers especially in rural areas become very vulnerable to various impacts such as poverty, food insecurity, and illiteracy. The apparent approach to these issues is to respond to post-disaster impacts and support farmers with their needs so they can go back to their regular livelihoods (Chapagain & Raizada, 2017). However, others argue that this traditional approach of response only addresses short term goals but will fail to reduce the impact of disasters on farmers in the long run (Sauer, 2011). As Smith et al. (2016) suggest, "effective flood prevention policy, though, has to move beyond the linear hazard-dose-response relationship often associated with natural disasters" (as cited in Sauer, 2011). The major flood policy change should reflect a changing set of attitudes, behavior, and values towards the flood problem, which in turn may influence attitudes toward several factors like flood warning systems, public awareness raising, etc. (Johnson et al., 2005, as cited in Sauer, 2011).

In recent years, considerable attention has been paid to studying not just the post-disaster impacts of flood but the communities' behavior before and during flood situations. This highlights the importance of disaster preparedness to reflect appropriate behavioral change that will eventually contribute to reducing disaster-induced losses. The long term goals are being considered such that the behavior and attitude of communities are believed to heavily influence several behavioral traits like risk awareness, perceived benefits, or even denial (Lopez, Baldassarre, & Seibert, 2017). To quote, "both researchers and practitioners are realizing the importance of integrating social, environmental, and economic aspects of flood risk management in order to improve flood risk reduction and mitigation actions (Bucheker et al., 2013; Sivapalan et al., 2012, as cited in Lopez et al., 2017).

Disaster Preparedness

According to Lopez et al., preparedness is considered a key element conditioning of FEWS efficiency (2017). Defined as the "extent to which individuals and organizations are equipped and ready to respond to negative environmental threats" (Espina & Teng-Calleja, 2015), it is assumed that disaster preparedness is influenced by several factors. These may include institutional, community, personal/individual factors (Sagala et al., 2009, as cited in Espina & Teng-Calleja, 2015) and environmental and social factors (Tekeli-Yesil et al., 2010, as cited in Espina & Teng-Calleja, 2015). Meanwhile, as to UNISDR's definition of disaster preparedness, "refers to knowledge and capacities of different stakeholders to anticipate, prepare themselves, and respond to an imminent or ongoing disaster", it

referring to different social groups like policy and decision-makers, first responders, or the general public, each with the corresponding set of significant factors (2019). These factors associated with different belief systems in turn are assumed to influence response behavior and are equated with risk perception (Becker et al., 2013, as cited in Espina & Teng-Calleja, 2015).

Factors Influencing Response Behavior

Risk perception is the "subjective assessment of the probability of a specified type of accident happening and how concerned we are with the consequences" (Sjöberg, Moen, & Rundmo, 2004). Since risk perception is subjective, it is considered one of the individual factors affecting response behavior. According to a study, people were more receptive to hazard information such as flood warnings when they perceive it as serious, "thus attention was focused on salient information that could guide beneficial behavior" (Venkatraman, Aloysius, & Davis, 2006, as cited in Soane et al., 2010).

In most literatures, the general concept of risk perception is associated with probability, uncertainty, consequence, and benefits. As cited by Darker (2013), when people perceive risk, they evaluate the probability of a potential harm or the possibility of loss and the consequences of an uncertain result. These concepts prevail in the definition of risk as "a situation or an event where something of value (including humans themselves) is at stake and where the outcome is uncertain" (Rosa, 2003, as cited in Sjöberg et al., 2004). Thus, uncertainty is also closely linked

to risk perception and is believed to be a significant mediator of human responses in instances with unknown results (Sjöberg et al., 2004).

While the concept of probability, uncertainty, and consequence in risk perception is interrelated, the concept of benefits is believed to also affect the way people perceive risk. Starr concluded that the "acceptability of risk from an activity is roughly proportional to the third power of the benefits from that activity" (Starr, n.d., as cited in Slovic, 1990). In addition, this is supported by an investigation conducted by Starr as society appears to accept risks to the extent that they were associated with benefits, of which he coined as 'voluntary' (Starr, 1969, as cited in Sjöberg et al., 2004). As Starr concluded, the public will accept risks that are almost 1000 times as great from voluntary activities like skiing as compared to involuntary activities such as food preservatives (Starr, n.d., as cited in Slovic, 1990). Meanwhile, outcome expectancies have two classifications, the negative and positive expectancies. According to Sniehotta et al., people who decide not to act might have seen less beneficial outcomes compared to those who have decided to act. Involved stakeholders and key actors in warning communication may view positive expectancies in terms of compliance to laws and regulations on disaster management (2005).

Risk perception includes three (3) major dimensions which include "perceived likelihood (the probability that one will be harmed by the hazard), perceived susceptibility (an individual's constitutional vulnerability to a hazard), and perceived severity (the extent of a harm a hazard would cause)" (Darker, 2013). Perceived vulnerability is defined as the individual's belief in the likelihood of threats to occur (National Cancer Institute, 2008). In this case, individuals who have high perceived vulnerability of flood will likely to initiate behavior after receiving a flood warning than

those who have low perceived vulnerability and are unengaged. This is a similar case when community members have low perceived vulnerability, thus, they are likely to take no action or no response for flood warnings issued. To add, "people with low-risk perceptions are more likely to poorly adjust to threats of natural hazards while those with high-risk perceptions tend to anticipate the impact of disasters and prepare more for them" (Delfin & Gaillard, 2008, as cited in Espina & Teng-Calleja, 2015). However, this notion is also argued in a study conducted by Campbell Institute, that it is possible for an individual to accurately assess risks both for the incident's probability and its consequences and still willing to tolerate higher risks (n.d.). These individuals are called 'thrill seekers' and they are proof of how high risk tolerance levels do not necessarily imply lower risk perception ability. Whereas valid arguing points and several literatures closely link risk perception with risk tolerance, this study limits itself to the idea of risk perception alone as a factor that influences disaster response behavior.

Thus, it can be concluded that risk perception is dependent on farmers' judgments as s/he perceives disaster events as a threat. Based on these facts, it is implied that risk perception influences an individual's assessment of flood threats which eventually influences their assessment of flood warnings; thus determining and predicting behavior. Therefore, implied in this assumption is that risk perception influences farmers' response behavior towards flood warnings.

Trust is another factor assumed to influence response behavior. Defined as "a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another" (Rousseau et al., 1998, as cited in Ryu, Kim, & Kim, 2018), it is also considered a determinant believed to affect risk perception. In recent years, greater attention has been paid to

trust in risk studies. Trust becomes a significant factor in making people feel safe and had a strong impact on the perceived benefits and risks; this can be supported by the change of attitudes of people towards nuclear power following the 2011 Fukushima Daiichi nuclear incident where there was an increase in perceived risk towards nuclear power (Ryu et al., 2018) and negatively affected the people's trust towards operators of nuclear power plants and regulatory authorities (Nakayachi, 2015; Tsujikawa et al., 2016, as cited in Siegrist, 2019). Hence, trust may influence perceptions of hazard because trust in a given situation relies on perception and attribution (Seigrist, Gutcher, & Earle, 2005).

According to Trettin & Musham (2000), erosion of public trust in government agencies can be a major hindrance for effective risk communication (as cited in Soane, 2010). This is supported by the World Meteorological Organization (WMO) that concludes how trust is a big part of effective risk communication. To quote, "if the information source cannot be trusted, those at risk may not respond proactively to the warnings – and it takes a long time to establish trust" (WMO, 2018). This refers to institutional trust, a specific type of trust where citizens hold trust not only on public organizations but public institutions or systems as well (Cook et al., 2005; Smith, 2011, as cited in Ryu et al., 2018).

In this study's case, the role of trust is established as to the extent of the community trusting the information sources which is considered critical in attending to risk messages (Soane et al., 2010), hence the flood early warning system managed by the local government and key actors involved in the creation and dissemination of flood warning data. It can be noted that according to Ryu et al., "the higher the credibility of an information source, the higher the possibility of changing

attitudes" (2018). Thus, trust in the information source is considered a significant contributor in influencing the behavior of farmers in responding to flood warnings.

Aside from trust in the source of risk information, the role of trust can also be established in terms of the credibility of risk information per se. In fact, the credibility of information is deemed to improve trust in the information source (Zahadi & Song, 2008; Zhou, Li, & Liu, 2010, as cited in Ryu et al., 2018). In particular, the quality of the information becomes a variable that persuades people to utilize the information and information system and affects user's reliability and satisfaction (Ryu et al., 2018). To add, "trust is especially relevant when false alarms and missed events occur, undermining the confidence of the public in warnings issued and therefore decreasing the likelihood that adequate precautionary actions will be taken" (Lopez et al., 2017).

However, Sjöberg (1999b) argued that trust only correlates to about 0.3 with perceived risk and a weak explanatory variable with regard to perceived risk (Sjöberg et al., 2004). Nevertheless, trust is still considered a significant component in this study because this study considers the analysis of social factors and not methodological factors, from where Sjöberg's results were based from (Sjöberg et al., 2004). To highlight, there should be a need to further understand the nature of trust to develop social and institutional processes for decision making (Slovic, 1990).

While several risk literatures have analyzed trust as an antecedent of risk perception, this study will treat and analyze trust results independently from risk perception results and will not include analysis of the relationship between these variables. To conclude, this study focuses on two kinds of trust; trust in the information source and trust in flood data as a factor believed to influence the response behavior of farmers towards flood advisories.

Another individual factor assumed to also influence behavior response to flood warnings is the severity of flood experience. It is believed that people who have prior flood experience are most likely to take special actions and measures to prepare (Takao et al., 2004, as cited in Espina & Teng-Calleja, 2015). In addition to Takao's study, it showed that preparedness for flood events was partly determined by previous flood experiences, and was even argued that preparedness for a hazard depends on the amount of damage from previous hazard experience (Takao et al., 2004, as cited in Espina & Teng-Calleja, 2015). These facts appeal to farmers as a severe flood can enforce a range of economic costs, which many of them are considered 'severe' (Rahman, 2014). Based on these proofs, it is believed that the severity of flood experience can influence farmer's behavior response towards flood warnings.

However, flood experience also poses negative attitudes towards early actions. As studied by Soane et al., people with flooding experience could be less concerned and no longer take personal responsibility for protecting their home and were less worried about flooding compared to those with no flooding experience (2010). Notably, this poses a potential problem of responsibility since people with flood experience are believed to become less concerned because they expect scientists to manage the flooding problem (Soane et al., 2010). Thus, these findings make it very significant to include the severity of flood experience to clearly understand whether the factor has an influence to farmers' behavior toward flood warnings.

Lastly, communication exposure as an environmental factor is also believed to influence response behavior. Defined in mass communication as "the extent to which audience members have encountered specific messages or classes of

messages/media content" (Slater, 2004, as cited in National Institute of Health, n.d.), this factor can also be linked to identifying the level of awareness of recipients on issued flood warnings. To quote, "warnings need to get the message across and stimulate those at risk to take action" (WHO, n.d., as cited in UNDP, 2016).

While its definition lies more on the message content, communication exposure can also be affected by the mode and medium used to disseminate flood risk information. According to Keller, Seigrist, and Gutscher (2006), information relayed in a frequency format with given probabilities presented in longer periods of time were found out to be more effective in emphasizing the risk threat rather than shorter probabilities (as cited in Soane, et al., 2010). Thus, communities at-risk have a greater understanding of the threat and are assumed to greatly resort to performing early actions.

Gaps in Warning Communication

Basically, warning communication is defined as the packaging of monitoring information into actionable messages that are understood by the people who need it, and are prepared to hear them (Global Disaster Preparedness Center, 2017). This is the fourth basic element of EWS after risk knowledge, monitoring, and response capability. The element basically sums up efforts linking to monitoring and response capability (IFRC, 2012) and this reflects the success of communicating risks to communities because in essence, a successful warning communication should eventually reflect early action among at-risk communities during disasters.

Generally, various gaps are identified being a hindrance to successful warning communication. It is argued that in order for change to happen, people should be receptive to information (Lion, Meertens, & Bot, 2002, as cited in Soane et al., 2010). Based on a detailed description by the Faculty of Geo Information Science and Earth Observation University of Twente (ITC) and Caucasus Environmental NGO Network (CENN) of Georgia,

> "during risk communication, it is important not only the proper information distribution and communication to the citizens, but the information receiving from the public about the hazards can play an important role in disaster management and risk reduction as well" (n.d.).

Thus, there should be a focus on how risk information is presented to reflect disaster response. Such a step is vital in building up accurate early actions, thus resulting to saving lives, livelihood and properties, and to mitigate cost damage. As quoted from Labo, Floresca, & Gracilla, "the message content of the warning needs to be as simple as possible for end-users and to be provided in a timely manner to facilitate appropriate action" (2016).

The idea of highlighting the exchange of messages and information on risks and hazards is highly associated with the concept of risk communication. According to Peter O'Neill, Risk Communication may be defined as "an interactive process of exchanging information and opinions between stakeholders regarding the nature and associated risks of a hazard on the individual or community and the appropriate responses to minimize the risks" (2004).

Risk communication used to be viewed as one-off and one-way, primarily focusing on the sharing and distribution of information. In a study by O'Neill (2004), the traditional education approach (public awareness programs) of risk

communication was found out to be questionable because being informed does not guarantee a change in attitude and/or behavior. Thus, it does not assure an immediate action after receiving the information. This is particularly the case in the Philippines where the effectiveness of a warning message is measured through the number of resources distributed or the number of people recalling the message. Usually, agencies distribute disaster preparedness and response actions in pamphlets and posters without considering their perceptions and attitudes. To quote, "the literature on risk communication indicates that distribution of information on the hazard and associated risk will not by itself make a significant difference in attitude, perception or behavior" (Boura, 1998, as cited in O'Neill, 2004). Thus, it is significant to identify how risk information is presented to at-risk communities and how communities perceive flood risk information to have an in-depth understanding of the communities' attitude and perception towards flood warnings.

Over the years, researchers have given attention to studying challenges to warning communication and how it can contribute to promoting early actions and response to various hazards and threats. In a study entitled 'Communicating Complex Forecasts for Enhanced Early Warning in Nepal', communicating warnings were found out to be a challenge with consideration to understanding available data and forecast, their integration into dissemination, and information flow (Budimir et al., 2019). To cite, "challenges relating to access, understanding, and capacity to act on information impede preparedness and early action before a flood event (Budimir et al., 2017; Scienseed, 2016; Moser, 2010; Paton, 2008, as cited in Budimir et al., 2019). It can also be noted that this study paved way for developing common alerting protocols with a continual feedback loop for community members receiving the warning information thru SMS to ensure access, understanding, and use of

information (Budimir et al., 2019). In this study, aside from message content, mode and medium of communication were also considered as a factor influencing disaster behavior response.

An additional study that highlights the importance of communication as a major component towards a successful understanding of risks and vulnerabilities to promote disaster response in the community is the 2017 case study entitled 'The Journey towards Integrated Risk Assessment: The Case in the Philippines' by Bercilla, Porio, & Loyzaga (as cited in Shaw et al., 2017). From the results of the study of hazards and level of exposure, it was found out that there were communication gaps in terms of the country's communication protocols. This was believed to have resulted in the inefficient preparedness and response of Local Government Units (LGUs) in the country to prepare their communities from these disasters (Bercilla et al., 2017, as cited in Shaw et al., 2017). Thus, MO studied and shared to the communities several information such as preparation of tropical cyclone advisories, examination of their risks and vulnerabilities, and analysis of cyclone paths (Bercilla et al., 2017, as cited in Shaw et al., 2017). This effort increased communities' capacities and such analysis "provided the LGUs and other stakeholders an appreciation of the contextual drivers of exposure and vulnerability to hazard impacts, especially on the poor, marginalized and coastal populations" (Bercilla et al., 2017, as cited in Shaw et al., 2017).

Meanwhile, Risk Communication has been a significant topic for several literatures in relation to disaster preparedness because it was found out that there is a relationship between the concept of risk communication and early warning. In fact, one of the major objectives of disaster communication is to provide early warning about disaster risks to help reduce economic losses and reduce the effects of

disasters to protect lives and properties (ITC & CENN, n.d.). According to van Western & Kingma (2009b), the direct relation between these concepts is that risk communication that is focused on the imminent threat of extreme events is called early warning and is designed to create an effective and suitable emergency response (as cited in ITC & CENN, n.d.).

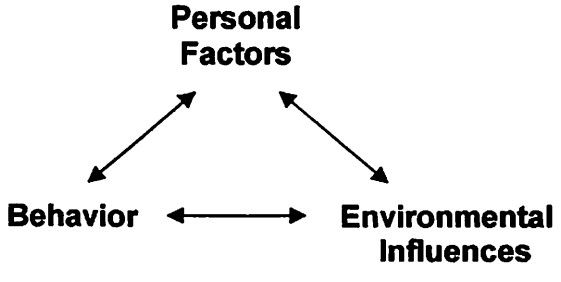
Risk communication may vary at different levels such as national, regional, or local level. What differs from national and local is the use of mass media campaigns for the national level while more focused measures are used at the local level. In the case of this study, a more focused approach and method will be used to understand the risk perception and response of an at-risk community.

Theoretical Constructs

It is hypothesized that in a social cognitive perspective, a person's behavior can be explained and described both by individual and environmental factors rather than external stimuli and inner forces (Bandura, 1978, as cited in Espina & Teng-Calleja, 2015). According to Wood & Bandura (1989), Social Cognitive Theory (SCT) presents a framework that emphasizes the interactive dynamic link of both individual and environmental factors that determine a person's behavior (as cited in Espina & Teng-Calleja, 2015). Founded as a Social Learning Theory (SLT) by Albert Bandura in the 1960s, it was developed into SCT in 1986 and hypothesized that learning happens in a social context with interaction of the person, environment, and behavior (LaMorte, 2019). While SLT assumes that people learn from one another via Observation, Imitation, and Modeling (Nabavi, 2012), SCT assumes that learning

occurs based on three factors; cognitive, behavioral, and environmental (Bandura, 1991, as cited in iSalt Team, 2014) and these factors work in reciprocal nature. Whereas SLT cannot explain and further elaborate complex behavior and cannot quite account for a person's development of a whole range of behavior, SCT stresses a better description of how people can learn from social experiences which include thoughts and feelings, thus the modification of the theory (McLeod, 2016).

Figure 1. Social Cognitive Theory Framework



Source: (Bandura, 1986, as cited in OBSSR, n.d.)

Despite several literatures using and gratifying the theory such as but not limited to fields like nutrition intervention, health behavior, and clinical psychology among others, the framework assumptions have been consistently tested. Researchers conclude that SCT's comprehensiveness and complexity make it difficult to operation allies, consider it as a framework not fully systematized, and a unified theory loosely organized (Nabavi, 2012). Other scholars' criticisms of the framework include bias to the environmental factors as the chief influence of behavior and giving limitations to explain behavior in terms of either nature or nurture (McLeod, 2016). Regardless of these criticisms, SCT is considered one of the most commonly used behavior change theories (Plow & Chang, 2019, as cited in LaMorte, 2019) because it can comprehensively explain important human social behaviors

with its social implications (Nabavi, 2012) while uniquely contrasting the traditional psychological theories which highlight learning through direct experience (Bandura, 1986, as cited in iSalt, 2014).

SCT and Disaster Preparedness

Several fields have applied SCT including disaster preparedness. According to Lee & Lemyre (2009), "a study that used SCT in the context of disaster preparedness showed people's motivation to prepare for disasters is a function of the cognitive and affective reasons to a natural hazard" (as cited in Espina & Teng-Calleja, 2015). The model is fit to explain and discuss the developmental process that initiates with factors that motivate and persuade people to prepare, to form intentions, and finally ends with decisions to prepare (Paton, 2003). This is also supported by a study on the impact of social preparedness on flood early warning systems that concludes how social preparedness is strongly influenced by human behavioral traits which include risk awareness, trust in authorities, recency of flood experience, or interaction between the society and environment (Lopez et al., 2017).

Hence, SCT provides disaster experts with variables to look into how individuals are motivated to prepare considering their social environment, thus deeply understanding the reasons for their behavior and behavioral patterns. In addition, one study verifies that "individual and community factors contribute to an individual's intention to prepare for disasters (McIvor, Paton, & Johnston, 2009, as cited in Espina & Teng-Calleja, 2015). Hence, SCT provides a suitable framework on how to understand individual's behavior toward disaster preparedness, contributing

to how agencies should approach the society in terms of disaster management measures and eventually mitigating risks and losses caused by various hazards and natural disasters.

SCT and Warning Communication

Since warning communication forms part in disaster preparedness, the response behavior to risk information is also assumed to be understood and stipulated through SCT. Similar to disaster preparedness, the framework can work towards understanding individual's motivations to respond when faced with warnings and advisories. In this case, since the framework's assumption is founded on individuals acquiring and maintaining behavior in a social context, it is used to understand the actual relationship between individuals motivation to respond and flood warnings in general, as supported by the conceptualization of the study by Lopez et al. on flood warnings and society (2017).

Conceptual Framework

To understand the relationship between the social cognitive factors and an individual's behavior to respond when faced with flood warnings, this study used the modified variables of SCT to appropriately analyze their relationship. The modified framework best supports Bandura's statement that human beings are the main

managers of their own behavior and not based on observational learning being a simple imitative process (Bandura, 2001, as cited in iSalt Team, 2014).

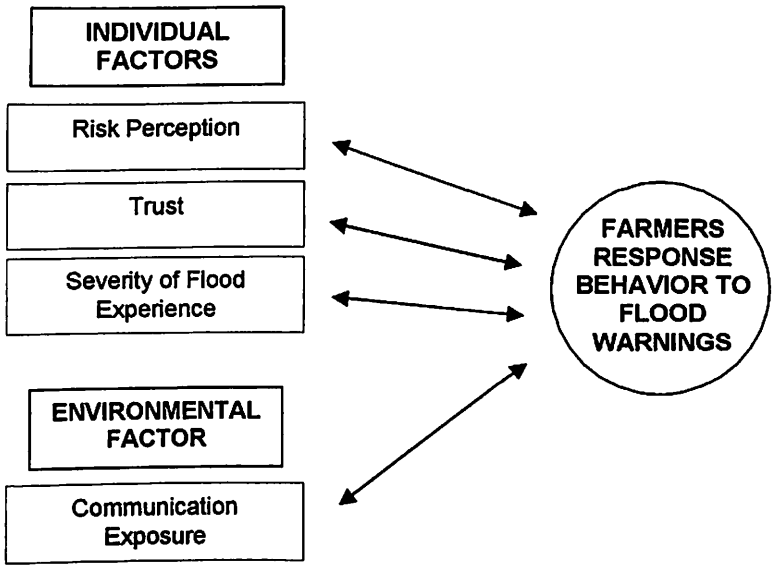


Figure 2. Individual and Environmental Factors Influencing Response Behavior

Operational Definition of Variables

Based on the modified framework, the four independent variables of this study are categorized under Individual and Environmental Factors. Risk Perception refers to how farmers perceive flood and its threat including their analysis of their vulnerability to the disaster. The first independent variable was measured using a five-level Likert scale with numerical scores, where 1 is "strongly disagree" and 5 is "strongly agree". Questions include perceived risk of flooding, emotions linked with risk, likelihood of risk to affect their family and their community, their vulnerability to risk, and perception of flood risk whether it may be increasing or decreasing.

The second independent variable, trust, refers to the extent on how credible the farmers believe risk information and its source is. Respondents were asked with items to rate the responsibility of agencies to control and handle the flooding problem and the value of risk information if they deem it credible. This was measured using a five-level Likert scale with numerical scores, where 1 is "strongly disagree" and 5 is "strongly agree".

Next, the severity of flood experience refers to farmers' past flooding experiences. This adapted measures from Espina & Teng-Calleja's study (2015) to measure this variable and farmers were asked questions based on their experience following the recent flooding caused by Typhoon Basyang last 2018. Questions include perceived threat to life, injury to self or another household member(s) and/or community members, death of relative or death of someone in the community, escaped being washed away or seeing nearby village(s) being washed away, and house and property damage. The scores were measured by counting the number of yes and no answers (Mishra et al., 2009, as cited in Espina & Teng-Calleja, 2015).

The last independent variable, communication exposure, refers to farmers' extent to which they are exposed to different communication channels during the dissemination of flood advisories. This may also refer to how flood warning content was relayed using various formats, and how often do they receive such warnings. Respondents were asked how they would like the warnings to be communicated to them (e.g. via bulletin, SMS, social media, radio announcement). Moreover, respondents have selected from the provided communication channels available in the local scene. Aside from choosing the channels, all items were measured using a five-level Likert scale with numerical scores on frequency, where 1 is 'never' and 5 is 'always'.

Lastly, to identify and measure response behaviors of farmers when faced with flood warnings, respondents were provided items which include preparing for emergency kit, securing their family and property, evacuation, re-echo of warnings to neighbours and relatives, etc. The score was generated by counting the number of yes or no answers.

Hypothesis

The study's basic assumption is that the response behavior of farmers to flood warnings is predominantly influenced by individual and environmental factors, hence the study's hypothesis: "There is a relationship between factors risk perception, the severity of flood experience, trust, and communication exposure to the farmer's response behavior towards flood warnings".

Chapter III

METHODOLOGY

Research Design

Mixed methods were used in this study. Since the study both employed quantitative and qualitative approaches to achieve its objectives, the mixed method was appropriate. According to Leech & Onwuegbuzie (2008), the method involves collecting, interpreting, and analyzing both quantitative and qualitative data that investigates a single study or same underlying phenomenon (as cited in Cameron, 2015).

In particular, the concurrent triangulation design type of the mixed method design was used in this study. Generally, a triangulation design can be used "to obtain different but complementary data on the same topic" (Morse, 1991, as cited in Creswell, 2006). According to Creswell, researchers use this design when they want to directly compare and contrast quantitative results with the qualitative findings and/or to validate the quantitative results with the qualitative data (2006).

Specifically, the convergence model of the mixed method triangulation design appropriately represented the process of treating both quantitative and qualitative data. The convergence model refers to collecting both quantitative and qualitative data separately in a research and different results are converged (Creswell, 2006). In this case, data and results from the survey (quantitative) were validated with the qualitative findings from the KII and document review to better understand the behavior of farmers towards flood warnings.

Respondents and Study Area Profile

Barangay Panikian is one of the 14 barangays of the Municipality of Carrascal, Surigao del Sur Province. The barangay is located approximately 115kms from Surigao City, Surigao del Norte, and 70kms from Tandag City, Surigao del Sur. It was created in 1910 with a total land area of 2,111 has. with 6 puroks and 3 sitios; Banban, Maslog, and Pili (BDP, 2019). Its total population is 3,445, of which non-ethnic residents are mostly farmers where their average income is P18K-P30K per household per year.

Of the total land area, 9.44% or 26,580 hectares are predominated with land assets with the following specifications; Agricultural Cropland (1510.74 hectares), Forestland (603.26 hectares) and Mineral Land of 30 hectares. Residential and commercial spaces take up 353 hectares of the total land area. It can be noted that the largest portion of the barangay's terrain, which is 57% of the total land area or 1,431.27 hectares, is classified as Plain/Flat in which agricultural production prevails. To add, the soil type in the area is predominantly sandy loam with a mixture of clay, clay loam, loam, and sandy which produces a sticky soil texture during rainy season (BDP, 2019). These features basically contribute to majority of the area being vulnerable to flooding, as supported by the results from the geohazard assessment conducted by the LDRRMO.

In 2016, the Local Government Unit (LGU) of Carrascal has established and institutionalized LFEWS particularly Rain Gauge to respond to the flooding incidents caused by river overflows highly associated with high rainfall rates. LGU Carrascal is

among the several municipalities in the CARAGA Region that adopted LFEWS because the region is generally flood-prone because of its topography. Additionally, out of the 14 barangays of the municipality, 12 are identified as vulnerable to flooding (flash floods and/or fluvial flooding).

LGU Carrascal adopted the system thru a third party provider and the provider installed and set up the system at Barangay Pantukan with an upstream river and Barangay Panikian as the area where flood usually occurs with the connecting river being the Dinayhugan river.

Research Instrument

This study used a self-administered survey questionnaire and employed the proportional allocation of stratified sampling to survey a total of seven (7) villages. Out of the nine (9) villages of the barangay, only Villages 1-7 were surveyed since these villages are the central farming communities that are predominated by agricultural cropland.

Essentially, proportional allocation "is a procedure for dividing a sample among the strata in a stratified sample survey" (Lavrakas, 2008). According to Barangay Panikian Council, in estimation, there are a total of 113 farmers from Villages 1-7. To implement the stratified sampling in proportional allocation, the total population was divided into seven (7) institutions (represented by seven (7) villages) before sampling (Lavrakas, 2008). Thus, the computed sample size is 88 participants.

The survey questionnaire was first subjected to validity and reliability tests. Foremost, the survey instrument was validated by the thesis panel to assure the accuracy of survey information. After the validity test, pilot testing was conducted to assure reliability of survey information through application of Cronbach's alpha. According to Bolarinwa, Cronbach's alpha "is the most commonly used measure of internal consistency reliability" (2015).

Since the method should not include subjects in the original target population, pilot testing was conducted to farmers in Barangay Bacolod with the following considerations; (1) Barangay Bacolod has similar characteristics with Barangay Panikian being a flood prone low-lying barangay, and (2) Barangay Bacolod also has a large land asset classified as agricultural cropland, hence, farming is also the major source of livelihood in the barangay. In this study, pilot testing was conducted to at least 10% of the study's sample size. Since Barangay Bacolod has eight (8) villages, the researcher surveyed two (2) farmers from each village. Results of the pilot testing were subjected to t-tests to satisfy the reliability of the survey questionnaire.

The conduct of the survey was done through a door-to-door approach. Before distributing the survey questionnaire, respondents were asked to sign an informed consent and whether they opt to answer the questionnaire on their own or have the interviewer ask the questions for them. For the respondents' convenience, survey information was translated to Surigaonon.

The questionnaire was divided into six 6) major sections mainly; (i) socio-demographic profile, (ii) risk perception items, (iii) trust items, (iv) severity of flood experience items, (v) communication exposure items, and (vi) response behavior items. Section iv and vi have the dichotomous category wherein items are

answerable by either yes or no, Sections ii and iii employed the five-level Likert scale with numerical scores. The Likert-scale for variables risk perception and trust were coded as follows; (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, (5) strongly agree while Section v (communication exposure) used the frequency Likert-scale and coded as follows; (1) never, (2) rarely, (3) sometimes, (4) very often, and (5) always. The scaling method was used to measure these variables because the scaling technique is widely used in social sciences research in measuring socio-psychological constructs like perception and attitude (Raghuvanshi & Ansari, 2019). The survey served as the main method for gathering first hand quantitative data from the farmers.

Statements for Section II (Risk Perception), Section III (Trust to Source and Warning Content), and Section V (Communication Exposure) were answerable by a five-point Likert scale. Before the actual survey, pilot testing was conducted at Barangay Bacolod using a survey questionnaire with the following statements:

Risk Perception (*Cronbach's Alpha = 0.521*)

1. Flooding will likely occur in your barangay/community
2. Flooding is considered one of the most devastating natural disasters in your community
3. Flooding causes huge financial loss to families, livelihood, and properties
4. Flooding greatly affects the quality of life in the community
5. Flooding causes fear and panic among community members
6. Effects of flooding will unlikely be controlled by community members
7. In general, I think me and my family is at risk from the effects of flood disasters

8. I can hardly adopt to whatever mitigation actions is/are needed/necessary

The test showed that all the Cronbach's Alpha (CA) Items for Risk Perception was below the acceptable internal consistency value of at least 0.70. Nevertheless, if Item 1 is deleted, the value of CA will increase to 0.558 which is a little less close to the acceptable value. Thus, Item 1 was deleted.

Trust to Warning Content (*Cronbach's Alpha = 0.885*)

1. Flood warnings provided by source is reliable information
2. Flood warnings provided by source is accurate and based on facts
3. Flood warnings provided by source is true without falsehood
4. Flood warnings provided by source is fair and proven
5. Flood warnings provided by source is based on deep knowledge
6. Flood warnings provided by source is clear and easily understood

Trust to Information Source (*Cronbach's Alpha = 0.930*)

1. Source of warning content is credible and reliable
2. Source of warning content is capable and expert in providing and analyzing flood warnings
3. Source is responsible for mitigation measures and/or protective actions
4. Key actors involved in disseminating flood warning content are credible and reliable
5. In general, government agencies can be trusted in terms of flood warning communication

The test showed that the CA values for both Warning Content and Information Source were more than the acceptable value. Thus, there was no need to delete any item in this Section.

Communication Exposure (*Cronbach's Alpha = 0.525*)

1. How often are you alerted by the disseminated flood warning information in the community during flood disaster?
2. How frequent do you encounter evacuation warnings during a flooding?
3. How frequent do key actors disseminate flood warning information to the community before a foreseen flooding?
4. How often do you seek flood information through family members and/or community members?
5. How frequent do you seek flood information from local authorities before a foreseen flooding?
6. How often are you exposed with any of the traditional media channels (radio ads/announcements, TV, door to door announcements/bandillo) during the dissemination of flood warning information?
7. How often are you exposed with any of the new media channels (SMS, social media, mobile apps, web, blogs, emails, chatrooms, etc) during the dissemination of flood warning information?

In Section V (Communication Exposure), items were answerable with the frequency Likert-scale. The test showed that the CA value was less than the acceptable value. Nevertheless, if Item 7 is deleted, the value of CA will increase to 0.637 which is closer to the acceptable value. However, the researcher deemed Item 7 as an

important statement in the overall assessment of exposure to new media of respondents. Thus, Item 7 was instead modified.

The qualitative part of the study included two parts; the document review and the Key Informant Interview (KII). The document review focused on reviewing and analyzing files related to adoption, establishment, and management of LFEWS and other pertinent documents related to issuing flood warnings and/or warning communication in general. KII was subjected to two (2) key actors, the head of Barangay Panikian Disaster Council, Punong Barangay Hon. Mamelito Cabadonga and Kresta Mae I. Paas, RSW, Carrascal Local Disaster Risk Reduction and Management Officer (LDRRMO), who greatly took part in the creation and dissemination of LFEWS warnings in the barangay. Key actors were selected because of their specific functions and roles. KII was very appropriate for gathering data from individuals who execute and lead an organization related to warning communication. Additionally, interviews were framed from the experiences during the Typhoon Basyang flooding last 2018 to identify and assess their understanding of early warning information. Facts such as how they disseminate early warning information, what communication channels were used, and several factors they considered during the process were also identified. Questions were aimed at classifying what communication strategies used were effective and convenient for the organization and gaps and challenges that need to be further addressed.

Method of Data Analysis

Collected quantitative data from the survey were subjected to descriptive and statistical analysis thru Chi-Square Test using Statistical Package for the Social Sciences (SPSS). Specifically, the Chi-Square Test of Independence was used since it "compares two variables in a contingency table to see if they are related" (Glen, n.d.). Chi-Square Test of Independence was chosen to discover whether the independent variables have a relationship with the dependent variable, thus the behavior of farmers to flood warnings. Accordingly, the method was appropriate with the study's assumption because the Test of Independence "assesses whether an association exists between the two variables" (Statistics Solution, n.d.). Thus, the test determined if a relationship exists between two variables and if they are truly independent of each other (Hayes, 2020).

Meanwhile, data from the document review and interviews were examined and analyzed through the premises of SCT to validate the qualitative results.

Chapter 4

RESULTS AND DISCUSSION

LFEWS

The Municipality of Carrascal has adopted a Local Flood Early Warning System particularly Rain Gauge. It was installed and institutionalized in 2016 by 7 Lakes Communication Systems, Inc., a third service provider duly registered as Radio Communication Equipment (RCE) Dealer with services focused on the Radio Communications Equipment category.

Basically, the system's operation starts from catching and gathering rainfall data from the equipment located at the upstream river of Barangay Pantukan. The equipment then sends the collected data through an alert to the network named Carrascal Unified Communication Network System set up at the Municipal Disaster Risk Reduction and Management Office (MDRRMO) (K. Paas, personal communication, August 30, 2020). After data assessment and reading by the Disaster Officer, LDRRMO Paas will then send a communication to the barangays concerned in cases where there is reported intense rainfall or if there are detected changes to certain parameters. Paas added that reading and interpretation of data is based on the system's operational manual procedures and not anchored on any Philippine agency's guidelines.

According to LDRRMO Paas, sending of communication is through SMS messaging and/or radio communication (K. Paas, personal communication, August 30, 2020) since some are far flung barangays with no mobile phone signal.

Socio-Demographic Profile

After conducting the pilot testing with 16 farmers as respondents in Barangay Bacolod last July 5 and July 11, 2020, the final survey was conducted at Barangay Panikian last July 25 and August 8, 2020 respectively. Eighty-eight (88) farmers participated in the survey, of which population is composed of 41 males and 47 females. Eight (8) out of 10 participants are married (81%) while the distribution of participants in terms of gender was almost equal. In terms of age, the participants' average age is 53 year-old with 25 year-old and 73 year-old as youngest and oldest, respectively. Hence, it can be inferred that the average farmers' population in the barangay is composed of middle-aged farmers.

Based on Table 1, it shows that Barangay Panikian farmers have an average farming experience of more than 10 years (80%) with the majority of them using rice as their primary crop (80%). All of the participants have no ethnic group while a third of them came from Village 6 with 31 respondents. Seven (7) out of 10 participants have low family income (73%) with earnings below PHP 50,000 yearly while the average hour spent on farming was 4.9 hours.

Table 1. Demographic Profile

PROFILE	CATEGORY	%	SIGNIFICANCE
AGE	Average = 53 years		0.629*NS*
GENDER	Female	53%	0.580*NS*
	Male	47%	
CIVIL STATUS	Married	78%	0.975*NS*
	Single	12%	

Table 1 (continued)

	Widowed	10%	
PUROK	1	13%	0.133*NS*
	2	14%	
	3	9%	
	4	8%	
	5	10%	
	6	35%	
	7	11%	
FARMING EXPERIENCE	1-5yrs	9	0.666*NS*
	6mos-1yr	6	
	6-10yrs	2	
	6mos below	1	
FAMILY INCOME	Low	64	0.695*NS*
	Middle	20	
	High	4	
HOURS SPENT ON FARMING	Average = 4.9 hours		0.468*NS*
CROP VARIETY	Rice	80%	0.006**
	Mixed	17%	
	Corn	2%	
	Others	1%	

Farming experience responses were coded 1 = Less than 6 months, 2 = Six months to one year, 3 = One to five years, 4 = Six to ten years, 5 = More than ten years

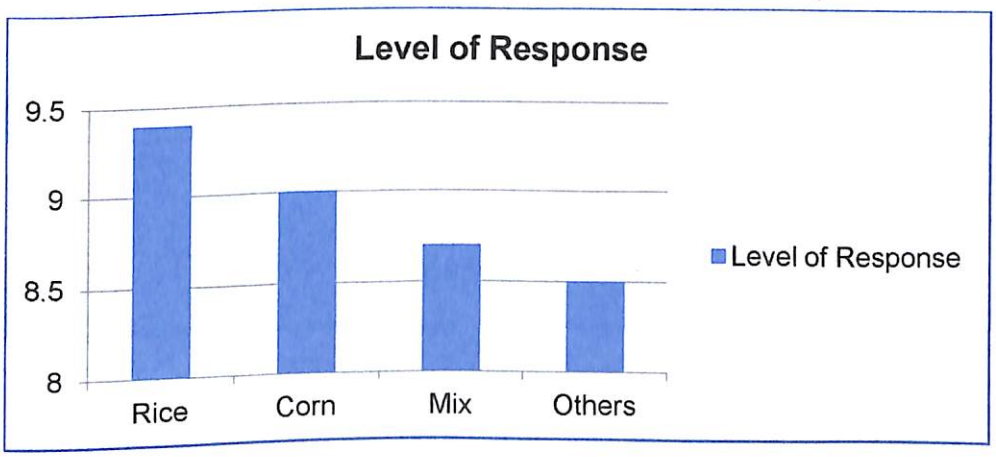
Family income responses were coded Low = Below PHP 50,000, Middle = Between PHP 50,000-PHP120,000, High = More than PHP 120,000

It can be noted that the test of factors under the demographic profile was not significant, except for Crop Variety (*p=0.006*) in terms of determining the level of response behavior of participants. Though demographic characteristics are deemed important and believed to influence response behavior to warnings, research has not shown any clear results or relationship demonstrating their interrelated impact (Brynielsson et al., 2017).

Among the factors under demographic profile, only the *Crop Variety* factor was a significant factor that influences the level of response behavior of farmers.

Hence, the average level of response behavior between farmers who used a different variety of crops was different. This might be attributed to the fact that a majority of the farmers in the barangay preferred rice than corn as their major crop all throughout the year. More farmers also prefer cultivating rice than any other crop variety during the wet season due to its cultivation condition which requires a regular supply of water for moisture. Floods are frequent during the wet season. In fact, rice is traditionally grown in flooded areas (Barth, 2018) due to its cultivation condition. Hence, farmers have more prior experience as to how floods affected their rice fields and how they responded to flooding events compared to when they cultivate other crop varieties. This can be supported in the figures shown in Figure 1 where survey results revealed that farmers who used rice as a primary crop have the highest average level of response.

Figure 3. Level of Response based on Crop Variety



Risk Perception

In Section II, all seven (7) items under Risk Perception were interpreted as 'Strongly Agree'. The test of determining Risk Perception as a significant factor was discovered significant in influencing the level of response behavior of farmers with a significance value of (*p=0.021*). Hence, Risk Perception has an influence on the level of response behavior of farmers. Furthermore, participants who agree with the Risk Perception questions tended to have high levels of response, as provided in Table 2.

Table 2. Risk Perception, *Significance = 0.021****

STATEMENTS	MEAN
1. Flooding is considered one of the most devastating natural disasters in your community	4.32
2. Flooding causes huge financial loss to families, livelihood and properties	4.74
3. Flooding greatly affects the quality of life in the community	4.60
4. Flooding causes fear and panic among community members	4.74
5. Effects of flooding will unlikely be controlled by community members	4.70
6. In general, I think me and my family is at risk from the effects of flood disasters	4.66
7. I can hardly adopt to whatever mitigation actions is/are needed/necessary	4.51
Over-all	4.61

Responses were coded as 1=Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Disagree

Interpretation = 1.-1.8 – Strongly Disagree, 1.9-2.6 – Disagree, 2.7-3.4 – Neutral, 3.5-4.2 – Agree, 4.3-5 – Strongly Agree

Of the Risk Perception items, the top three statements show how farmers consider flooding as one of the causes of huge financial loss to families, livelihood, and to their properties (Statement 2, *M=4.74*) as well as causing panic and fear among community members (Statement 4, *M=4.74*). They also consider the effects of flooding as 'unlikely' to be controlled by community members (Statement 5,

M=4.70). Moreover, farmers also consider that they and their families are at risk from the effects of flood disasters in the community (Statement 6, *M=4.66*). The high level of response to the items was validated and supported by statements of Hon. Mamelito Cabadonga, Barangay Captain of Barangay Panikian during the KII where he stipulated how locals in the barangay have changed their risk perception to flood after the onslaught of TS Basyang last February 2018. To quote, "they already have fear of floods due to Basyang and it will serve as our basis for flooding events" (M. Cabadonga, personal communication, August 30, 2020).

Influences on Respondents' Risk Perception

Based on the data presented, top statements on Risk Perception items reflected a high perceived vulnerability and perceived likelihood among farmers on floods because of the 2018 TS Basyang flooding. It is highlighted that the top three (3) statements with the highest significance are statements that express a probability that the community members will be harmed by flooding events and presentation of effects and likelihood that a flooding event will occur. It can be noted that the Municipality of Carrascal considered TS Basyang flooding as one of the most disastrous flooding events in the history of the municipality because one of the upland barangays, Barangay Babuyan with a total of 274 families, was totally relocated due to the severe damages the flooding has brought. Plus, it can be noted that Barangay Babuyan and Barangay Panikian are adjacent barangays.

The high perceived vulnerability and perceived likelihood can be linked to one of the factors believed to affect the quantitative estimates of risk which is the

'availability' heuristic. Availability heuristic is considered one of the cognitive shortcuts which means that "events that are easily remembered or imagined are more accessible or "available" to people, so that their frequencies are overestimated (Tversky and Kahneman, 1973, as cited in National Academy of Sciences, 1997). On a practical note, because of the availability heuristic, people easily bring or discuss examples of hazards to people's minds in estimating hazard probability (Keller, Siegrist, & Gutscher, 2006). However, this cognitive bias somewhat has a negative effect because people overestimate the likelihood of risk occurrence or frequency due to a certain risk that has recently been reported or recorded, say in popular press (Tversky and Kahneman, 1973, as cited in National Academy of Sciences, 1997).

Research by Weinstein (1989) (as cited in Keller, Siegrist, Gutscher, 2006) also suggests that past experience plays an important factor in influencing people's hazard perceptions and is found out that after a damaging event or a risk experience, people take precautions more readily (Jackson, 1981, as cited in Keller, Siegrist, & Gutscher, 2006). It can also be highlighted that past experiences from a natural hazard are linked with a negative effect and might increase risk perception (Keller, Siegrist, & Gutscher, 2006). Based on the gaps identified under the State of DRRM in the municipality, "the prevailing trend that is happening is that people tend to realize the importance of DRR after they have experienced extreme losses after a tremendous disaster event" (State of DRRM of LGU Carrascal, n.d.). In this context, the negative effect of the cognitive bias (availability) plus the negative effect brought by past experience of a natural hazard (in such case, the TS Basyang Flooding) may have been the major influences on the farmers' high risk perception. The

interrelationship of these concepts has been validated in various studies on risk perception and climate change. To cite,

> "risk perception often concerns future events (Sjöberg, 2000) and because affective evaluations of future risks largely depend on the vividness with which negative consequences can be represented mentally (Damasio, 1994; Weber, 2006), it logically follows that personal experience with the impacts of climate change and affective processing are closely interrelated (Marx et al., 2007)" (Linden, 2014).

Thus, in this case, the cognitive and affective aspects are believed to have been linked. This notion has been supported in a study by Slovic et al. (2004) where he suggested that risk perception should be thought of as a dual process, both associating cognitive and affective systems of thinking and information processing (as cited in Altarawneh, Mackee, & Gajendran, 2018).

It can also be noted that the lowest significance among the risk perception items is Statement 1 which stipulates that flooding is considered one of the most devastating natural disasters in the community. According to Local Disaster Risk Reduction and Management Officer (LDRRMO) Kresta Paas, Barangay Panikian has since experience perennial flooding (K. Paas, personal communication, August 30, 2020) and possibly fluvial flooding (Municipal Flood Contingency Plan, 2010). Perennial flooding in this area is usually caused by extreme rainfall in adjacent barangays as per data from Surigao City and Hinatuan Synoptic Stations (Municipal Flood Contingency Plan, 2010) while fluvial flooding can be caused by excessive water release from Dinayhugan Dam located in Barangay Panikian. With this data in addition to the fact that Barangay Panikian is a low-lying barangay, it is given that its community members are already accustomed to yearly flooding. This might explain

why Statement 1 was the lowest among the items because the respondents experience yearly flooding in their areas due to the mentioned factors, making the frequent occurrences of floods normal to them.

To conclude, these influences support the premises of SCT where it "takes into account a person's past experiences, which factor into whether behavioral action will occur" (LaMorte, 2019). Past experience is seen as one of the influences to expectations, reinforcements, and expectancies that all shape whether a person will engage in a specific behavior or the reasons why certain people engage into that specific behavior (LaMorte, 2019). Risk perception in this context has been considered significant based on farmers' personal experience, cognitive and environmental influences. This indicates that risk perception affects the farmers' decision in terms of their response behavior towards flood early warnings.

Trust to Warning Content

In terms of Trust in to the content of flood warning messages, survey findings showed that Trust to Warning Content was not found significant in influencing the level of response of farmers ($p=0.093$). Hence, it can be concluded that Trust to Warning Content has no influence on the response behavior of farmers towards flood advisories.

Table 3. Trust to Warning Content, *Significance = 0.093NS*

STATEMENTS	MEAN
1. Flood warnings provided by source is reliable information	4.72
2. Flood warnings provided by source is accurate and based on facts	4.67
3. Flood warnings provided by source is true without falsehood	4.69
4. Flood warnings provided by source is fair and proven	4.70
5. Flood warnings provided by source is based on deep knowledge	4.63
6. Flood warnings provided by source is clear & easily understood	4.73
Over-all	4.69

Responses were coded as 1=Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Disagree

Interpretation = 1.-1.8 – Strongly Disagree, 1.9-2.6 – Disagree, 2.7-3.4 – Neutral, 3.5-4.2 – Agree , 4.3-5 – Strongly Agree

Statistically, warning content is not significant in terms of influencing the response behavior of farmers. However, it can be noted in Table 3 that in general, farmers indicated 'Strongly Agree' in all six (6) items for warning content. From the six (6) items, the top three (3) statements are statements that focus on clarity, reliability, and level of understanding on flood warnings issued (Statement 6, *M=4.73*); (Statement 1, *M=4.72*); (Statement 4, *M=4.70)*. Among the statements, the clarity and the level of understanding on warnings were tagged as the highest (Statement 6, *M=4.73*) and were strongly agreed upon by the respondents.

Influences on Respondents' Trust to Warning Content

Respondents concluded that flood warnings issued were clear, reliable, and easily understood. One possible reason for this is the localisation of creation and dissemination of flood warnings and advisories. In Carrascal, all flood-prone barangays are given the main responsibility by the local government to assess their

local condition and release their own flood warnings based on their conditions. Except for flood, all other hazard-specific messages are released by the LDRRM Office down to the barangay level. According to Paas, flood warnings are specific and customized (K. Paas, personal communication, August 30, 2020). In this case, the creation and dissemination of flood warning is a bottom-up approach since the barangays are responsible for assessing the threat and the likelihood of flood occurrence in their area. After assessment, disaster response will be identified by the barangay which includes the localized issuance of warnings. Hence, as Paas reiterated, the barangays are mainly responsible for the creation and dissemination of flood warnings based on their risk and hazard assessment (K. Paas, personal communication, August 30, 2020). This might explain why respondents have high responses because the Barangay Panikian council uses local language and terminologies in creating and disseminating flood warnings.

This finding also adjoins existing discussions on how localisation and locally-led efforts on creation, formatting, and dissemination of flood warning messages can be more beneficial to communities at-risk. Aside from aiming a better understanding of warnings, the utmost consideration in creating flood warning messages using the local language is the minimisation of flood damage to the communities (Rahman, Goel, & Arya, 2012).

Several researches suggest other factors might have been overlooked since there has no established significance with trust to information content despite high responses in almost all statements.

Consistent and Technical-Based Messaging

According to IFRC Geneva, "research indicates that effective public education for DRR requires sustained repetition of the same messages" (2013). In another research by IFRC (2011), one of the four principles for effective implementation of public awareness and education on DRR is consistency and standard messaging. These literatures emphasized the importance of consistency in order to establish legitimacy, credibility, and strong impact (IFRC, 2011). Repetition of warnings is considered key towards promoting urgency in key and resilience messages. Based on practice, Barangay Panikian Council typically disseminates flood warnings once followed by evacuation warning messages, if the case worsens (M. Cabadonga, personal communication, August 30, 2020). Hence, the barangay local government unit (BLGU) should also consider this factor for establishing community members' trust in flood warning content.

Moreover, in a study by Perera et al. (2019), one of the several technical challenges identified in developing countries is the lag in terms of ground records integration and Numerical Weather Predictions outputs, among others, in creating forecasts and risk knowledge information. To quote, "globally, 75% of the flood forecasts (based on this study) indicated that their river basins are equipped with insufficient gauging stations for rainfall, water level and streamflow observations" (Perera et al., 2019). It can be noted that Panikian only has one (1) installed river level marker placed in Maslog River and this might have affected the way key actors generate forecasts due to inadequate hydrological networks present in the area. Said technical challenge poses greater issues ahead such as poor catch of quality data, short records of data, or worse, measurement data errors. These factors may

affect data quality and accuracy, which in turn also affects how officials generate forecasts and flood warnings.

In conclusion, warning messages must be credible and accurate for them to be trusted by the community. Said technical challenge may have been the explanation why Statement 5 *(warnings provided by source is based on deep knowledge)* ranked the lowest among all statements in this section (*M=4.63*).

Trust to Source

In terms of Trust to Information Source, survey results indicate that the said factor has no influence on the level of response behavior of farmers. Thus, trust to warning source influencing the level of response behavior was not significant (*p=0.265*). Nevertheless, it was noted that in over-all, farmers strongly agreed with all the five (5) items concerning trust to the information source, as reflected in Table 4.

Table 4. Trust to Information Source, *Significance = 0.265NS*

STATEMENTS	MEAN
1. Source of warning content is credible and reliable	4.73
2. Source of warning content is capable and expert in providing and analyzing flood warnings	4.68
3. Source is responsible for mitigation measures and/or protective actions	4.67
4. Key actors involved in disseminating flood warning content are credible and reliable	4.60
5. In general, government agencies can be trusted in terms of flood warning communication	4.75
Over-all	4.69

Responses were coded as 1=Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Disagree

Interpretation = 1.-1.8 – Strongly Disagree, 1.9-2.6 – Disagree, 2.7-3.4 – Neutral, 3.5-4.2 – Agree , 4.3-5 – Strongly Agree

Survey results revealed that the top statements are statements on how respondents find the sources of information credible and reliable in terms of flood warning communication (Statement 5, *M=4.75*); (Statement 1, *M=4.73*); (Statement 2, *M=4.68)*. Generally, farmers trust government agencies in terms of handling flood warning communication. This was tagged as the highest response among all the statements under this factor. This result reflects how harmonized and linked the efforts of the barangay with the local government is. It has been discussed that while the barangay creates and disseminates its own flood warnings, the local government has also taken its role in leading DRR efforts by capacitating barangay officials and stakeholders. While it is known that the Carrascal Municipal Disaster Office was newly institutionalized last 2017, establishing their relationship with the grassroots level has been one of the greatest accomplishments of the office by far. According to Paas, constant monitoring and coordination with the Barangay Local Governments (BLGUs) is key to an effective implementation of disaster management plans and efforts (K. Paas, personal communication, August 30, 2020). Whereas the BLGUs lead the effort for flood warning communication, the local government supports the barangays by executing programs and projects advocated and proposed by the BLGUs on flood risk management. In fact, LGU Carrascal through the Municipal DRRMO has institutionalized a Flood Contingency Plan last 2010 way before the Disaster Office was even created and fully operationalized. This shows how focused the government agencies are in terms of their efforts in flood hazard management.

Influences on Respondents' Trust to Information Source

Among the statements on Trust to Information Source, Statement 5 (*M=4.75)* scored the highest reflecting how farmers truly trust government agencies in handling flood warning communication. One possible explanation is the community-based warning system for flood hazards. It has been discussed that the flood warnings are produced from the barangay level, with barangay officials taking the lead from hazard assessment down to dissemination of flood warnings. In a study by Mileti et al., (2006), it was found out that people are more likely to believe or respond to warning messages coming from official sources that are generally characterized as governmental (as cited in Steelman, McCaffrey, Velez, Briefel, 2014). Researchers assert that typically, the public does not analyze risk information for themselves, rather relies on others to process the risk information (McCallum et al., 1991) further recommending that in this context, sources, according to Mileti et al. (2006) are viewed as trustworthy, credible, and useful information source (as cited in Steelman et al., 2014).

It can also be noted that respondents find the source of warning as credible and reliable. Although the factor is not significant with the level of response behavior, in general, respondents had high responses on statements related to credibility and reliability of source. This may be credited on the ground that sources of information are barangay officials who are local community members as well. Different studies revealed similar results where local institutions such as local emergency management, local fire protection, among others had higher competency and trust scores compared to administrative and national political sources and instilled greater trust than federal officials (Jungermann et al., 1996; Wray et al., 2006, as cited in

Steelman et al., 2014). Another study on how disaster relief works affect trust in local government points out that this duality comes from the division of responsibilities and that "while the central government is undisputed as the source of policy and law, implementation falls almost entirely in local entities" (Han, Hu, & Nigg, 2011). Furthermore, in a study by Rahman, Goel, & Arya, it is emphasized that "people's participation at the community level is essential in the response of early flood warning" (2013). One major factor that might have contributed to the high response to these statements is the involvement of communities in the process. As Parker et al. (2007) describe, warnings does not reach everyone in the community for most cases prior to flooding, thus, involvement of communities is integral for a successful EFWS (as cited in Rahman, Goel, & Arya, 2013). These facts suggest that other interventions should be considered for warnings to better appeal to the farmers' feelings and motivations and eventually their decision to act and respond during flood events as well.

Technical Expertise and Manpower

The Barangay Panikian warning communication team is composed of barangay officials and CVOs. According to Hon. Cabadonga, the team is primarily responsible for the creation and dissemination of flood warnings (M. Cabadonga, personal communication, August 30, 2020). These members regularly attend capacity building seminars in disaster management to equip them with knowledge on various hazards and risks. However, despite their significant roles, it can be noticed that they lack the technical expertise and manpower in terms of flood and other

hazard forecasting. A recent study showed that one of the recognized challenges in FEWS operation is the lack of expertise and manpower in terms of flood forecasting (Perera et al., 2019). According to the study, this is a common operational system issue for most communities especially for developing countries where there is a recognized lack of investment in personnel and permanent staff (Perera et al., 2019). Warning context must be accurate and should be based on proper integration of data to produce effective and timely forecasts to provide guidance to the warnings. And "to take that guidance, however, people must trust the source" (The National Academies of Sciences-Engineering-Medicine, 2018).

Several studies also support how trustworthiness of source is associated with the quality and accuracy of the forecast disseminated. Based on the results however, the high responses to statements did not reflect significance. This result appears to be supported by one of the core concepts of SCT where it recognizes that just because there is learning, it does not necessarily imply or result in behavior change (Bandura, 1977, as cited in Cherry, 2019). In such cases, other factors should also be considered to appeal to people's motivations and learning behavior to fully understand how behaviors are initiated and maintained.

Severity of Flood Experience

Survey findings showed that the factor Severity of Flood Experience was not significant ($p=0.928$) in influencing the level of response behavior of farmers. Hence, severity of flood experience has no influence on the level of response behavior of farmers towards flood advisories. Results also revealed that there were no

consistent answers of participants in all eight (8) questions under this factor, as shown in Table 5.

Table 5. Severity of Flood Experience, *Significance = 0.928NS*

STATEMENTS	YES	NO
1. Have you or any of your family members/relatives/community members experienced harm or threat to life during the flood event?	77(88%)	11(12%)
2. Have you experienced loss of a family	20(23%)	68(77%)

Table 5 (continued).

member(s)/relative(s)/community member(s) due to flooding?		
3. Have you or any family member(s)/relative(s)/community member(s) experienced being washed away due to flooding?	44(50%)	44(50%)
4. Have you witnessed part of your village or seeing nearby village being washed away due to flooding?	46(52%)	42(48%)
5. Do you often come across flooding in your community?	52(59%)	36(41%)
6. Do you think your preparedness and readiness for flooding is due to your experience and exposure with flood disaster?	86(98%)	2(2%)
7. Do you used to evacuate during flood disaster?	72(82%)	16(18%)
8. Do you take a relatively long time to return home after evacuation?	30(34%)	58(66%)

Influences on Severity of Flood Experience

Despite response inconsistencies, it can be noted that there are notable statistics with the statements. For one, Statement 6 has the highest YES response percentage (98%) among all statements where respondents agree that their preparedness and readiness to flooding is due to their experience and exposure to flood disasters. To add, the third highest YES response percentage is Statement 7 where respondents revealed that they used to evacuate during flood disasters at

82%. These may be attributed to the fact that the community experiences perennial flooding every year, thus, they have several flooding exposure and experiences throughout the years. Similarly, this may also be relevant to Statement 2 which is the highest NO response percentage among all statements at 77% where respondents agreed they have not experienced the death of a relative/community member(s) due to flooding. According to Paas, there were few severe flood disasters recorded in the municipality and most floodings were credited as perennial flooding (K. Paas, personal communication, August 30, 2020). Hence, in most cases, community members don't take a relatively long time to return to their homes after evacuation (Statement 8). This may have been the reason why the factor was insignificant due to the few recorded severe floodings in the community. Hence, data indicates that severity of flood experience is insufficient in promoting response behavior towards flood warnings.

Another factor that may have contributed to the results is the sense of self-efficacy among farmers. Self-efficacy is one of the constructs of SCT referring to the level of ability or confidence of individuals successfully executing a behavior or action (LaMorte, 2019). A study pointed out that despite successful emergency and disaster messaging, a farmer concluded that despite respect to flood, farming in general is all about educated risk (Shevellar & Riggs, n.d.). To quote, "If I was worried about every risk, I wouldn't get out of bed in the morning" (Simon, n.d., as cited in Shevellar & Riggs, n.d.). Clearly, high self-efficacy is similarly evident in Barangay Panikian farmers as Hon. Cabadonga concluded that perennial flooding and the years of flooding experience have contributed to their capacity to make decisions on flood response behavior and their perceived control with the flooding situation (M. Cabadonga, personal communication, August 30, 2020). Although the

factor was found insignificant with response behavior, the results support that self-efficacy among Panikian farmers has increased through years of flood experience motivated by perennial flooding in the community.

Communication Exposure

The test of independence showed that Communication Exposure was not significant in influencing the level of response behavior of participants (p=641). However, as shown in Table 6, it can be noted that in over-all, participants were very often exposed to communication concerning flood disasters.

Table 6. Communication Exposure, *Significance = 0.641NS*

STATEMENTS	MEAN	INTERPRETATION
1. How often are you alerted by the disseminated flood warning information in the community during flood disaster?	4.05	Very Often
2. How frequent do you encounter evacuation warnings during a flooding?	3.68	Very Often
3. How frequent do key actors disseminate flood warning information to the community before a foreseen flooding?	3.88	Very Often
4. How often do you seek flood information through family members and/or community members?	3.95	Very Often
5. How frequent do you seek flood information from local authorities before a foreseen flooding?	3.75	Very Often
6. How often are you exposed with any of the traditional media channels (radio ads/announcements, TV, door to door announcements/bandillo) during the dissemination of flood warning information?	4.29	Very Often
7. How often are you exposed with any of the new media channels (SMS, social media, mobile apps, web, blogs, emails, chatrooms, etc) during the dissemination of flood warning information?	2.06	Rarely
Over-all	**3.67**	Very Often

Responses were coded as 1=Never, 2= Rarely, 3= Sometimes, 4= Very Often, 5= Always

Interpretation = 1.-1.8 – Never, 1.9-2.6 – Rarely, 2.7-3.4 – Sometimes, 3.5-4.2 – Very Often , 4.3-5 – Always

From Table 6, it is shown that out of the seven (7) statements, Statement 6 has the highest response rate (*M=4.29, Very Often*) followed by Statement 1 (*M=4.05, Very Often*) and Statement 4 (*M=3.95, Very Often*). Statement 6 discusses the frequency of how often farmers are exposed to traditional media during the dissemination of flood warning information. Clearly, the majority of the rural areas do not have access to internet connection and new media, thus, barangay personnel and local government resort to use of traditional media channels for dissemination of warnings and other relevant notices. As a result, Statement 7 has the lowest response rate among all statements (*M=2.06, Rarely*) since it is directly contrary to Statement 6 discussing how frequent respondents are exposed to any new media channels.

In terms of traditional media, the most commonly used is Bandilyo which means to "blare out or announce loudly" (Albaos, n.d.). Key actors and/or local officials use any of the following (megaphones, microphones with speakers) to disseminate warnings in the community.

Correspondingly, word of mouth is also a common medium in disseminating risk information and other notices in the municipality. It can be highlighted that Statement 4 results indicated that farmers in the community very often seek flood information through family and/or community members. This was confirmed by Hon. Cabadonga during the KII and emphasized that family and community members played a great role in disseminating information to the community. This result then validates the high YES response to Statement 8 (100%) on Response Behavior

which states that they would communicate/re-echo flood warning information disseminated by authorities to other family and/or community members.

Significantly, it can also be noted that while respondents generally trust government agencies in terms of warning communication (Statement 5, Trust to Information Source, *M=3.95),* results in this factor indicates that respondents seek disaster information more preferably from family and/or community members (*M=3.95, Very Often*) rather than local authorities before a foreseen flooding (*M=3.75, Very Often*). As also shown in Statement 9 under Response Behavior, results revealed that respondents had a high YES response (91%) when asked if they still sought other information aside from flood warning content provided by authorities. Hence, based on these results, it can be concluded that while respondents understand and are well-informed of the warnings from authorities, they still seek other sources of information and more preferably from their family, relatives, and community members.

Influences on Respondents' Communication Exposure

According to demographics, a majority of rural farmers surveyed are middle-aged individuals with an average age of 53 years old. Research has identified that older age and location are one of the demographic explanations for rural dwellers' low to non-use of new media and can be further elaborated by social, cultural, and local factors (Rasi & Kilpeläinen, 2016). This may have been the reason why among the statements, Statement 7 has the lowest response rate pertaining to the low

exposure and use of new media channels during the dissemination of flood warnings.

In terms of gaps in warning communication, both Hon. Cabadonga and LDRRM Officer Paas recognized the need for the local and barangay government to scale up their efforts in terms of acquiring additional communication equipment. They also pointed out the importance of refresher courses to officials-incharge in Communication and Warning Services. However, they did not point out other factors that may have possibly affected the way people respond to warnings. These results are noteworthy to Paton's (2008) claim where he observed that risk communication has been more focused on the messages rather than on relationships between citizens and the civic agencies that are responsible for risk communication (as cited in Shevellar & Riggs, n.d.). As stated by Shevellar and Riggs, "the body of work regarding social cognitive models seeks to contextualise meaning-making sociologically and psychologically" (n.d.). Hence, it can be reflected that there should be consideration of social and psychological factors that affect the way people perceive and understand information. As studied by Nicholls & Healy (2008), there are indeed psychological needs of the community in terms of communication (as cited in Shevellar & Riggs, n.d.) that should be addressed which may guide actions and lead to initiate or change behavior. In fact, according to the Centers for Disease Control and Prevention (2014), emergency organisations have recognized this need and have responded through reworking strategies and acknowledging and mitigating 'psychological barriers' (as cited in Shevellar & Riggs, n.d.).

Integrating the results in an SCT perspective, these findings are significant since literatures on the theory's concepts suggest that there should be a deep understanding of social and psychological factors and/or barriers to examine how

learning occurs that may lead to acquiring and maintaining behavior. From the results, it can be inferred that relationship with family and/or community members forms part in seeking risk information rather than local authorities. This finding validates the unique aspect of SCT which takes into account social influences and its emphasis both on internal and external social reinforcement (LaMorte, 2019). Hence, this suggests the importance of analysing relationships during the dissemination of warnings especially between the community and the civic agencies involved in warning communication.

Furthermore, the presentation of risk information on traditional media channels should also be regarded considering the identified factors that seem important to the respondents rather than just settling to provide adequate awareness and timely warnings during disasters. Additionally, Bandura (1997, as cited in Cherry, 2019) and Paton et al. (2008, as cited in Shevellar & Riggs, n.d.) similarly concluded that just because people are informed, does not mean it will eventually result in behavior change.

Response Behavior

Table 7 presents the responses from Response Behavior statements that are framed on their experiences during the 2018 onslaught of TS Basyang. In over-all, majority — all the respondents — have answered YES in all 10 questions. Among the items, three (3) statements tied as the highest YES response rate at 100%. Respondents agree that (1) they would evacuate in a flooding incident in case they are advised to do so (Statement 3); (2) they would communicate/re-echo any

disaster information provided by authorities to their family and/or community members (Statement 8); (3) and that they personally observe changes in weather conditions during flooding (Statement 6). The table also shows that respondents are highly influenced by family and/or community members when it comes to evacuation efforts and decisions (Statement 5, 99%) and are more likely to perform security measures to protect their family and properties during flooding (Statement 7, 98%). According to LDRRMO Paas, even before the Municipal Disaster Office was established and institutionalized, community members of flood-prone barangays have always performed pre-emptive evacuation since they experience perennial flooding. Moreover, included in the municipal 5-year disaster plan is the establishment of various disaster-resilient infrastructures such as river dikes and landslide protection walls. This might be the reason why there was a high response rate to Statements 6 and 7 and why they tended to perform flood protective behaviors, since the barangay has only few disaster-resilient infrastructures and structural strategies to mitigate the risk of flooding in the community.

Table 7. Response Behavior Results

STATEMENTS	YES	NO
1. Have you and your family prepared an emergency family kit in case of a flooding event?	76(86%)	12(14%)
2. Did you prepare a safety and evacuation plan for your family in case of a flooding event?	83(94%)	5(6%)
3. Would you and your family evacuate in a flooding incident in case you are advised to do so?	88(100%)	0(0%)
4. Do you take and lead decisions on evacuation efforts during a flooding event?	79(90%)	9(10%)
5. Are your evacuation efforts and decisions influenced by opinions of family members and/or community members?	87(99%)	1(1%)

Table 7 (continued)

6. Do you personally observe changes in weather conditions during flooding?	88(100%)	0(0%)
7. Have you performed security measures to protect your family, home and other properties in case of flooding?	86(98%)	2(2%)
8. Would you communicate/re-echo to other family members and/or community members flood warning information disseminated by authorities?	88(100%)	0(0%)
9. Will you seek other information aside from flood warning content provided by authorities?	80(91%)	8(9%)
10. Have you invested in any post-disaster efforts (i.e. crop insurance) for security?	59(67%)	29(33%)

Meanwhile, it can be noted that while a majority of the statements had high response rates, the lowest YES response among all statements was on Statement 10 at 67%. 59 out of the 88 farmers have invested in post-disaster effort especially crop insurance for security. This mitigation strategy is part of the risk transfer behavior to a formal institution, in this case, the Philippine Crop Insurance Corporation (PCIC) of the Department of Agriculture. Although the insurance is free under PCIC, not all farmers in the community are registered. Hence, this suggests that the local government should also need to look at non-structural risk management and strategies such as an agricultural flood insurance program as part of post-disaster efforts.

CHAPTER V

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Summary

The study's main objective is to identify factors that influence the level of response behavior of Barangay Panikian farmers towards flood advisories through survey, KII, and document review. The survey was participated by 88 farmer respondents from 7 farming villages and determining their level of response with the following Individual (Risk Perception, Trust to Source and Warning Content, Severity of Flood Experience) and Environmental (Communication Exposure) factors. The study also identified the farmers' overall attitude to flood risk information as a factor promoting response behavior and contextualizing results through the premises and core concepts of Bandura's Social Cognitive Theory (SCT). In addition, the five (5) constructs of Social Learning Theory (SLT) which were added when the SCT evolved was also used in understanding respondents' behavior to flood warnings.

Results showed that the farmers' socio-demographic profile in Barangay Panikian is composed of middle-aged, low-income individuals with extensive farming experience and familiarisation to flood events due to perennial flooding in the community. Survey results also revealed that Crop Variety is a significant factor that influences the farmers' level of response behavior towards flood warnings.

The Chi-Square Test of Independence showed that the respondents had high risk perception of flooding with significant regard to their flood experiences, particularly the recent onslaught of TS Basyang last February 2018. They perceived

flooding as one of the causes of huge financial losses for their families, livelihoods, and properties; concluding that it caused fear and panic among community members. Results also revealed that perennial flooding and past experience link with cognitive biases play a significant role in terms of increased hazard perception.

The test also revealed that in overall, respondents trust both the flood warning content and the source of information. Localisation of early warnings and locally-led efforts of the local officials in terms of warning communication have contributed to this status although the factor did not establish significance with response behavior. Results also revealed that other factors appealing to social and cognitive processes should also be considered such as consistent and technical-based messaging and improving technical expertise and manpower.

Furthermore, the test of factors showed that both the severity of flood experience and communication exposure factors had no significant relationship with response behavior. However, findings show that respondents have high self-efficacy that should be considered when dealing with prior flood experience to motivate action.

Lastly, findings revealed that respondents were very often exposed to communication concerning flood information and were more exposed to traditional media channels specifically Bandillo over new media channels during the dissemination of flood warnings. Farmers also valued their relationship with their families and/or community members, and sought disaster information more preferably from them rather than local authorities. Based on these findings, it validated that farmers truly take into account their social influences which in turn factors how they handle flood warnings received.

Conclusion

The study's results showed that Barangay Panikian farmers were very often exposed to communication concerning flood information and were more exposed to traditional media channels over new media during the dissemination of flood warnings. In addition, they generally trust government agencies and government officials in terms of warning communication. However, they sought warning information more preferably from family/community members rather than local authorities.

Furthermore, Barangay Panikian farmers resulted to have high perceived vulnerability and perceived likelihood. They also have high responses to flood warnings when presented with facts grounded on cognitive biases with high regard to recent flood events and flood experiences. Hence, based on the study's results, it can be concluded that Risk Perception is the significant factor among the four (4) variables that significantly influenced the level of response behavior of Barangay Panikian farmers toward flood advisories. Therefore, the response behavior of farmers is predominantly influenced by said individual factor.

Recommendations

BLGU and LGU Carrascal

The study's results revealed that several factors should be considered for flood warning communication to reflect or initiate actions or behavior. These factors

should be considered by both the Barangay Local Government Unit (BLGU) of Panikian and LGU Carrascal to possibly reflect actions or behavior.

One of the study's objectives is to identify how farmers respond to flood warnings. Findings revealed that the majority of the farmers are middle-aged individuals who valued their families and/or community members more as their social networks over local officials. This suggests that key officials in-charge of warning communication must consider the learning needs of adults and understand how they learn in a social context. To add, it is suggested to possibly launch media literacy initiatives to cater to middle-aged adults to support their skills and competence that best suit them.

Results also revealed that respondents are frequently exposed to traditional media over new media during the dissemination of flood warnings. Hence, it is important to recognize how they treat both traditional and new media with emphasis on the maximization of traditional media usage since it is more widely used, readily available and appealing to community members.

This study also determined the overall attitude of farmers toward flood risk information. Findings revealed that perennial flooding and recent flood experience played a significant role to both individual and environmental factors. Thus, this study suggests integration of the said factor with social cognitive processes to identify how farmers learn from social experiences which include their thoughts and feelings.

Additionally, based on interviews and document reviews, the LFEWS has not been upgraded since its instalment and there are no experts or technical staff in-charge of its operation. Moreover, the reading and interpretation of its data is not anchored on any guidelines from any certain agency except on the operational procedures set by the third service provider. Hence, it is suggested to upgrade the

system and seek technical expertise either from meteorological or hydrological services for its operation and assessment of rainfall data patterns and intensity.

Furthermore, this study has recognized the national agencies' lack of installed early warnings and interventions, monitoring, and support for localized warnings for these devices. In response to this gap, the municipality has proactively requested the intervention of the Regional Department of Environment and Natural Resources – Mines and Geosciences Bureau (DENR-MGB) to conduct the geohazard mapping and assessment under the National Geohazard Assessment and Mapping Program (NGAMP). This has established local risk data since it identified specific areas in the municipality that are susceptible to different geologic hazards with focus on rain-induced landslides, floods, and coastal hazards which are common hazards in the municipality. Thus, it is suggested that this action be sustained and updated since it has identified specific local hazards in various at-risk villages and barangays, and have helped the communities understand local risks, eventually issuing localized warnings based on their specific hazards.

Lastly, while the local government has created its own flood contingency plan, the document has not been updated since 2010. The BLGU has no established flood risk communication plan, hence, all these should be taken into account in crafting such plan as factors that may greatly influence how farmers respond to flood warnings.

Future Researchers

First, the test of factors was conducted to determine the significance between the four (4) independent variables with response behavior. However, findings revealed that some factors influence one another, hence, this suggests that future studies may want to consider conducting a test of significance between these independent variables.

Second, this study only assessed the level of trust that farmers have toward warning content and its credibility. The analysis did not include a comprehensive content analysis to issued risk information. Future studies may consider analysing the content of warnings and assessing whether these warnings carry out social cognitive concepts that motivate and persuade people to act.

Finally, this study only identified the level of exposure of respondents to different communication channels categorized as traditional and new media and determined the common formats and frequency scale on how often farmers receive flood warnings. Future studies may want to elaborate on the extent of exposure to specific media channels and compare which communication channels are more appropriate to be used to cater to the farmer's learning needs and support motivations to initiate actions.

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ANNEX I: REQUEST LETTER BARANGAY PANIKIAN

July 20, 2020

HON. MAMELITO CABADONGA
Barangay Captain
Barangay Panikian, Carrascal, SDS

Hon. Cabadonga,

Marajaw na adlaw!

The undersigned would like to request permission to conduct a survey among farmers in your barangay. The said survey is in line with the study ***"Towards An Effective Warning Communication: An Analysis Of Factors Influencing Response Behaviorof Farmers To Flood Warnings".*** This is in partial fulfillment for the graduate studies requirement under the Masters of Development Communication.

The study's main goal is to better understand the factors influencing the individual farmers' response behavior towards flood advisories. The study is both quantitative and qualitative in nature.

Attached is the survey questionnaire for your reference. The survey will be conducted to 45 farmers from your barangay. Rest assured that all information provided by the respondent will be kept with utmost confidentiality and would only be used mainly for academic purposes. Further, the respondent will adhere and observe to COVID-19 protocols and following the minimum health standards set forth by DOH and the Municipal COVID-19 Task Force.

The undersigned is looking forward for your approval in the hopes that this study will contribute to how local governments, private sectors, and other agencies should handle farmers in terms of warning dissemination during flood events.

Hoping for a positive response with our request. Salamat.

Sincerely,

CHRISTINE MARIE ARREZA
Student
UP Los Baños Open University

ANNEX II: CONSENT FORM (ENGLISH)

Title of the Study: Towards an Effective Warning Communication: Analysis of Factors Influencing Response Behavior of Farmers To Flood Warnings

Researcher: Christine Marie Arreza

This study aims to analyse the factors that affect the response behavior of farmers when faced with flood warnings. This includes analysis of knowledge, risk perception, attitudes, communication exposure and the level of trust of farmers to the source and content of flood warnings. You have been included in this study because our main respondents are farmers of Barangay Panikian. Based on records from the Barangay Panikian Council, you have been identified as one of the farmers in this village.

Given that you agree to participate in this study, you will be provided the survey questionnaire, of which you may opt to answer on your own or have the interviewer ask the questions for you.

☐ Answer the questions on my own

☐ Let the interviewer ask the questions for me

Your details and any other identifying information will not be used in presentations or in written products resulting from the study.

By signing this form, I am consenting to participate in this study via face to face interview designed by the student/researcher.

Respondent's Signature: _____ Date: _____

ANNEX III: CONSENT FORM (SURIGAONON)

PORMA SA PAGTUGOT

Title of the Study: Towards an Effective Warning Communication: Analysis of Factors Influencing Response Behavior of Farmers To Flood Warnings

Researcher: Christine Marie Arreza

Ang katuyuan sa kini nga pagtuon para masabtan ang mga hinungdan nga makaapekto sa tubag na pamatasan sa mga mag-uuma sa panahon na sila maka atubang sa mga pasidaan sa pagbaha. Kini apil ang pagtuki sa kahibalo, pagtan-aw sa peligro, pamatasan, pagka ekspos sa komikasyon, ug ang lebel sa pagsalig nan mga mag-uuma sa tag gikanan ug kaundan nan pasidaan sa pagbaha. Isa kaw sa mga apil sa maong pagtuon tungod kay ikaw nailhan nga rehistrado nga mag-uuma sa Barangay Panikian. Base sa mga records gikan sa Barangay Panikian Council, isa kaw sa mga nailhan nga mag-uuma sa inyong purok.

Isip ikaw mutugot nga muapil sa maong pagtuon, hatagan kaw ug survey questionnaire nga pwede nimo tubagon nga ikaw lang o ang interviewer ang magbasa sa mga pangutana para sa imo.

☐ Ako lang ang mutubag sa mga pangutana

☐Ang interviewer ang mangutana sa mga pangutana para sa ako

Ang imong detalye ug uban pa nimong impormasyon kay dili gamiton sa masking unsa nga pasundayag o mga kasulatan nga resulta sa maong pagtuon.

Sa pagpirma niining porma, ikaw nitugot nga muapil sa maong pagtuon pinaagi sa atubangay nga pakigsulti nga gibuhat sa estudyante.

Pirma sa Tag Interview: _____ Petsa: _____

ANNEX IV: SURVEY QUESTIONNAIRE (ENGLISH)

Socio-Demographic Profile

Age: ____ years old

Crop: ____ (1) Rice ____ (2) Corn _____ (3) Others

Sex: ____(1) Male ____(2) Female

Marital Status: __ Single __ Married __ Widowed __ Separated

Ethnic Group: ___(1) Manobo ___(2) Mamanua ___(3)Badjao Others: _____ None: _____

Village No: _____

Farming Experience

How many years have you been a farmer?

(1) Less than 6mos
(2) 6mos to 1yr
(3) 1-5yrs
(4) 6-10yrs
(5) 10yrs or more

Family Income

__Low (less than P50,000)
__Middle (P50K-P120K)
__High (more than P120K)

How much time do you usually spend in the farm? _____ hours

SECTION II. RISK PERCEPTION

Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1.. Flooding is considered one of the most devastating natural disasters in your community					
2. Flooding causes huge financial loss to families, livelihood and properties					
3. Flooding greatly affects the quality of life in the community					
4. Flooding causes fear and panic among community members					
5. Effects of flooding will unlikely be controlled by community members					
6. In general, I think me and my family is at risk from the effects of flood disasters					
7. I can hardly adopt to whatever mitigation actions is/are needed/necessary					

SECTION III. PAGSALIG SA TAG GIKANAN NAN DATOS UG MGA WARNING NGA DATOS

Statements for Trust in Warning Content were modified from the measures developed by Ryu, Kim & Kim (2018)

Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
TRUST TO WARNING CONTENT					
1. Flood warnings provided by source is reliable information					
2. Flood warnings provided by source is accurate and based on facts					
3. Flood warnings provided by source is true without falsehood					
4. Flood warnings provided by source is fair and proven					
5. Flood warnings provided by source is based on deep knowledge					
6. Flood warnings provided by source is clear & easily understood					
TRUST TO INFORMATION SOURCE					
1. Source of warning content is credible and reliable					
2. Source of warning content is capable and expert in providing and analyzing flood warnings					
3. Source is responsible for mitigation measures and/or protective actions					
4. Key actors involved in disseminating flood warning content are credible and reliable					
5. In general, government agencies can be trusted in terms of flood warning communication					

IV. SEVERITY OF FLOOD EXPERIENCE

Statements on this variable are framed on their experience during the 2017 onslaught of TS Basyang

Statements	Yes(1)	No(2)
1. Have you or any of your family members/relatives/community members experienced harm or threat to life during the flood event?		
2. Have you experienced loss of a family member(s)/relative(s)/community member(s) due to flooding?		
3. Have you or any family member(s)/relative(s)/community member(s) experienced being washed away due to flooding?		
4. Have you witnessed part of your village or seeing nearby village being washed away due to flooding?		
5. Do you often come across flooding in your community?		
6. Do you think your preparedness and readiness for flooding is due to your experience and exposure with flood disaster?		
7. Do you used to evacuate during flood disaster?		
8. Do you take a relatively long time to return home after evacuation?		

SECTION V. COMMUNICATION EXPOSURE

Statements	Never (1)	Rarely (2)	Sometimes (3)	Very Often (4)	Always (5)
1. How often are you alerted by the disseminated flood warning information in the community during flood disaster?					
2. How frequent do you encounter evacuation warnings during a flooding?					
3. How frequent do key actors disseminate flood warning information to the community before a foreseen flooding?					
4. How often do you seek flood information through family members and/or community members?					
5. How frequent do you seek flood information from local authorities before a foreseen flooding?					
6. How often are you exposed with any of the traditional media channels (radio ads/announcements, TV, door to door announcements/bandillo) during the dissemination of flood warning information?					
7. How often are you exposed with any of the new media channels (SMS, social media, mobile apps, web, blogs, emails, chatrooms, etc) during the dissemination of flood warning information?					

VI. RESPONSE BEHAVIOR

Statements on this variable are framed on their experience during the 2017 onslaught of TS Basyang

Statements	Yes(1)	No(2)
1. Have you and your family prepared an emergency family kit in case of a flooding event?		
2. Did you prepare a safety and evacuation plan for your family in case of a flooding event?		
Would you and your family evacuate in a flooding incident in case you are advised to do so?		
3. Do you take and lead decisions on evacuation efforts during a flooding event?		
4. Are your evacuation efforts and decisions influenced by opinions of family members and/or community members?		
5. Do you personally observe changes in weather conditions during flooding?		
6. Have you performed security measures to protect your family, home and other properties in case of flooding?		
7. Would you communicate/re-echo to other family members and/or community members flood warning information disseminated by authorities?		
8. Will you seek other information aside from flood warning content provided by authorities?		
9. Have you invested in any post-disaster efforts (i.e. crop insurance) for security?		

ANNEX V: SURVEY QUESTIONNAIRE (SURIGAONON)

SECTION I. SOCIO-DEMOGRAPHIC PROFILE

Edad: ____ years old Crop: ____ (1) Rice ____ (2) Corn _____ (3) Others

Kinatawhan: ___(1) Laki ___(2) Babaye Pangmamamayang Kalagayan: __ Single __ Minyo __ Byudo/Byuda __ Buyag

Ethnic Group: ___(1) Manobo ___(2) Mamanua ___(3)Badjao Others: _____ None: _____

PUROK NO: ___

KASINATIAN SA PAG-UMA

Pila nakaw ka tuig na mag uuma?

(6) 6 ka bulan paubos
(7) 6 ka bulan hangtud 1 ka tuig
(8) 1-5 ka tuig
(9) 6-10 ka tuig
(10) Sobra sa 10 ka tuig

Kita sa Pamilya sa isa ka tuig

__Low (ubos sa P50,000)
__Middle (P50K-P120K)
__High (labay sa P120K)

Mga pila ka oras imo igahin sa imo basakan sa isa ka adlaw? _____ ka oras

SECTION II. PAGSABUT SA PELIGRO

Statements	Dili Gayud Muoyon (1)	Dili Muoyon (2)	Nyutral (3)	Muoyon (4)	Kusog nga Muoyon (5)
1. Isa an pagbaha sa mga pinakagrabe nga natural nga katalagman nga pirmi mahitabo sa ijo barangay					
2. An pagbaha hinungdan sa dako nga pagkawala pinansyal nga aspeto sa pamilya, panginabuhian ug mga kabtangan					
3. An pagbaha maka apekto gayud sa kalidad sa kinabuhi sa barangay					
4. An pagbaha makahatag kahadlok ug kataranta sa mga miyembro sa barangay					
5. Ang epekto sa pagbaha kay dili bagan makontrol nan mga miyembro sa purok/barangay					
6. Sa kinatibuk-an, sa ak pagtan-aw, ako ug ang akong pamilya kay naay risgo sa mga epekto sa pagbaha					
7. Maglisud ako pag-uyon o pag-adjust kun jaoy mga makapugong nga lakang nga kinahanglan					

SECTION III. PAGSALIG SA TAG GIKANAN NAN DATOS UG MGA WARNING NGA DATOS

An mga tagsaysay mahitungod sa Pagsalig sa Warning nga Datos tagbag-o base sa lakang na taghimo ni Ryu, Kim & Kim (2018)

Statements	Dili Gajud Mouyon (1)	Dili Mouyon (2)	Nyutral (3)	Mouyon (4)	Kusog nga Muoyon (5)
PAGSALIG SA MGA PASIDAAN NGA DATOS					
1. An mga warning sa pagbaha na taghatag nan tag gikanan kay kasaligan na impormasyon					
2. An mga warning sa pagbaha na taghatag nan tag gikanan kay tukma, sakto ug nagbase sa kamatuoran					
3. An mga warning sa pagbaha na taghatag nan tag gikanan kay tinuod sanan way bakak					
4. An mga warning sa pagbaha na taghatag nan tag gikanan kay patas ug napamatud-an					
5. An mga warning sa pagbaha na taghatag nan tag gikanan kay nagbase sa lawom nga kahibalo					
6. An mga warning sa pagbaha na taghatag nan tag gikanan kay klaro sanan dali ra sabtan					
PAGSALIG SA TAG GIKANAN NAN IMPORMASYON					
1. An tag gikanan nan warning kay kasaligan					
2. An tag gikanan nan warning kay may katakos ug eksperto sa paghatag pagsabot sa mga warning mahitungod sa baha					
3. An tag gikanan kay responsible sa mga aksyon nga sama sa pagpugong ug pagpanalipod sa baha					
4. Ang mga hinungdanon nga aktor (barangay opisyales) nga apil sa pagsibya sa warning sa pagbaha kay kasaligan					
5. Sa kinatibuk-an, an mga ahensya sa gobyerno kay masaligan pag-abot sa paghatag warning ug komunikasyon sa pagbaha					

IV. KABUG-AT SA KASINATIAN SA PAGBAHA

An mga tagsaysay diri kay nagbase sa kasinatian nan miagi na 2018 TS Basyang

Saysay	Oo(1)	Waya(2)
1. Nakasinati na ba kaw o maskin usa sa miyembro sa imong pamilya/lumon/ miyembro sa komunidad ug kadaot ug hulga sa kinabuhi tungod sa mga panghitabo na may kalabutan sa pagbaha?		
2. Nakasinati na ba kaw mapatjan nan miyembro sa pamilya/lumon/miyembro sa komunidad tungod sa pagbaha?		
3. Nakasinati na ba kaw o maskin usa sa miyembro sa imong pamilya/lumon/ miyembro sa komunidad na nawashed out tungod sa pagbaha?		
4. Nakasaksi ba kaw na an bahin sa imo purok o sa duol na mga purok na nawashed out tungod sa pagbaha?		
5. Kanunay ba ka makasugat ug pagbaha sa imong barangay?		
6. Sa imong huna-huna, ang imo bang pagpangandam sa pagbaha kay tungod sa imong mga kasinatian ug pagka ekspos sa mga katalagman sa pagbaha?		
7. Mubakwit ba kaw kun jaoy katalagman sa pagbaha?		
8. Dugay ba kaw makabalik sa imo bayay human kaw mubakwit?		

SECTION V. PAGKA EKSPOS SA KOMUNIKASYON

Saysay	Dili Gajud (1)	Panagsa Ra (2)	Usahay (3)	Kanunay (4)	Pirminti (5)
1. Kapila kaw maalerto sa tagsibya na mga warning sa barangay sa panahon na jaoy mga katalagman sa pagbaha?					
2. Kapila kaw maka engkwentro nan warning sa pagbakwit sa panahon sa pagbaha?					
3. Kapila ba magsibya ang mga taga barangay (hinungdanon nga actor) sa mga warning bag-o pa man mubaha?					
4. Kapila kaw maghanap nan impormasyon sa pagbaha na gikan sa miyembro sa pamilya o miyembro sa barangay?					
5. Kapila kaw maghanap nan impormasyon sa pagbaha na gikan sa lokal na awtoridad o mga opisyales sa barangay bag-o pa man mubaha?					
6. Kapila kaw makadawat nan warning na gikan sa TV, radyo, bandillo o iban pa na tradisyonal na medya sa panahon sa pagsibya nan impormasyon sa baha?					
7. Kapila kaw makadawat nan warning na gikan sa facebook, messenger o sa iban pa na mga bag-o na medya sa panahon sa pagsibya nan impormasyon sa baha?					

VI. RESPONSE BEHAVIOR

An mga tagsaysay diri kay nagbase sa kasinatian nan miagi na 2018 TS Basyang

Saysay	Oo(1)	Waya(2)
1. Nag-andam ba kaw o an imo pamilya nan emergency family kit ingkaso jaoy pagbaha?		
2. Nag-andam ba kaw nan safety and evacuation plan para sa imo pamilya ingkaso jaoy pagbaha?		
3. Mubakwit ba kaw o imo pamilya kun tambagan kamo na mubakwit ingkaso jaoy pagbaha?		
4. Ikaw ba an mag desisyon na mubakwit sa panahon sa pagbaha?		
5. An imo ba pagpaningkamot sa pagbakwit ug ang desisyon sa pagbakwit kay impluwensiya sa mga opinyon nan miyembro sa pamilya o miyembro sa barangay?		
6. Personal ba kaw na maniid sa mga pagbag-o sa panahon ingkaso jaoy pagbaha?		
7. Nakahimo ba kaw nan mga paningkamot bahin sa imo seguridad para panalipdan imong pamilya, balay, ug mga kabtangan sa panahon sa pagbaha?		
8. Mu-istorya ba kaw sa miyembro sa imo pamilya o miyembro sa barangay sa mga warning sa pagbaha na tagsibya sa taga barangay o LGU?		
9. Maghanap ba kaw nan lain na impormasyon mahitungod sa pagbaha gawas sa impormasyon na tagsibya ug taghatag sa mga awtoridad?		
10. Mipuhunan ba kaw nan mga paningkamot human sa mga katalagman o kalamidad? (i.e. crop insurance, pagpataas ug balay)		

ANNEX VI: GUIDE QUESTIONS FOR KEY INFORMANT INTERVIEW

1. Do you create local flood warnings? Or do you revise/modify warnings from the local government?

1.1. How do the barangay create flood warnings? (Or how do you modify/revise them?)

2. What is the flow of communication on flood warnings?

3. Who are involved in the creation and dissemination of flood warnings?

3.1. What communication medium/channels are used in flood warning dissemination?

4. As a farming community and as a flood prone barangay, do you think farmers of Brgy Panikian consider flood warnings as an important factor in influencing their response behaviour?

5. How do you think these factors affect the response behaviour of farmers to flood warnings?

- Risk Perception (Pagsabut sa Peligro)
- Trust to Source and Trust to Warning Content (Pagsalig sa source sanan sa content nan warning)
- Severity of Flood Experience
- Communication Exposure

6. What are your considerations in the creation and dissemination of flood warnings to farmers?

7. In general, what were your challenges in warning communication? How did you solve/overcome them?

8. What were your challenges/encounters on warning communication during the 2018 Basyang? How did you overcome those?

- Experiences during Basyang (response behaviour?)

9. What are your programs to better warning communication in the barangay?

ANNEX VII: SURVEY RESULTS

Demographic Profile

Profile	Category	n	%	Significance
Age	Min=25yrs, Max=73yrs, Ave=53yrs			0.629*NS*
Gender	Female	47	53%	0.580*NS*
	Male	41	47%	
Civil Status	Married	71	81%	0.975*NS*
	Widowed	10	11%	
	Single	7	8%	
Purok	Purok 1	11	13%	0.133*NS*
	Purok 2	12	14%	
	Purok 3	8	9%	
	Purok 4	7	8%	
	Purok 5	9	10%	
	Purok 6	31	35%	
	Purok 7	10	11%	
Ethnic Group	None	88	100%	NA
Farming Experience	10 years above	70	80%	0.666*NS*
	1-5 years	9	10%	
	6-10 years	6	7%	
	6months-1year	2	2%	
	6mos below	1	1%	
Family Income	Low	64	73%	0.695*NS*
	Middle	20	23%	
	High	4	4%	
Hours Spent on Farming	Min=1Hr, Max=8Hrs, Ave=4.9Hrs			0.468*NS*
Crop Variety	Rice	70	80%	0.006**
	Mixed	15	17%	
	Corn	2	2%	
	Others	1	1%	

CROP VARIETY

Crop Variety	Level of Response
Rice	9.4
Others	9.0
Mixed	8.7
Corn	8.5

RISK PERCEPTION

Cronbach's Alpha – 0.021**

Statements	Mean	Interpretation
1. Flooding is considered one of the most devastating natural disasters in your community	4.32	Strongly Agree
2. Flooding causes huge financial loss to families, livelihood and properties	4.74	Strongly Agree
3. Flooding greatly affects the quality of life in the community	4.60	Strongly Agree
4. Flooding causes fear and panic among community members	4.74	Strongly Agree
5. Effects of flooding will unlikely be controlled by community members	4.70	Strongly Agree
6. In general, I think me and my family is at risk from the effects of flood disasters	4.66	Strongly Agree
7. I can hardly adopt to whatever mitigation actions is/are needed/necessary	4.51	Strongly Agree
OVER-ALL	**4.61**	**Strongly Agree**

TRUST TO WARNING CONTENT

Cronbach's Alpha – 0.093*NS*

Statements	Mean	Interpretation
1. Flood warnings provided by source is reliable information	4.72	Strongly Agree
2. Flood warnings provided by source is accurate and based on facts	4.67	Strongly Agree
3. Flood warnings provided by source is true without falsehood	4.69	Strongly Agree
4. Flood warnings provided by source is fair and proven	4.70	Strongly Agree
5. Flood warnings provided by source is based on deep knowledge	4.63	Strongly Agree
6. Flood warnings provided by source is clear & easily understood	4.73	Strongly Agree
OVER-ALL	**4.69**	**Strongly Agree**

TRUST TO INFORMATION SOURCE

Cronbach's Alpha – 0.265*NS*

Statements	Mean	Interpretation
1. Source of warning content is credible and reliable	4.73	Strongly Agree
2. Source of warning content is capable and expert in providing and analyzing flood warnings	4.68	Strongly Agree
3. Source is responsible for mitigation measures and/or protective actions	4.67	Strongly Agree
4. Key actors involved in disseminating flood warning content are credible and reliable	4.60	Strongly Agree
5. In general, government agencies can be trusted in terms of flood warning communication	4.75	Strongly Agree
OVER-ALL	**4.69**	**Strongly Agree**

SEVERITY OF FLOOD EXPERIENCE

Cronbach's Alpha – 0.928*NS*

Statements	Yes	No
1. Have you or any of your family members/relatives/community members experienced harm or threat to life during the flood event?	77(88%)	11(12%)
2. Have you experienced loss of a family member(s)/relative(s)/community member(s) due to flooding?	20(23%)	68(77%)
3. Have you or any family member(s)/relative(s)/community member(s) experienced being washed away due to flooding?	44(50%)	44(50%)
4. Have you witnessed part of your village or seeing nearby village being washed away due to flooding?	46(52%)	42(48%)
5. Do you often come across flooding in your community?	52(59%)	36(41%)
6. Do you think your preparedness and readiness for flooding is due to your experience and exposure with flood disaster?	86(98%)	2(2%)
7. Do you used to evacuate during flood disaster?	72(82%)	16(18%)
8. Do you take a relatively long time to return home after evacuation?	30(34%)	58(66%)

COMMUNICATION EXPOSURE

Cronbach's Alpha – 0.641*NS*

Statements	Mean	Interpretation
1. How often are you alerted by the disseminated flood warning information in the community during flood disaster?	4.05	Very Often
2. How frequent do you encounter evacuation warnings during a flooding?	3.68	Very Often
3. How frequent do key actors disseminate flood warning information to the community before a foreseen flooding?	3.88	Very Often
4. How often do you seek flood information through family members and/or community members?	3.95	Very Often
5. How frequent do you seek flood information from local authorities before a foreseen flooding?	3.75	Very Often
6. How often are you exposed with any of the traditional media channels (radio ads/announcements, TV, door to door announcements/bandillo) during the dissemination of flood warning information?	4.29	Very Often
7. How often are you exposed with any of the new media channels (SMS, social media, mobile apps, web, blogs, emails, chatrooms, etc) during the dissemination of flood warning information?	2.06	Rarely
OVER-ALL	**3.67**	**Very Often**

RESPONSE BEHAVIOR

Statements	Yes	No
1. Have you and your family prepared an emergency family kit in case of a flooding event?	76(86%)	12(14%)
2. Did you prepare a safety and evacuation plan for your family in case of a flooding event?	83(94%)	5(6%)
3. Would you and your family evacuate in a flooding incident in case you are advised to do so?	88(100%)	0(0%)
4. Do you take and lead decisions on evacuation efforts during a flooding event?	79(90%)	9(10%)
5. Are your evacuation efforts and decisions influenced by opinions of family members and/or community members?	87(99%)	1(1%)
6. Do you personally observe changes in weather conditions during flooding?	88(100%)	0(0%)
7. Have you performed security measures to protect your family, home and other properties in case of flooding?	86(98%)	2(2%)
8. Would you communicate/re-echo to other family members and/or community members flood warning information disseminated by authorities?	88(100%)	0(0%)
9. Will you seek other information aside from flood warning content provided by authorities?	80(91%)	8(9%)
10. Have you invested in any post-disaster efforts (i.e. crop insurance) for security?	59(67%)	29(33%)