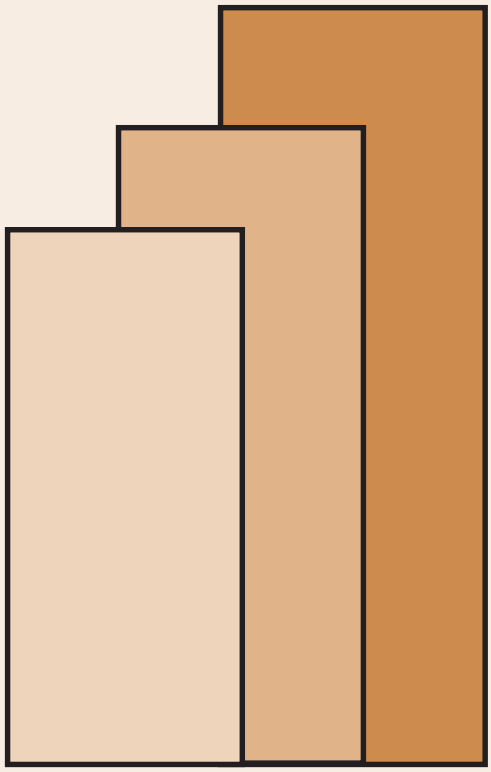
Philippine Institute for Development Studies
*Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas*

# Property Damage Recovery and Coping Behavior of Households Affected by an Extreme Flood Event in Marikina City, Metro Manila, Philippines

*Jamil Paolo S. Francisco*

**DISCUSSION PAPER SERIES NO. 2015-40**



The *PIDS Discussion Paper Series* constitutes studies that are preliminary and subject to further revisions. They are being circulated in a limited number of copies only for purposes of soliciting comments and suggestions for further refinements. The studies under the *Series* are unedited and unreviewed.

The views and opinions expressed are those of the author(s) and do not necessarily reflect those of the Institute.

Not for quotation without permission from the author(s) and the Institute.

August 2015

For comments, suggestions or further inquiries please contact:
**The Research Information Staff,** Philippine Institute for Development Studies
5th Floor, NEDA sa Makati Building, 106 Amorsolo Street, Legaspi Village, Makati City, Philippines
Tel Nos: (63-2) 8942584 and 8935705; Fax No: (63-2) 8939589; E-mail: publications@mail.pids.gov.ph
Or visit our website at http://www.pids.gov.ph

# Property Damage Recovery and Coping Behavior of Households Affected by an Extreme Flood Event in Marikina City, Metro Manila, Philippines

Jamil Paolo S. Francisco

Asian Institute of Management

This study identifies the factors influencing household choice of coping strategy to an extreme flood event in Marikina City in the national capital region of the Philippines, as well as household recovery after the event, measured in terms of the length of time repair, rebuild, or replace damaged property. A survey of 400 households was conducted to obtain data. A multinomial logistic model was used to analyze coping strategy choice among three possible alternatives: (1) reactive and short-term anticipatory behavior only, (2) reactive and anticipatory behavior plus general long-term preventive measures, and (3) reactive and anticipatory behavior plus preventive and proactive measures. Results showed that wealth, income, learning from past experience, advice from the media, and people's perceptions/attitudes towards natural disasters had significant influences on household choice. With regards to recovery, household income, access to credit (borrowing), the use of a flood alarm system, access to safe shelter, membership in a community organization, adoption of disaster-specific anticipatory measures, and adoption of general preventive measures significantly reduced the time it took for affected households to recover from property damage. Evacuation, relief aid, type of housing, education, household size, and frequency of flooding in the area did not have significant effects.

Keywords: Coping, Recovery; Flood; Natural Disaster; Adaptive Behavior

JEL Codes: Q54

# Property Damage Recovery and Coping Behavior of Households Affected by an Extreme Flood Event in Marikina City, Metro Manila, Philippines

Jamil Paolo S. Francisco, Ph.D.

Extreme flood events can cause significant damage to affected communities and can be devastating to its most vulnerable members. Many parts of Metro Manila, the national capital region of the Philippines, are particularly vulnerable to flooding. Its location between Manila Bay in the west and Laguna de Bay to the southeast makes it a drainage basin that is subject to frequent overflowing of storm waters. One of 17 cities and municipalities that make up Metro Manila, the City of Marikina, has experienced some of the worst flooding in recent history. In August 2012, Marikina River, which runs through the city, swelled following days of torrential rain, inundating a large portion of the city in floods that reached as high as four and a half meters.

The increasing frequency of extreme weather events makes it important for households, communities, and institutions to improve their capacity to adapt to such events and increase their resilience to the risk of damage. Local governments and nongovernment organizations (NGOs) seeking to help vulnerable communities adapt need to know what factors contribute to the adaptive capacity of households in order for them to frame effective and appropriate policies. It is also important to understand the kinds of adaptive behavior that households make and the reasons they choose one kind or another.

## *1.1 Overview*

The Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) classifies extreme weather events into three types: extreme temperatures, dry days, and extreme rainfall. Given no exact definition for "extreme flood event," such is interpreted by this study as flooding that results from extreme rainfall, which is defined by PAGASA as rainfall exceeding 300 mm within 24 hours.

In early August 2012, intensified monsoon rains led to massive flooding in the national capital region and adjacent provinces—the result of 472 mm of rainfall within a 22-hour period. A total of 8,629 houses were destroyed. The National Disaster Risk Reduction and Management Council (NDRRMC) estimated the total cost of damage to infrastructure and agricultural output at PHP 2.26 billion. In Metro Manila where about 80 percent of *barangays* (districts) were flooded, more than 66,000 families were affected. Approximately 20,000 of these families had to be moved to evacuation centers.

This was the second extreme flood event in recent years, preceded by even worse flooding from Typhoon *Ondoy* (international name Ketsana) in 2009, which affected close to 90,000 families. The City of Marikina was one of the hardest hit during the 2009 and 2012 floods. In 2012, the Marikina River swelled as the water level reached close to 21 meters above sea level, well above the

flood level of 16 meters. This study focuses on a contiguous area through which the Marikina River flows, covering four barangays in Marikina City.

### *1.2 Objectives*

The main research objective of the study is to examine the factors that influenced property-damage recovery, which is defined as the length of time of repair or replacement, and the choice of coping strategy of households in Marikina City after the flood event of August 2012. The study aims to specifically address the following research questions:

1. What are the costs of such property damage to Marikina households?
2. What are the factors that affected the property-damage recovery time of Marikina households after the extreme flood event?
3. What coping strategies did households employ during and after the extreme flood event?
4. What factors affected the household decision on the type of coping strategies they employed during and after the extreme flood event?

## 2. Review of Literature

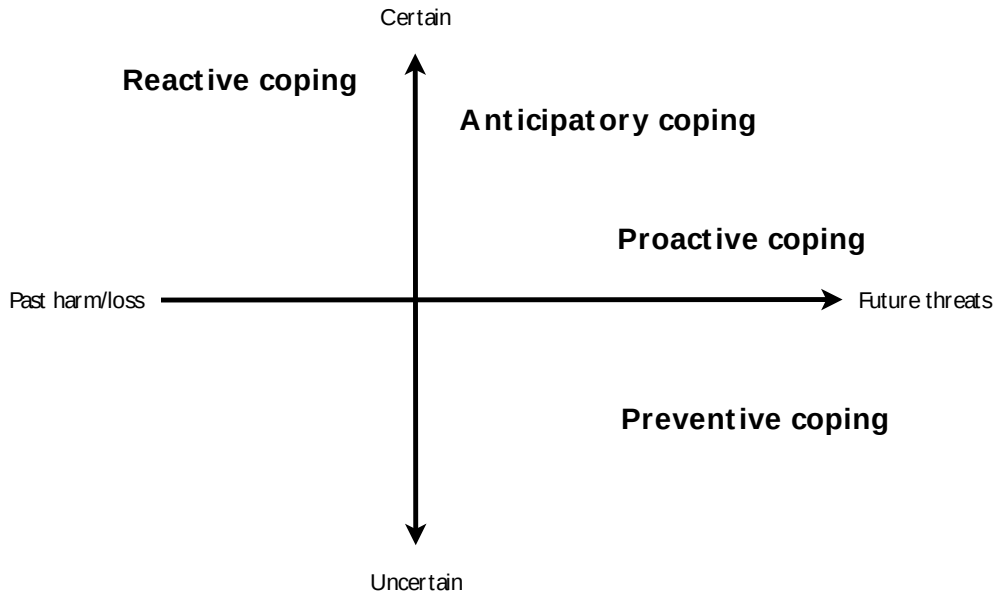
When a crisis strikes, individuals, households, and communities must face the challenge of recovery and must cope with the challenges of the changing environment. In psychology literature, adaptive behavior and coping are considered synonymously (Harrison and Boney 2002). Adaptive behavior and coping refer to the specific efforts, both behavioral and psychological, that people employ to master, tolerate, reduce, or minimize crisis events (Folkman and Lazarus 1980). Coping behavior depends on, among other factors, the timing of demands and the subjective certainty of events. Schwarzer and Schwarzer (1996) describe four types of coping behavior: reactive, anticipatory, preventive, and proactive in terms of the certainty of the event happening and when it is expected to happen (fig. 1).

*Reactive coping* is defined as an effort to deal with an ongoing crisis or one that has already happened. In this case, since the crisis has already taken place, coping efforts aim to either compensate for loss or alleviate harm. *Anticipatory coping* is defined as an effort to deal with imminent threat. Individuals face a critical event that is certain to occur in the near future. There is a risk that the upcoming event might cause harm or loss later on. Thus, the person has to manage this perceived risk by solving the actual problem through increased effort, getting help and investing resources, or by redefining the situation as less threatening through distraction or reassurance from others.

*Preventive coping* is an effort to build up general resistance resources that result in less strain in the future (minimizing the severity of the impact of potential distress) and an overall reduced risk of the crisis. In the case of preventive coping, individuals face a potentially critical event in the distant future. The individual prepares for the potential occurrence of such life events

that are appraised as threatening. Since any kind of harm or loss could possibly materialize, the individual builds up general resistance resources, accumulating wealth, time, social bonds, and skills "just in case" or as a general precaution. Finally, *proactive coping* is an effort to build up general resources that facilitate promotion toward challenging goals. In proactive coping, people have a vision. They see risks, demands, and opportunities in the far future, but they do not appraise these as potential threats, harm, or loss. Rather, they perceive difficult situations as challenges. Coping becomes goal management instead of risk management. Rather than simply reacting to a crisis, proactive strategies involve starting a constructive path of action such as creating better life conditions and achieving higher performance levels. The processes through which people foresee potential stressors and act in advance to prevent them can be seen as proactive behavior. To the extent that individuals offset, eliminate, reduce, or modify impending crises, proactive behavior can eliminate a great deal of stress or damage before it occurs.

**Figure 1. Types of coping**




*Source*: Schwarzer and Luszczynska (2008).

Francisco et al. (2011) surveyed households in the Philippines, China, Vietnam, Indonesia, and Thailand to determine the factors that influence household decisions on the type of adaptive or coping behavior they make after an extreme weather event. Their study used a multinomial logit (MNL) model to analyze the determinants affecting household choice of coping behavior. Household adaptation strategies were classified as zero adaptation, reactive, or proactive. Reactive measures referred to (willingness to participate in) evacuation, replacement of damaged structures, and simple reinforcement of structures. Proactive measures included building protective structures (e.g., dikes) or elevated structures (e.g., second floor), and developing or subscribing to early warning systems. They found that the choice of adaptive strategies was

significantly influenced by housing type, household size, level of education, attendance in training programs on disaster preparedness, perception of the risk of extreme climate events in the future, the number of information channels available, and level of dependence on others for help. The authors concluded with a recommendation that proactive adaptation measures be encouraged and enhanced by providing vulnerable households with better access to information (including early warnings), training on disaster management and adaptation options, livelihood support to enhance their economic capability, opportunities for higher education, and financial support to enable them to build stronger and more resilient housing units.

Alternatively, Patnaik and Narayanan (2010) categorized coping mechanisms into ex-ante and ex-post strategies. Ex-post strategies may include coping behavior such as dissaving, borrowing, and sale of assets. These behaviors aim at mitigating risk by reducing income instability, thereby smoothening consumption streams after a disaster strikes. Ex-ante strategies include income diversification (or crop diversification in rural areas) and insurance. Although adopting ex-ante strategies may appear to be more prudent than relying on ex-post coping behavior, ex-ante strategies may not be enough to smoothen consumption postdisaster. Since natural disasters are rare events and may occur on an unprecedented scale, it may not be possible to fully hedge against them and some negative impacts are still likely to happen, which only ex-post behavior can seek to address. Nevertheless, the more effective these strategies are, both ex-post and ex-ante, in enabling households/communities to cope with the risk of disasters, the less disastrous these events are likely to be to its victims. In turn, the choice and effectiveness of these strategies depend on the adaptive capacity of households/communities in dealing with disasters.

Adaptive capacity is the ability of a system to respond to changes in its external environment and to recover from damage to internal structures within the system that affects its ability to achieve its purpose (Dalziell and McManus 2004). It is the ability to cope or adapt to hazards, which Twigg (2004) defines as potentially damaging physical events, phenomena and/or human activities that may cause loss of life or injury, property damage, social and economic disruption, or environmental degradation. When these hazards negatively impact individuals, households or communities, they become classified as disasters. In the specific case of climatic disturbances, adaptive capacity refers to the ability of a system to adjust its characteristics or behavior in order to expand its coping range under existing climate variability or future climate conditions (Brooks and Adger 2005).

The process of adaptation requires a capacity to learn from past experiences and to apply these lessons to cope with future events. When people know that an event may occur in the future because it has happened in the past, they come up with ways to cope with it (Blaike et al. 1994.) Such coping strategies or adaptive behaviors depend on the assumption that the event itself will follow a familiar pattern and that past experience would be a reasonable guide for similar events. Households and communities use these adaptive strategies to hedge against the negative shocks associated with natural disasters.

Smit and Pilifosova (2001) identified six determinants of the adaptive capacity of communities in the context of climate change: (1) economic resources; (2) technology; (3) information, skills and management; (4) infrastructure; (5) institutions and networks; and (6) equity. Using criteria based on these determinants, Peñalba and Elazegui (2011) assessed the adaptive capacity of local government units (LGUs), community organizations, and households in two municipalities in the Province of Batangas in Southern Luzon. Their study used key informant interviews, focus group discussions, and a household survey to evaluate and compare adaptive capacities between lowland and coastal communities. To assess the adaptive capacity of households, Peñalba and Elazegui developed an index using five indicators: infrastructure, economic resources, technology, social capital, and skills/knowledge. They found that households in lowland and coastal communities had the same aggregate level of adaptive capacity but that lowland communities relied mostly on infrastructure and technology while coastal communities relied more heavily on social capital. The study also revealed that most adaptation strategies involved structural improvements (e.g., reinforcing roofs and fences) and behavioral changes (e.g., securing food and water). Recovery period for most households was within a month but agricultural households took longer due to the loss of income from damaged crops.

Dewi (2007) explored the coping/adaptive behavior of urban households in flood-prone areas in Semarang, Indonesia, under four broad categories as defined by Twigg (2004): economic, technological, social, and cultural. The notable coping strategies included income diversification, housing modifications, and cooperation with neighbors and local government. Many households derived their incomes from employment activities outside the flood-prone region. Some households reconstructed their houses with stronger materials or built a second floor. The most widely exhibited adaptive behavior was cooperation with the community in cleaning canals and their surroundings in anticipation of the flood season as well as in providing safe shelter to neighbors with more vulnerable houses during storms/floods.

Patnaik and Narayanan (2010) identified the four most common adaptive behaviors of households in flood-prone Uttar Pradesh in India as borrowing, receiving monetary transfers from friends and relatives, relief, and selling livestock. They used a four-variable multinomial probit model to determine the factors that increased the probability of a household adopting each of the coping strategies identified. The independent variables used in the analysis included both household-specific shock variables and household socioeconomic characteristics. Shock variables, such as whether the household suffered damage to housing, crops, health, or livestock were included following the hypothesis that the choice of adaptive behavior was also influenced by the specific types of damage incurred by the household. Their results suggest that coping strategies tend to be specific to the nature of loss caused by the disaster. Households that lost livestock resorted to borrowing while those that suffered occupational shocks resorted to money transfers (donations) from friends and relatives. Households that did rely on money transfers tended to have migrant members working in other regions.

In their case study of flooding in Ormoc and Cabalian Bay in the Philippines, Predo and Dargantes (2010) found that the use of family savings, monetary gifts/donations, and loans from friends were the most important coping strategies of households during and immediately after the disaster. They also found that respondents preferred individual household strategies over those that required community cooperation which is what is needed in broader community action such as major defensive engineering works.

## 3. Background of Marikina City

### *3.1 A History of Flooding*

Among the 17 cities that make up Metro Manila, Marikina was one of the most greatly affected during the onslaught of intensified monsoon rains in August 2012 as well as during Typhoon *Ondoy* (Ketsana) in 2009. Located along the eastern border of Metro Manila, the city is situated in a valley between the Sierra Madre Mountains to the east and the hills of Quezon City to the west. Most of the floods in the city's low-lying areas are caused by the runoff from the slopes of the Sierra Madre mountain range that runs along the east of Marikina Valley. Flowing through the midwest portion of the city is the Marikina River, which drains the Marikina River basin (total drainage area of 582 $km^2$) towards the Pasig River. The entire length of the Pasig-Marikina River is 27 km. The Napindan Channel and the Mangahan Floodway connect it to the lake of Laguna de Bay in the southeast, which temporarily stores excess floodwater from the Pasig and Marikina rivers.

The river can go up from 3 meters to more than 23 meters, the highest recorded level, which resulted from the severe rainfall during Typhoon Ondoy in 2009. In the recent extreme flood event of August 2012, the river rose to 20.6 meters.

Marikina City has had a long history of flooding. Although a comprehensive catalog of historical flood information has not been established, flood risk is well acknowledged. Various local government administrations have tried to reduce the city's exposure to flooding particularly after a huge flood in 1992, which inundated more than a quarter (27.52 percent) of the city's total land area. Between the mid-1990s and the early 2000s, the local government actively sought to reduce the city's flooding problem by improving road drainage, dredging large portions of the Marikina River, clearing obstruction (including structures built by informal settlers) along waterways, and improving diversion channels. In 2004, the city government claimed to have reduced flooding by 31 percent since the 1992 flood event. For this and other achievements in city beautification and the improvement of local government services such as garbage collection, the city government received numerous awards and recognition.

However, in 2009, unprecedented rainfall brought by Typhoon Ondoy seemed to have caught the city off guard. The Marikina River rose to a record 23 meters above sea level. Up to 70 percent of the city was flooded, with 30 percent of the city's land area submerged under 6 meters of water. The flood sent thousands of families to evacuation centers and left 44 people dead. The city

government estimated that approximately 70,000 houses and 2,000 buildings were damaged or destroyed as were about 20,000 vehicles. Total property damage was estimated at PHP 2 billion.

Although official figures on property damage still have not been released, the 2012 flood event may have been just as disastrous. The initial estimate of damaged or destroyed property was at 15,000 homes/buildings. Floodwaters reached levels very close to those in 2009, also inundating 70 percent of the city's land area, and with the Marikina River reaching just 2.4 meters shy of the record level reached during Ondoy. According to the local government, a total of 4,270 families were forced to evacuate during the August 2012 flood. There were no human casualties.

*3.2 Site Description*

The city is divided into 16 barangays with a total population of 424,150 residents (91,414 households) in 2010. All 16 barangays experienced varying degrees of flooding in August 2012 but the most severely affected were the barangays of Tumana, Nangka, Malanday, and Jesus de la Peña, which are situated on the floodplain of the Marikina River.

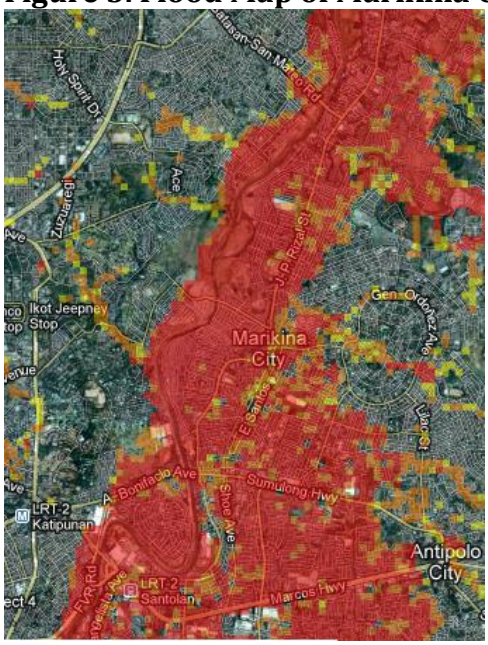
The study focuses on a contiguous area formed by these four barangays (Barangays Tumana, Nangka, Malanday, and Jesus de la Peña) which experienced the highest flood heights due to their direct proximity to the river and were thus the most severely affected during the floods.

Figure 2 shows Eastern Marikina City where the four selected barangays are situated. Figure 3 depicts a flood hazard map of Marikina City developed by the National Institute of Geological Sciences (NIGS) of the University of the Philippines (UP) based on simulations using flood routing software approved by the Federal Emergency Management Agency (FEMA) of the U.S. Department of Homeland Security. The simulations predict areas shaded in red to be inundated by more than 1.5 meters following rainfall equivalent to that experienced during Typhoon Ondoy in 2009. The four barangays chosen for the study are all situated within the red zone.

## Figure 2. Map of Eastern Marikina City


*Source*: Google Maps

## Figure 3. Flood Map of Marikina City




*Source*: National Institute of Geological Sciences

*3.2 Flood Event*

Torrential rain started to pour in Metro Manila and neighboring provinces beginning August 1, 2012, as Typhoon *Gener* (Saola) entered the Philippine area of responsibility in a south-southeastern path from Taiwan to the Pacific, east of the Philippines, strengthening the southwest monsoon affecting Metro Manila and much of Luzon. This was further intensified by the southerly flow of Typhoon Haikui into the Pacific that pulled the monsoon across Luzon beginning August 6.

**Figure 3. Paths of Tropical Storms Saolo (left) and Haikui (right)**

During a 72-hour period from August 6 to August 8, almost 40 inches (1,016 mm) of rain fell in parts of Metro Manila, inundating as much as 80 percent of the metropolis. By nightfall of the first day of the deluge, the Marikina River had already reached the critical level of 19 meters. The following day, August 7, saw the most severe flooding, particularly in areas along the Marikina River which swelled to a near-record level of 20.6 meters, well above the flood level of 16 meters. Forced evacuation of areas near the river in barangays Malanday, Nangka, and Tumana had begun as early as 5:00 a.m. that morning after the water level reached 18 meters. More than 23,000 Marikina residents were forced to evacuate to government shelters. Thousands more were stranded on rooftops or the second or third floors of their homes. The torrential rains and consequent flooding continued until August 8.

## 4. Methodology

*4.1 Site Selection and Sampling*

A household survey was conducted for the purpose of gathering primary data on household experiences during and after the extreme flood event of August 7-9, 2012. A total of 402 households were surveyed in barangays Jesus de la Peña, Malanday, Nangka, and Tumana in Marikina City. These four barangays form a contiguous area along the Marikina River that suffered the highest water levels during the flood. This sample size is sufficiently large to obtain reliable results at 95 percent confidence, with a 5 percent margin of error for a population size of 19,872 households in the four selected barangays.

The survey was conducted from March to mid-April 2013 by six enumerators. All enumerators received adequate training prior to the commencement of fieldwork.

Respondents were chosen using systematic random sampling. Using a city map, one starting point per enumerator was identified within the contiguous area formed by the four chosen barangays. From their respective starting points, the surveyors counted off to the 10th house. If the 10th household refused to participate, the enumerator proceeded to the next house. After each successful interview, the enumerator had to count off to the next 10th house from the participating household. Enumerators were specifically instructed to interview household heads or their spouses only since these people were expected to be the most knowledgeable about damage costs, recovery periods, and repairs undertaken following the flood. If the household head or his/her spouse was not available for interview, the enumerator was instructed to either ask if and when he could return to interview the head of the household or his/her spouse or to move to the next household if they declined to participate.

Prior to conducting the survey, a pilot test was conducted in barangay Tanong, an area adjacent to two of the barangays included in the main survey. A few minor revisions in the questionnaire were made based on the results and enumerator feedback from the pilot test.

### *4.2 Analytical Framework*

#### *4.2.1 Recovery*

The study examined two variables of interest: property damage recovery time and the choice of coping behavior. Property damage recovery is measured by the length of time (in days) it took for a household to fully replace or repair damaged infrastructure and equipment. Since recovery is the first step to adaptation, indicators of adaptive capacity was applied to the analysis of factors that influence such recovery. Following Smit and Pilifosova (2001) with minor revisions, the following indicators are adopted as determinants of recovery time:

**Table 1. Determinants of recovery**

| Determinant | Indicator Variable | Rationale |
|---|---|---|
| Economic Resources | • Real estate property ownership<br>• Vehicle ownership<br>• Household income<br>• Sources of income<br>• Access to credit | • Greater access to economic resources increases the speed of recovery.<br>• Asset diversity reduces damage risk and increases likelihood of quick recovery. |
| Infrastructure | • Degree of permanence<br>• Housing characteristics (number of floors, primary construction material used, etc.)<br>• Access to electricity and water | • Housing characteristics affect vulnerability, cost of damages and repairs, and speed of recovery. |
| Information and Skills | • Training in disaster preparedness<br>• Indigenous knowledge<br>• Learning from previous disasters | • Access to information and disaster preparedness increases the likelihood of timely response and smooth recovery. |
| Technology | • Access to communications network (TV, radio, telephone, Internet, etc.)<br>• Access to evacuation centers<br>• Willingness to evacuate | • Effective communications guarantee a quicker response to the disaster and quicker recovery. |
| Social Capital | • Membership in community organizations<br>• Cooperation with other members<br>• Sources and types of assistance available to household | • Social, religious, and community organizations reduce impact of damage from disasters and facilitate access to support during and after the crisis. |

A liner regression model of the following specification was used to examine the effects of each variable:

$$R = \alpha + b\,\beta h + \gamma c + \delta_1 x_1 + \delta_2 x_2 + \delta_3 x_3 + \delta_4 x_4 + \delta_5 x_5 + \qquad (1)$$

Where $R$ is property damage recovery time measured in number of days to fully repair/replace property damaged during the flood. The coefficients $\beta$, $\gamma$, and $\delta_n$ represent the effects of a unit increase in each of the explanatory variables represented by the vectors $h$, $c$, and $x_1$ to $x_5$ on property damage recovery. The vector $h$ represents household characteristics apart from income such as number of household members residing at the current address, number of years of schooling of the household head, and the frequency of flooding in the area. The

vector *c* includes dummy variables indicating the types of coping strategies adopted by the household.

Each *x* vector represents a host of indicator variables under each of the categories of determinants of adaptive capacity as listed in table 1. The vector $x_1$ represents access to, and ownership of, economic resources; $x_2$ represents housing characteristics (infrastructure); $x_3$ represents access to information and mastery of skills that facilitate adaptation/recovery such as disaster preparedness; $x_4$ represents access to communications technology and evacuation centers; and $x_5$ represents affiliation with, and support from, social, religious, and community organizations.

*4.2.2 Coping Behavior*

Households adopt coping strategies to deal with a crisis, to recover from it, and to reduce their vulnerability to future crises. Coping strategies can be broadly classified into reactive, anticipatory, preventive, and proactive measures (Schwarzer and Schwarzer 1996). Table 2 lists specific measures according to these four types.

*Reactive* measures generally involve strategies that wait until the event is just about to happen or is already happening. The goal is to compensate losses or minimize harm as the crisis unfolds and as soon as it ends. For example, a usual reactive measure to flooding is to evacuate to higher ground or to move valuables and important documents to upper floors as soon as the flood hits or as floodwaters begin to rise in the vicinity of one's home. Clean-up and securing of valuables as soon as the flood subsides are also another example of reactive coping behavior.

*Anticipatory* measures involve making preparations just before the looming disaster strikes. It aims to deal with an imminent threat by addressing the problem through increased effort, getting help, or investing resources. In the case of storms or flooding, anticipatory measures include buying/preparing emergency supplies, evacuating to safe shelter, or moving valuables to higher ground as soon as storm or flood warnings are received and just before the flood hits or the storm intensifies.

*Preventive* coping behavior involves building general resistance that reduces the overall risk of future disasters. Since any kind of harm or loss could possibly materialize, the individual builds up general resistance resources, accumulating wealth, time, social bonds, and skills "just in case." The preparations tend to be general rather than specific to a particular crisis event. As such, preparations tend to be done a long time before a crisis strikes. Examples include attending disaster-preparedness seminars, preparing evacuation or disaster plans for the family, and preparing emergency supplies/equipment way before any impending event.

Finally, *proactive* coping strategies, rather than being reactionary to a specific threat or crisis, involve working towards a constructive path of action to create better life conditions and greater well-being. The goal is to improve conditions so as to offset, eliminate, reduce, or modify crises so that if and when

they do strike, the dangers they present are greatly diminished. By reducing vulnerabilities and improving circumstances, crises become less threatening and less disastrous.

**Table 2. Reactive, anticipatory, preventive, and proactive measures**

| Reactive Behavior | Anticipatory Behavior | Preventive Behavior | Proactive Behavior |
|---|---|---|---|
| Evacuate to safe shelter or higher ground as soon as the flood reaches home. | Regularly check on weather updates and flood warnings. | Buy and store food, medicines, and emergency supplies. | Reinforce shelter or increase protection from storms/floods. |
| Move belongings/ documents to higher ground as soon as flood hits. | Move belongings/ documents to higher ground upon receiving flood warning. | Temporarily move family to a different location during typhoon season. | Build mezzanine, second/third floor, or roof deck. |
| Take along emergency equipment and supplies upon evacuation as soon as flood hits. | Evacuate self and family to shelter upon receiving flood warning. | Attend disaster-preparedness seminars. | Migrate or plan to migrate to other areas less prone to flooding. |
| Help neighbors/ relatives as soon as flood reaches homes. | Prepare emergency equipment and supplies upon receiving flood warning. | Help neighbors or community to prepare for disasters. | Buy insurance against property damage. |
| Contact neighbors/ relatives to warn about flood arrival | Construct sandbag dikes; reinforce shelter upon receiving flood warning | Cut/trim trees near house to prevent damage during storms. | |
| Secure belongings and important documents as soon as flood subsides. | Help neighbors/ relatives upon receiving flood warning. | Prepare an evacuation plan for the family. | |
| Start cleaning as soon as flood subsides. | Contact neighbors/ relatives to spread warning. | | |
| Repair shelter as soon as flood subsides. | | | |
| Help neighbors/ relatives as soon as flood subsides. | | | |

| Reactive Behavior | Anticipatory Behavior | Preventive Behavior | Proactive Behavior |
|---|---|---|---|
| Contact neighbors/relatives as soon as flood subsides. | | | |

All households affected by floods are expected to demonstrate some form of reactive coping behavior, such as moving to higher ground at the onset of flooding or cleaning up as soon as the flood subsides. Some households demonstrate anticipatory behavior, choosing to act once they perceive a sufficiently high likelihood that the flood may hit their homes. This anticipatory behavior may be observed on top of the reactive behavior demonstrated. Other households adopt preventive measures long before disaster strikes or before the likelihood of disaster increases in addition to their anticipatory and/or reactive measures. Finally, some households adopt proactive measures on top of the other types of behavior. Several combinations are possible in the empirical analysis, examining the decision of households to adopt:

1. Reactive behavior only;
2. Anticipatory behavior in addition to reactive behavior;
3. Preventive measures in addition to reactive behavior;
4. Preventive measures in addition to anticipatory and reactive behavior;
5. Proactive measures in addition to reactive behavior;
6. Proactive measures in addition to reactive and anticipatory behavior;
7. Proactive measures in addition to reactive and preventive measures;
8. Proactive measures in addition to reactive, anticipatory and preventive measures.

The decision to undertake any of these combinations of coping strategies is considered under the framework of utility maximization (or loss minimization). Households choose to adopt a particular strategy over other strategies when their expected utility from such strategy is greater than their expected utility from all the rest.

Following Francisco et al. (2011), suppose a household chooses between two strategies, *j* and *k*, each providing utility $U_j$ and $U_k$. A linear random utility model can be specified such that:

$$U_j = b_j X + \varepsilon_j \quad (2a)$$

$$U_k = b_k X + \varepsilon_k \quad (2b)$$

Where $X$ is a vector of explanatory variables that affect the perceived utility derived from each strategy, and $\varepsilon$ is a random error term. If a household chooses option *j*, then it follows that its expected utility from option *j* is greater than its expected utility from option *k* such that:

$$U_j = (b_j X + \varepsilon_j) > U_k = (b_k X + \varepsilon_k) \quad (3)$$

The probability that a household would choose option *j* among a set of adaptive strategies can be written as:

$$P(Y = 1 \mid X) = P\,(U_j > U_k) \quad (4)$$

It was initially intended that the decision the household would take on the possible combinations listed earlier would be examined. However, the results of the survey showed that all households adopted only one of three combinations: (1) reactive and anticipatory behavior only, (2) preventive measures in addition to reactive and anticipatory behavior, and (3) proactive measures in addition to reactive, anticipatory, and preventive measures.

A multinomial logit (MNL) model was used to analyze the determinants of the choice of adaptation measures taken. Francisco et al. (2001) used a similar model to analyze adaptive decisions among households after strong typhoons in several Southeast Asian countries.

Following equation 3, the general form of the MNL model can be expressed as:

$$Prob[Y = j] = e^{\beta_j' X_{ji}} / \Sigma_j e^{\beta_j' X_{ji}}, \; j = 0,1,\ldots,J \quad (5)$$

where *i* represents each individual household and *j* represents its chosen coping strategy. The vector *X* represents a host of explanatory variables including socioeconomic variables (income, household size, education, etc.), past experiences of extreme flood events, and household beliefs (e.g., fatalistic attitudes). The values of coefficients from the estimated MNL model have qualitative meaning. A change of the explanatory variable by one unit influences the certainty level positively if the sign is positive and negatively if it is negative.

Parameter estimates of the MNL model provide only the direction of the effect of the explanatory variables on the dependent variable. Estimated coefficients have only qualitative meaning. A change in the explanatory variable by one unit influenced the probability of the household choosing a particular strategy positively if the sign was positive and vice versa. In order to provide a quantitative estimate of the magnitude of these changes in probability, the marginal effects of explanatory variables can be obtained by differentiating Eq. (5) with respect to each explanatory variable as such:

$$\delta_j = \frac{\partial P_j}{\partial x_i} = P_j\left[\beta_j - \sum_{k=0}^{J} P_k\,\beta_k\right] = P_j(\beta_j - \bar{\beta}) \quad (6)$$

The marginal effects or marginal probabilities are functions of the probability itself and measure the expected change in the probability of a particular strategy being chosen with respect to a unit change in an explanatory variable at the sample mean (Green 2000).

## 5. Survey Results and Discussion

### *5.1 Household Characteristics*

Respondents were asked to rate on a scale of one to ten how well they thought they remembered the details of what happened during the flood of August 2012. Out of the 400 households sampled, only the responses of those

who gave themselves a rating of 7 and above were included in the analysis. A total of 379 samples were included in the final tally.

The typical respondent was a 44-year-old female who had completed 11 years of education, was married, and had two young children (below the age of 12). The typical respondent owned the two-story house they lived in, which had electricity and a private water connection. There were two income-earning household members who generated a combined income of about PHP 20,025 per month (USD 465).

**Table 3. Respondent and household characteristics**

| | | Mean | Std. Dev. |
|---|---|---|---|
| Age | | 44.2 | 12.1 |
| Gender | =1 if male, 0 if female | 0.3 | 0.4 |
| Civil Status | =0 if single, widowed or separated, 1 if married | 0.7 | 0.4 |
| Education | Number of years of schooling | 10.5 | 2.7 |
| Household size | Number of household members | 5.8 | 2.6 |
| Young children | Number of children </= 12 yrs | 1.6 | 1.4 |
| Home ownership | =0 if owned, 1 if rented | 0.7 | 0.4 |
| Number of floors | Number of floors of dwelling | 1.6 | 0.5 |
| Water connection | =0 if connected to piped system, 1 if not connected | 0.9 | 0.3 |
| Electric bill | Monthly electricity bill in PHP | 1,334 | 1,347 |
| OFW | =1 if a member of the household is working abroad, 0 if not | 0.2 | 0.4 |
| Affiliation | =1 if affiliated with local community or religious/parish organization, 0 if not | 0.2 | 0.5 |
| Income earners | Number of income earners | 2 | 0.9 |
| Income | Average monthly household income in PHP | 20,025 | 19,243 |

*5.2 Economic Indicators*

Most (71.5 percent) of the households interviewed owned their homes but only 63 percent owned their land. This suggests that about 9 percent of respondents were *de facto* or informal settlers who did not have legal titles to their land. The average rental value of homes, according to the estimates of respondents, is PHP 3,250/month (USD 76/month).

On average, each household had two income-earning members, generating a combined monthly income of PHP 20,025 (USD 465). Twenty percent of households had at least one family member working abroad. About 24 percent of households owned a motorized vehicle (motorcycle or car). Among the most common household assets were appliances and electronics such as TV sets (95 percent), mobile phones (91 percent), radios (77 percent), and washing machines (60 percent).

Access to credit was inferred from responses on sources of funds used to finance repair/replacement of damaged property. Most (71 percent) households depended on themselves, partly or wholly, to finance their recovery. About 20 percent borrowed from friends/relatives. Only 3 percent borrowed from banks or used credit cards while about 2 percent borrowed from social security. Quite notably, more than 12 percent of households borrowed from informal lenders that typically charged very high interest for short-term loans without collateral. The lack of access to affordable credit may adversely affect the speed and capacity of households to recover from a disaster.

*5.3 Infrastructure*

The homes of those that were interviewed ranged from small, rudimentary single-story structures to expansive, three-story buildings. The average number of floors is 1.64. About 56 percent of homes had walls made of cement while 28 percent had walls made of plywood. Fifty-four percent had floors made of polished cement; 17 percent, vinyl; 17 percent, marble, granite, or ceramic; and 11 percent, either earthen or rudimentary wood shingles. Most households had roofs made of either corrugated tin (84 percent) or colored metal sheets (8 percent). All households had electricity and 90 percent had piped water connections.

*5.4 Information and Skills*

Sixty-one percent of respondents had only 10 years of education or less. Only 21 percent of respondents had previously attended training seminars on preparing for, and coping with, disasters. Most respondents received their training from the government (46 percent) or NGOs (37 percent). Majority of households (78 percent) used past experience as a guide in dealing with the crisis. Almost all respondents (97 percent) experienced the onslaught of Typhoon Ondoy in 2009. Other sources of information on how to prepare for, and cope with, disasters include the media (41 percent) and relatives/friends (7 percent). When asked how prepared they thought they were for this flood, 49 percent said they were very well prepared, 34 percent said they were adequately prepared, 15 percent said they were not very prepared, and 2 percent said they were not prepared at all.

*5.5 Technology*

Ninety-one percent of households interviewed had at least one mobile phone at the time of the flood. Ninety-five percent had television, 77 percent had radio, and 26 percent had a computer. The Marikina City government installed a flood warning system in 2011. The system employed loud sirens that can be heard within a 1.5 km radius. Four alert levels with corresponding siren codes warned residents about the water level of the Marikina River measured at the Gil Fernando Bridge in Barangay Tumana. At level 4, the highest alert, a continuous 10-minute blast signaling that the water level had reached 18 meters meant that forced evacuations would be enforced by the local government in low-lying areas along the banks of the river.

All respondents received warning before the floodwater reached their homes. Forty-one percent heard and understood the sirens of the flood warning system while 10 percent first learned about the threat of flooding through radio or television. Most households, however, received warning through word of mouth, either from barangay officials/local government or from neighbors and concerned relatives. On average, households had three hours between the time of receiving the warning and the time that the flood reached their homes.

**Table 4. Flood warning**

| Question | Percentage (%) |
|---|---|
| Did you or any member of your household receive a warning before the floodwater reached your area? | 100 |
| How did you receive this flood warning? | |
| Flood alarm | 41.2 |
| Radio or television (media) | 9.5 |
| Word of mouth | 48.6 |
| What did you do upon receiving the warning? | |
| Wait for another warning | 24.5 |
| Move belongings/documents to higher ground | 57.8 |
| Evacuate self and family to safe shelter | 36.4 |
| Prepare emergency equipment and supplies | 19.0 |
| Construct sand dikes; reinforce shelter | -- |
| Help neighbors/relatives | 2.9 |
| Contact neighbors/relatives to spread warning | 12.7 |

Upon receiving warning, majority (58 percent) of households started to move valuables and important documents to higher ground. However, only 36 percent of households started to evacuate themselves or some household members. Twenty-five percent waited for further warnings. As soon as the flood reached their homes, only then did majority of households (58 percent) evacuate. About 38 percent of households also waited until the flood reached their homes before moving belongings and important documents to higher ground.

**Table 5. Action upon flood impact**

| Question | Percentage (%) |
|---|---|
| As soon as the flood reached your house, what did you do? | |
| Nothing; the flood did not reach our house | 0.3 |
| Nothing; we had already evacuated by then | 19.5 |
| Evacuate self and family to safe shelter | 58.3 |
| Move belongings/documents to higher ground | 38.0 |
| Prepare emergency equipment and supplies | 7.7 |
| Construct sand dikes; reinforce shelter | -- |
| Help neighbors/relatives | 3.4 |
| Contact neighbors/relatives to spread warning | 15.3 |

About 80 percent of households interviewed had access to safe shelter at the time of the flood but only 70 percent evacuated. Majority of those who evacuated stayed in government-designated evacuation centers (60 percent), but many households also moved to the homes of their neighbors/relatives/friends (37 percent) that were located in higher areas or had upper floors.

Fifty-one percent of those who decided not to evacuate said they felt that there was no need to move since their homes were safe. Less than 3 percent said there was no accessible shelter. Almost half (49 percent) of respondents said that they did not want to leave their valuables behind. Looting was particularly common immediately after the flood due to Typhoon Ondoy in 2009, and many respondents shared stories about their own experiences and what they heard had happened to some of their neighbors who lost more valuables to looters. About 6 percent felt that it was too dangerous to leave their house or too late to evacuate.

**Table 6. Access to shelter and willingness to evacuate**

| Question | Percentage (Yes), % |
|---|---|
| Was there safe shelter accessible to you and your family at the time of the flood? | 80.0 |
| Did you or your family evacuate? | 69.9 |
| Where did you evacuate? | |
| Government building or designated evacuation center | 60.1 |
| Place of worship | 3.8 |
| Neighbor's/friend's/relative's house | 36.7 |
| Why did you not evacuate? | |
| No need; own house is safe | 50.9 |
| No safe shelter available or accessible | 2.7 |
| Did not want to leave belongings and property | 49.3 |
| Too late; more difficult/dangerous to leave the house | 6.2 |

*5.6 Social Capital*

Majority (79 percent) of respondents were not members of any community or religious organization. However, responses did seem to suggest that there had been some forms of interaction and mutual support among neighbors, at least before the actual flood event. Forty-four percent of respondents claimed to have helped neighbors or the community to prepare for disasters in general, although the amount and kind of help given had not been verified in the research. Only about 3 percent of respondents said that they helped neighbors/relatives upon receiving flood warnings and less than 4 percent said they helped out once the flood reached their homes. However, 13 percent of respondents said they contacted neighbors/relatives upon receiving the flood warnings and 15 percent said they contacted neighbors/relatives when the flood came.

Almost all (96 percent) respondents said that they had received help during or soon after the flood, mostly from the government (62 percent) or from neighbors/friends/relatives (24 percent). The help they received was mostly in the form of food, water, and clothing (77 percent), medicines (32 percent), and information (26 percent).

**Table 7. Help from others**

| Question | Percentage (%) |
|---|---|
| Did you receive any help from others during or soon after the flood? | |
| Yes from, | 95.8 |
| Government | 62.3 |
| Neighbors/friends/relatives | 23.7 |
| NGOs/community or religious organizations | 14.5 |
| What kind of help did you receive? | |
| Information | 25.7 |
| Shelter | 10.6 |
| Food, water, clothing | 77.1 |
| Medicine | 32.3 |
| Financial support | 10.8 |

*5.7 Preparing for Disasters*

Respondents were asked what measures they took in preparation for the rainy season of 2012 when the *Habagat* flood occurred. They were also asked what preparations they had made for the coming monsoon season of 2013 to see if there had been any changes in behavior following their recent experience. The most commonly adapted measure in 2012 was to check weather updates and flood warnings regularly (88 percent) followed by the preparation of an evacuation plan for the family (73 percent). The percentage of respondents who adapted these measures further increased to 97 percent and 79 percent respectively in 2013. There was also a rise in the percentage of respondents who bought and stored food, medicine, and emergency supplies from 68 percent to 89 percent as well as in the percentage of respondents who reinforced their homes from 40 percent to 64 percent. These changes suggest that many households learned from their recent experience of flooding, and that more households have now implemented measures in preparation for the next rainy season.

**Table 8. Coping behavior**

| Measure | Implemented in preparation for the 2012 monsoon season (%) | Implemented in preparation for the 2013 monsoon season (%) |
|---|---|---|
| Regularly check on weather updates and flood warnings | 88.13 | 97.36 |
| Buy and store food, medicines, and emergency supplies | 68.07 | 88.65 |
| Reinforce or repair house | 40.11 | 64.12 |
| Build mezzanine, second/third floor, or roof deck | 26.12 | 26.91 |
| Move family members to a different location | 45.65 | 44.33 |
| Attend disaster-preparedness seminars/workshops | 30.08 | 35.36 |
| Help neighbors or community to prepare for disasters | 43.88 | 43.80 |
| Cut/trim trees near the house to prevent damage | 33.51 | 21.37 |
| Prepare an evacuation plan for your family | 73.09 | 79.18 |
| Buy insurance against property damage | 7.65 | 8.97 |

*5.8 Impact of the Flood on Households*

About 50 percent of respondents claimed that it flooded in their area more than once a year. The average flood height reported for the August 2012 flood event was 4 meters outdoors and 3 meters indoors. The intensified monsoon and resulting flood caused damage to property, including the dwelling structure itself and its contents – appliances, electronic devices, and personal belongings. Most houses only needed thorough cleaning but others had damaged floors (22 percent), roofs (33 percent), and walls (29 percent). The most commonly damaged household appliances were television sets (48 percent), rice cookers (47 percent), refrigerators (44 percent), washing machines (43 percent), and radios (33 percent). Some households also experienced damage to their vehicles – cars (37 percent) and motorcycles (32 percent).

The average amount of losses reported by households was PHP 33,142 (USD 771), which was 165 percent of the average monthly income of sampled households or 13.8 percent of their average annual household income.

**Table 9. Damage to dwellings**

| Parts of House | Percentage of households that suffered damage/loss | Percentage of households that have replaced or repaired parts in the last 6 months | Average cost of repair or replacement (in PHP) |
|---|---|---|---|
| Floor | 21.64% | 56.10% | 3,051 |
| Roof | 33.25 | 66.70 | 3,595 |
| Walls | 28.76 | 63.30 | 6,412 |

Six months after the flood event, more than half of households had repaired/replaced damage to their floors (56 percent), roofs (67 percent), and walls (63 percent), which on average cost PHP 3,051 (USD 71), PHP 3,595 (USD 84), and PHP 6,412 (USD 149), respectively. Among household assets, damage to vehicles and computers were the most costly. However, 76 percent of households whose cars were damaged, 71 percent of those whose motorcycles were damaged, and 42 percent of those whose computers were damaged had already replaced/repaired them within six months of the disaster. The high values may reflect the fact that households that owned vehicles and computers tended to have high incomes, which enabled them to repair/replace these high-priced assets relatively quickly.

**Table 10. Damage to assets**

| Assets owned | Percentage of households that suffered damage/loss (%) | Percentage of households that have replaced or repaired items in the last 6 months (%) | Average cost of repair or replacement (in PHP) |
|---|---|---|---|
| Radio | 32.76 | 63.54 | 1,493 |
| Television | 48.04 | 69.77 | 6,337 |
| Mobile phone | 10.20 | 77.14 | 3,487 |
| Computer | 19.19 | 42.11 | 13,290 |
| Camera | 13.33 | 30.00 | 4,550 |
| Bicycle | 21.90 | 60.87 | 1,367 |
| Motorcycle | 31.91 | 86.67 | 16,282 |
| Car | 36.96 | 76.47 | 265,557 |
| Refrigerator | 44.49 | 71.29 | 6,443 |
| Microwave oven | 21.43 | 66.67 | 4,292 |
| Electric fan | 21.12 | 88.71 | 896 |
| Washing machine | 43.42 | 71.72 | 4,005 |
| Rice cooker | 46.67 | 38.10 | 993 |
| Table | 18.13 | 76.56 | 2,816 |
| Chair/sofa | 25.21 | 69.23 | 3,366 |
| Bed/mattress | 20.31 | 68.18 | 2,678 |

| Assets owned | Percentage of households that suffered damage/loss (%) | Percentage of households that have replaced or repaired items in the last 6 months (%) | Average cost of repair or replacement (in PHP) |
|---|---|---|---|
| Jewelry/artwork | 5.41 | 0.00 | -- |

Most households (71 percent) financed the cost of repairs/replacement wholly or partially with their family savings. About 20 percent of respondents borrowed money from friends/relatives while 12 percent borrowed from informal lenders. Only 5 percent of households availed themselves of credit through formal channels such as banks, credit cards, or social security (SSS, GSIS, or PAGIBIG). Finally, 11 percent of respondents received monetary gifts/donations.

**Table 11. Financing repairs/replacements**

| Question | Percentage (%) |
|---|---|
| How did you finance these repairs/replacements? | |
| Own money; savings | 71.0 |
| Borrowed money from friends/relatives | 20.1 |
| Borrowed money from bank or credit card | 3.2 |
| Borrowed money from government, SSS, or GSIS | 2.1 |
| Borrowed money from informal lenders | 12.1 |
| Gifts/donations from friends/relatives | 9.0 |
| Gifts/donations from government | 2.1 |

*5.9 Perceptions and Attitudes*

A large majority of respondents either agreed (39 percent) or strongly agreed (33 percent) with the notion that there is little that they can do to protect their family from natural disasters since the occurrence of such are beyond anyone's control. Thirty-one percent agreed and 30 percent strongly agreed with the statement that what happens to them and their families during calamities was ultimately God's will. These perceptions may be thought to have negative effects on people's willingness to prepare for future disasters. However, a greater majority of respondents still either agreed (46 percent) or strongly agreed (53 percent) that preparing for such natural disasters was important. Fifty-eight percent strongly agreed and 39 percent agreed that it was their responsibility to prepare for unforeseen emergencies. The responses thus demonstrated a curious mix of both fatalistic and action-oriented perceptions.

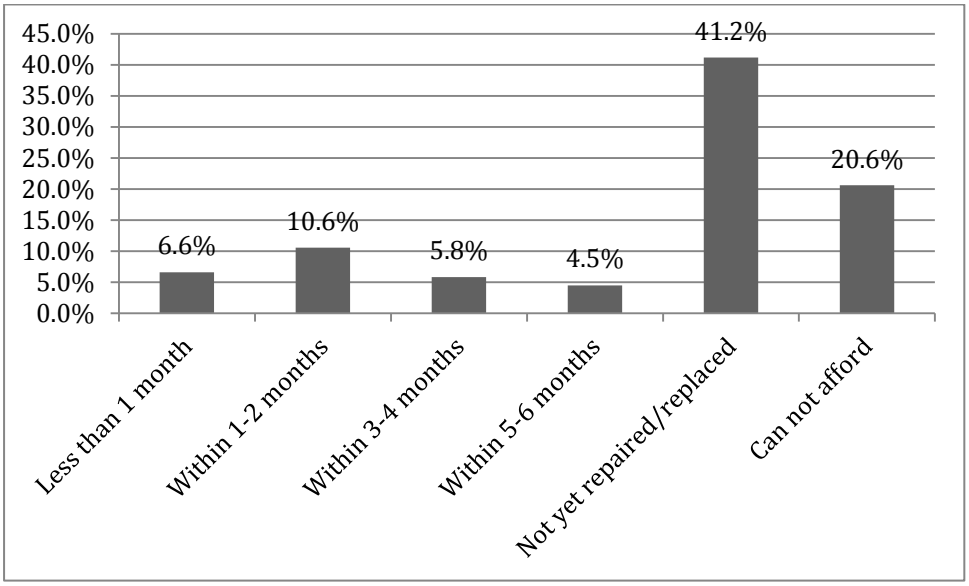
**Table 11. Perceptions and attitudes**

| | Strongly Disagree (%) | Disagree (%) | Neither agree nor disagree (%) | Agree (%) | Strongly Agree (%) |
|---|---|---|---|---|---|
| There is little I can do to protect my family from natural disasters since the occurrence of such disasters are beyond anyone's control. | 1.6 | 17.7 | 9.0 | 38.8 | 33.0 |
| Preparing for natural disasters is important in ensuring the safety and well-being of my family. | 0.0 | 0.3 | 1.6 | 45.7 | 52.5 |
| What happens to me and my family during calamities is ultimately God's will. | 7.7 | 13.7 | 8.2 | 30.6 | 29.6 |
| I can depend on others to help my family during times of calamity and emergency. | 0.8 | 11.1 | 31.9 | 45.4 | 10.8 |
| It is my responsibility to prepare myself and my family for unforeseen emergency. | 0.0 | 0.3 | 2.1 | 39.1 | 58.3 |

*5.10 Property Damage Recovery*

About 62 percent of households had not yet fully repaired or replaced all damaged property at the time of the survey (approximately seven months after the flood event). Almost 21 percent of those interviewed explicitly said that they could not afford the costs of repair/replacement of some or all damaged property.

**Figure 4. Repair/replacement of damaged property**




## 6. Model Results and Discussion

### *6.1 Property Damage Recovery*

Results from the pilot test showed that the respondents had difficulty remembering the exact time it took for them to repair/replace all damaged property. Answers were often given as a range of one to two months. To accommodate this, questions on how long it took for the household to repair/replace damaged property was modified to give respondents the following options to choose from: (1) less than one month; (2) within 1 or 2 months; (3) within 3 or 4 months; (4) within 4 or 5 months; (5) not yet repaired/replaced; or (6) cannot afford to repair/replace. This question was asked for each item of property reported as having been damaged during the flood.

Responses of each household to the questions on recovery time for property damage for all damaged items were then pooled together, and the maximum reported repair/replacement time for all damaged items was used to represent the overall property damage recovery time of each household. Since the responses obtained were in the form of two-month time intervals, interval regression was used in place of simple linear regression in the empirical analysis. Interval linear regression is used to model outcomes with interval censoring (i.e., when the ordered category into which each observation falls is known but not that exact value of the observation).

With property damage recovery time as the dependent variable, explanatory variables used include several variables representing the five

determinants of economic recovery—economic resources, infrastructure, information and skills, technology, and social capital—and variables representing the adoption of anticipatory, preventive, or proactive measures, total cost of property damage, and household characteristics such as household size, level of education of household head, and flood frequency. Table 12 below provides a description of the explanatory variables used in the model.

**Table 12. Description of variables for interval regression model**

| Variable | Mean | S.D. | Description |
|---|---|---|---|
| Cost of property damage | 33,011.16 | 118,186.40 | Continuous |
| Anticipatory measures | 1.00 | 0.05 | Dummy, 1 if taken, 0 otherwise |
| Preventive measures | 0.99 | 0.07 | Dummy, 1 if taken, 0 otherwise |
| Proactive measures | 0.44 | 0.50 | Dummy, 1 if taken, 0 otherwise |
| Household income | 20,025.07 | 19,243.77 | Continuous |
| Borrowing | 0.19 | 0.39 | Dummy, 1 if household borrowed from bank, credit card, relatives, or friends, 0 otherwise |
| Informal settler | 0.18 | 0.39 | Dummy, 1 if yes, 0 otherwise |
| Number of floors | 1.64 | 0.55 | Continuous |
| Housing material | 2.56 | 0.31 | Ordinal, 1 = natural, 2=rudimentary, 3 = finished |
| Heard flood alarm | 0.42 | 0.49 | Flood alarm; dummy, 1 if alarm was heard, 0 otherwise |
| Attended disaster training | 0.21 | 0.41 | Dummy, 1 if attended, 0 otherwise |
| Access to safe shelter | 0.86 | 0.43 | Dummy, 1 if yes, 0 otherwise |
| Evacuated during flood | 0.77 | 0.49 | Dummy, 1 if evacuated, 0 otherwise |
| Community organization | 0.41 | 0.72 | Dummy, 1 if affiliated, 0 otherwise |
| Relief aid | 0.69 | 0.46 | Dummy, 1 if received aid, 0 otherwise |
| Years of education | 10.56 | 2.73 | Continuous |
| Household size | 5.80 | 2.60 | Continuous |
| Frequency of floods | 3.97 | 1.32 | Ordinal, 1 = less than once in 5 years, 2 = once in 5 years, 3 = more than once in 5 years, 4 = once a year, 5 = more than once a year |

The initial run included all indicators listed in table 1 for each determinant of recovery (based on Smit and Pilifosova 2001). However, some indicator variables such as ownership of mobile phone and radio/TV, access to electricity and piped water, and learning from past experiences did not vary much across the sample, and thus had to be dropped. Other variables that were not found to be significant were also dropped to improve the results. Nonetheless, at least one indicator variable per determinant of recovery was preserved for the final regression model. Results of the interval regression model are shown in table 13.

**Table 13. Results of interval regression model**

| Explanatory Variables | Coefficients | | *P* values |
|---|---|---|---|
| Cost of property damage | 1E-05 | *** | 0.002 |
| Anticipatory measures | -21.092 | *** | 0.000 |
| Preventive measures | -21.899 | *** | 0.000 |
| Proactive measures | -0.252 | | 0.715 |
| Household income | -2E-04 | *** | 0.000 |
| Borrowing | -2.054 | *** | 0.006 |
| Informal settler | 2.353 | *** | 0.005 |
| Number of floors | -0.342 | | 0.550 |
| Housing material | 0.051 | | 0.968 |
| Heard flood alarm | -1.441 | ** | 0.037 |
| Attended disaster training | 1.579 | * | 0.061 |
| Access to safe shelter | -1.768 | * | 0.078 |
| Evacuated during flood | -0.863 | | 0.340 |
| Community organization member | -1.129 | ** | 0.025 |
| Relief aid | -0.728 | | 0.350 |
| Years of education | 0.089 | | 0.470 |
| Household size | 0.125 | | 0.304 |
| Frequency of floods | 0.333 | | 0.161 |
| Constant term | 51.394 | *** | 0.000 |

***Significant at 99% confidence level
**Significant at 95% confidence level
*Significant at 90% confidence level

As expected, the total cost of property damage was found to be a highly significant determinant. Greater property damage cost, even when controlling for income, resulted in a longer recovery time. Average monthly household income was also highly significant. A larger income led to a shorter recovery. As expected, greater economic resources enabled richer households to recover faster. Access to credit as indicated by having borrowed money to finance repairs/replacements from banks, relatives, friends, or informal lenders was also a very significant factor that led to quicker recovery among households.

In terms of infrastructure, the degree of permanence as indicated by whether the household possessed the property rights to their home (by lease or ownership) as opposed to being informal settlers/squatters was found to be a significant determinant of recovery. Being an informal settler/squatter increased the length of full recovery. Since this finding was observed even after having controlled for income, it can be inferred that informal settlers may have deliberately chosen not to repair/replace damaged property immediately. The finding that receiving aid from government and charitable institutions was not a significant determinant may also support this interpretation. Informal settlers were specifically targeted by local government relief efforts after the flood, and yet the recovery period still tended to be longer for informal settlers. Repair or replacement of damaged property may not have been their priority.

Other infrastructure variables such as the type of housing material and number of floors were not found to have a significant impact. In contrast, information variables were found to be significant. Hearing flood alarm warnings reduced recovery time for households, perhaps as this would have allowed them to take anticipatory measures (such as moving belongings to higher ground or evacuating family members) before the flood reached their homes. However, contrary to expectations, attendance in disaster preparedness training appeared to have significantly increased property damage recovery time.

There is not enough information available from the survey to explain this result. However, one may speculate that these disaster preparedness seminars have not really prepared attendees to prevent property damage, perhaps focusing instead on understanding flood/weather warnings, developing evacuation plans, and cooperating with the local authorities during disasters, with the ultimate goal being preservation of life rather than property damage mitigation.

In the case of technological determinants, having access to nearby safe shelter was found to have significantly decreased recovery time. Access to shelter would have allowed affected households to move their belongings and evacuate themselves to higher ground. However, evacuation per se was not found to be significant. Understandably, property damage may not have been significantly reduced by the evacuation of families to safe shelter since much of their property may have had to be left in their homes when they evacuated.

Damage to vehicles, for example, was the single largest contributor to total property damage costs. Many vehicle owners who did not incur flood damage to their vehicles reported having parked their cars in known flood-free areas, including homes of friends and relatives elsewhere. Most of those who experienced damage to their vehicles were either unable to move them to higher ground because the flood had already surrounded their area or were on the road when the flood hit the area.

Receiving relief aid from government, NGOs, friends/relatives, and community organizations was not found to have had a significant impact on recovery. Relief aid was specified as provision of shelter, food, water, clothing, or monetary donations. Although these forms of aid provided temporary relief to affected households, they did not affect the time it took for households to recover from property damage. This does not undermine the importance of relief aid in the immediate aftermath of a disaster. However, the findings suggest that governments and charitable organizations interested in helping families recover from property damage may find alternative strategies such as extending affordable credit to affected households to be more helpful than simply focusing on relief operations.

Membership in community organizations (whether civic or religious) was found to have significantly reduced recovery time among the sampled households. Not enough information was gathered in the survey to determine the mechanism by which social capital in the form of membership in community organizations reduced recovery time. However, it is possible that membership in such organizations provided support not necessarily in the form of relief aid.

Moral/emotional support, sharing of technical know-how, or access to a broader social support network may have been instrumental in helping households with family members affiliated with community organizations recover faster.

As for household characteristics, the number of years of formal schooling received by the household head did not have significant impact on recovery. Household size was also not found to be significant. Finally, frequency of flooding in the area of the household also did not have a significant effect on recovery from this particular disaster. This result is unexpected since flood frequency could be hypothesized to have either a positive effect on recovery speed as households adapt to frequent flooding in the area or a negative effect as households too frequently affected by floods may find it difficult to recover between floods.

The types of coping behavior adopted by households both in preparation for the monsoon season and during the actual disaster were expected to be major determinants of recovery as well. Since all households that participated in the survey adopted reactionary measures, the dummy variable for it was dropped. The dummy variables that were retained represented the adoption of anticipatory, preventive, and proactive measures. Results show that the adoption of anticipatory measures in preparation for this particular weather/flood event reduced property damage recovery time. Anticipatory behavior that significantly reduced recovery time included activities such as monitoring flood/weather updates, moving belongings to higher ground upon receiving warning, preparing emergency equipment upon receiving warning, and evacuating to safe shelter. The adoption of general preventive measures was also found to have significantly reduced recovery time. These measures taken a considerable time before disaster strikes include buying/storing food and medicine, temporarily moving family members to flood-free areas during the monsoon season, attending disaster preparedness training, trimming trees near their property, and preparing evacuation plans for the family.

Contrary to expectations, the adoption of proactive measures such as reinforcing homes, building mezzanines or second/third floors, and buying property insurance against flood damage did not have a significant impact on recovery from property damage. Reinforcing structural elements (roof, walls, etc.) may strengthen the existing property so that it could better withstand strong winds and heavy rain. Unfortunately, it may not do much to prevent flood damage. The same case holds for building higher floors or mezzanines. Lower parts of the home remain vulnerable. Heavy/bulky assets such as vehicles, refrigerators, washing machines, and furniture, which are costly to repair/replace when damaged by flood, are difficult or impossible to move to higher floors and thus could not be spared from flood damage.

This result certainly does not imply that reactive, anticipatory, and preventive measures are necessarily better than proactive measures in all aspects. Higher floors can provide safe refuge from floods, thereby saving lives, improving welfare, possibly removing the need to evacuate elsewhere, and allowing household members to stay on their property. However, in terms of

preventing flood damage and speeding up recovery, proactive measures did not have a significant effect.

To summarize, the results show that household income, access to credit (borrowing), the use of a flood alarm system, access to safe shelter, membership in a community organization, adoption of disaster-specific anticipatory measures, and adoption of general preventive measures significantly reduced the time it took for affected households to recover from property damage. Conversely, property damage cost, being an informal settler (squatter), and, contrary to expectations, attendance in disaster preparedness training significantly increased recovery time. Evacuation, relief aid, type of housing, education, household size, and frequency of flooding in the area did not have significant effects.

*6.2 Choice of Coping Behavior*

A multinomial logistic (MNL) regression model was used to analyze the household decision on the type of coping strategies to adopt. Originally, several combinations were considered. However, results of the survey showed that all households adopted only one of three combinations. This reduced the model to a multinomial logit with three possible outcomes: adoption of (1) reactive and anticipatory behavior only, (2) reactive and anticipatory behavior plus preventive measures, and (3) reactive and anticipatory behavior plus preventive and proactive measures.

Estimation of the MNL model required normalizing one category, often referred to as the "base category." In this case, the "reactive and anticipatory measures only" category was used as the base outcome. Table 14 presents a description of explanatory variables used in the analysis.

**Table 14. Description of variables for multinomial logistic model**

| Variable | Mean | S.D. | Description |
|---|---|---|---|
| Household income | 20,025.07 | 19,243.77 | Continuous |
| Vehicle ownership | 0.23 | 0.42 | Dummy, 1 if household owns a vehicle, 0 otherwise |
| Learning from experience | 0.78 | 0.42 | Dummy, 1 if learned from past experience, 0 otherwise |
| Learning from media | 0.41 | 0.49 | Dummy, 1 if learned from media, 0 otherwise |
| Married | 0.72 | 0.45 | Dummy, 1 if married, 0 otherwise |
| Years of education | 10.56 | 2.73 | Continuous |
| Household size | 5.80 | 2.60 | Continuous |
| Home ownership | 1.28 | 0.46 | Dummy, 1 if owned, 0 otherwise |
| Fatalistic attitude | 3.59 | 1.28 | Ordinal |
| Responsible attitude | 4.54 | 0.60 | Ordinal |
| Reliance on external aid | 3.53 | 0.88 | Ordinal |

Household income and vehicle ownership are indicators of the economic resources available to households when making their decisions on what type of coping strategies to adopt. Vehicles included all forms of motorized land transport. Households were asked for the sources of information that helped them prepare for or cope with the disaster, these included past experience of flooding and local media (newspapers/radio/TV).

Respondents were asked to indicate on a 5-point Likert scale whether they agreed or disagreed with several statements to determine their attitudes toward disasters and disaster preparedness. The statements "what happens to me and my family during calamities is ultimately God's will" and "there is little I can do to protect my family from natural disasters since the occurrence of such disasters are beyond anyone's control" were used to determine whether the respondent had a fatalistic attitude towards disaster. The statement "It is my responsibility to prepare myself and my family for unforeseen emergency" was used to determine whether the respondent felt responsible for ensuring his/her family's and own safety. This statement signaled an intention to secure the safety and well-being of one's family but did not necessarily translate to concrete action. Finally, the statement "I can depend on others to help my family during times of calamity and emergency" was used to determine how whether the respondent relied on help from others during disaster.

**Table 15. Results of multinomial logistic regression**

| Explanatory Variables | Reactive and Anticipatory plus Preventive | | | Reactive, Anticipatory, and Preventive plus Proactive | | |
|---|---|---|---|---|---|---|
| | Coefficients | | *P* values | Coefficients | | *P* values |
| Household income | 0.000 | * | 0.087 | 0.000 | * | 0.078 |
| Vehicle ownership | -0.175 | | 0.692 | 0.966 | | 0.024 |
| Learning from experience | 0.918 | *** | 0.008 | 1.148 | *** | 0.004 |
| Learning from media | 0.347 | | 0.309 | 1.305 | *** | 0.001 |
| Married | -0.062 | | 0.847 | 0.439 | | 0.222 |
| Years of education | -0.020 | | 0.730 | 0.015 | | 0.812 |
| Household size | 0.067 | | 0.269 | 0.108 | *** | 0.088 |
| Home ownership | -0.118 | | 0.735 | -0.455 | | 0.230 |
| Fatalistic attitude | -0.265 | * | 0.061 | -0.131 | | 0.413 |
| Responsible attitude | -0.460 | | 0.347 | -0.232 | | 0.630 |
| Trust in help from others | -0.315 | | 0.263 | -0.552 | ** | 0.051 |
| _cons | 4.141 | | 0.240 | 1.719 | | 0.612 |

***Significant at 99% confidence level
**Significant at 95% confidence level
*Significant at 90% confidence level

Parameter estimates of an MNL regression provide only the direction of the effect of explanatory variables on the dependent variable. The coefficients do not represent the actual magnitude of changes. In order to provide estimates of the expected change in the probability of a household choosing a particular

strategy combination for every unit change in an explanatory variable, marginal effects are also reported. Marginal effects reported in table 16 can be interpreted as the percent change in the probability of a household choosing a particular coping strategy combination following a one-unit increase from the sample average of the explanatory variable.

**Table 16. Marginal effects from multinomial logistic regression**

| Explanatory Variables | Reactive and Anticipatory plus Preventive | | | Reactive, Anticipatory, and Preventive plus Proactive | | |
|---|---|---|---|---|---|---|
| | dy/dx | | *P* values | dy/dx | | *P* values |
| Household income | 0.000 | | 0.463 | 0.000 | | 0.401 |
| Vehicle ownership | -0.216 | *** | 0.001 | 0.261 | *** | 0.000 |
| Learning from experience | 0.052 | | 0.442 | 0.107 | | 0.097 |
| Learning from media | -0.144 | *** | 0.012 | 0.238 | *** | 0.000 |
| Married | -0.089 | | 0.152 | 0.106 | * | 0.072 |
| Years of education | -0.007 | | 0.528 | 0.007 | | 0.560 |
| Household size | -0.002 | | 0.853 | 0.013 | | 0.204 |
| Home ownership | 0.049 | | 0.424 | -0.083 | | 0.178 |
| Fatalistic attitude | -0.044 | ** | 0.070 | 0.016 | | 0.509 |
| Responsible attitude | -0.075 | | 0.197 | 0.027 | | 0.574 |
| Trust in help from others | 0.017 | | 0.633 | -0.071 | ** | 0.032 |

***Significant at 99% confidence level
**Significant at 95% confidence level
*Significant at 90% confidence level

As expected, household income was found to have a positive effect on both the probability of adopting preventive measures in addition to reactive and anticipatory measures as well as the probability of adopting proactive measures in addition to preventive, reactive, and anticipatory measures. However, its marginal impact at the sample average of household income was not significant.

Vehicle ownership, which can be interpreted as a proxy for wealth, was found to have a significant marginal effect. Owning a car/motorcycle increased the probability of a household taking preventive measures in addition to reactive and anticipatory measures by 21.6 percent. It also increased probability of taking proactive measures in addition to reactive, anticipatory, and preventive measures by 26.1 percent.

Households that had gained indigenous knowledge on how to prepare for, and cope with, floods by learning from past flood experience were found to be more likely to adopt both preventive and proactive measures on top of their other coping behavior.

Gaining knowledge from media significantly increased the likelihood of adopting proactive measures in addition to reactive, anticipatory, and preventive measures by 23.8 percent. In contrast, the likelihood of adopting just preventive measures on top of reactive and anticipatory behavior was reduced by 14.4

percent. Media advice seemed to have had encouraged households to take proactive measures in addition to their other coping strategies.

Being married increased the likelihood of taking proactive measures by 10.6 percent. Having a family to take care of may have influenced decision makers to take concrete steps to improve their household's well-being, enhance their capacities to endure disasters, and reduce their vulnerability to such. This hypothesis was also supported by the positive relationship found between household size and the probability of taking such proactive measures. Likewise, it may also be that being married and having a family—especially a large one—facilitated the adoption of proactive measures that tend to require greater resources and a more collective effort among members of the household than other types of coping strategies.

Education, contrary to expectations, did not have significant effect. It can be argued that the adoption of preventive and proactive measures requires practical knowledge that is not necessarily learned through formal schooling. Home ownership also did not have a significant impact. Having a "fatalistic attitude" (i.e., agreeing that there was little one can do to protect one's family from disasters since disasters are beyond anyone's control and that what happens during a disaster is ultimately God's will) reduced the probability of taking preventive measures on top of reactive and anticipatory behavior by 4.4 percent. However, it did not have a significant effect on the likelihood of adopting proactive measures. Believing that it was one's own responsibility to prepare oneself and family for unforeseen emergencies (i.e., having a "responsible attitude") did not have a significant effect on both.

Reliance on help from others (i.e., agreeing that one could "depend on others to help my family during times of calamity and emergency") decreased the probability of taking proactive measures. However, it did not significantly affect the probability of taking preventive measures on top of reactive and anticipatory behavior.

In summary, wealth and income were found to have significant positive effects on the likelihood of adopting both preventive measures only and preventive plus proactive measures. Learning from previous flood experience also increased both of these likelihoods. Media advice increased the likelihood of adopting proactive measures on top of all other coping behavior. A "fatalistic attitude" decreased the likelihood of adopting preventive measures on top of reactive and anticipatory behavior but not the adoption of proactive measures. Reliance on help from others during disasters decreased the likelihood of adopting proactive measures.

## 7. Summary, Conclusions, and Policy Implications

Using data gathered through a survey of 400 households from four barangays in Marikina City that were most severely affected by the flood of August 2012, the study sought to analyze the factors influencing property damage recovery time of households and the factors that affected the household choice of coping strategy during and after the flood.

Households reported property damage equal to an average of PHP 33,142 (USD 771), which was equal to 165 percent of their average monthly household income or 13.8 percent of their average annual income. Television sets, rice cookers, refrigerators, and washing machines were the most commonly damaged household appliances (more than 40 percent of households). Damage to vehicles and computers were the most costly. Roofs (33 percent) were the most commonly damaged parts of the house followed by exterior and interior walls (28 percent).

Interval regression was used to investigate the factors influencing property damage recovery, measured as the time it took for households to fully repair/replace damaged property. The results show that household income, access to credit (borrowing), the use of a flood alarm system, access to safe shelter, and membership in a community organization significantly reduced recovery time. The adoption of disaster-specific anticipatory measures and of general preventive measures also significantly reduced the time it took for affected households to recover. Conversely, property damage cost, being an informal settler or squatter, and, contrary to expectations, having attended disaster preparedness training significantly increased recovery time.

As expected, access to economic resources enabled affected households to recover faster. The importance of borrowing in aiding recovery is confirmed by regression results and supported by survey findings that 37 percent of households had borrowed funds from banks, informal lenders, friend or relatives to finance repairs/replacements. In contrast, relief aid—specified as temporary shelter, food, water, clothing, medicine and monetary donations—did not have a significant impact on recovery. Although these forms of help provided temporary relief to affected households, they did not affect the time it took for households to recover from property damage. Governments and organizations interested in helping families recover from property damage may thus find alternative strategies such as extending affordable credit to affected households to be more helpful than simply focusing on relief operations.

Being alerted by the flood warning system significantly reduced recovery time of affected households as it allowed members of a household to prepare for the flood by moving valuables to higher ground and evacuating to safe shelter, access to which was also found to have significantly reduced recovery time. The dissemination of clear and relevant information through reliable warning systems is thus highly recommended along with the provision of safe shelter.

The adoption of anticipatory behavior (e.g., monitoring weather updates, moving valuables to higher ground upon receiving warning, etc.) and of general preventive measures (e.g., preparing evacuation plans, storing food/medicine, trimming branches before the monsoon season, etc.) both significantly reduced recovery time. However, the adoption of proactive measures (e.g., building higher floors, reinforcing homes, buying property insurance) had no significant effect. This result does not necessarily mean that proactive measures should be discouraged. Theoretically, proactive behavior can improve a household's chance of avoiding great costs when disaster strikes and can significantly enhance its ability to survive so much so that crises become much less "disastrous."

However, such proactive measures can also be very costly. The study's findings suggest that anticipatory behavior and general preventive measures, which are generally less expensive than proactive measures, may be enough to improve property damage recovery.

A multinomial logistic (MNL) model was used to analyze household choice of coping strategy among three possible alternatives: (1) reactive and anticipatory behavior only, (2) reactive and anticipatory behavior plus preventive measures, and (3) reactive and anticipatory behavior plus preventive and proactive measures. Explanatory variables used in the model include indicators of the household's available economic resources; socioeconomic characteristics; knowledge of how to prepare for, and cope with, disaster; and attitudes/beliefs towards disasters. Since parameter estimates in an MNL regression provide only the direction of the change in the probability of a particular outcome, marginal effects were also obtained and presented.

Both household income and vehicle ownership, an indicator of household wealth, were found to have had a significant impact on the probability of adopting preventive measures and the probability of adopting proactive measures in addition to reactive and anticipatory behavior. Households with greater economic resources seemed better equipped and/or better informed when it came to taking such measures. Government and NGOs are thus recommended to continue directing their efforts in helping and educating particularly lower-income households, which are less likely to adopt preventive and proactive measures and which rely mostly on reactive/anticipatory behavior when disaster strikes.

Experience appears to have been a good teacher. Households that had gained indigenous knowledge on how to prepare for, and cope with, floods by learning from past experience were found to be more likely to adopt both preventive and proactive measures on top of their other coping behavior. Years of formal education did not have a significant impact, suggesting that practical knowledge is more important in enhancing disaster preparedness. Being married and learning about disaster preparedness from the media increased the likelihood of adopting proactive measures but had no impact on the probability of adopting preventive measures.

The household head's level of education had no significant impact on choice of coping strategy. However, some of his/her attitudes and beliefs on what happens during a disaster did have significant effects. Having a "fatalistic attitude" reduced the probability of taking preventive measures on top of reactive and anticipatory behavior but did not affect the probability of taking proactive measures. Relying on help from others decreased the probability of taking proactive measures. However, it did not significantly affect the probability of taking preventive measures. Belief in an individual's responsibility for preparing for disaster had no effect on choice.

Integrating the findings on property damage recovery and choice of coping strategy, the study recommends focusing attention on not just educating but also enabling lower-income households in particular because such households are less likely to, on their own, adopt general preventive measures

well in advance of disaster in addition to their reactive and anticipatory behavior. Preventive measures include buying/storing food, medicine, and emergency equipment; temporarily relocating family members to less flood-prone areas; preparing an evacuation/contingency plan for the family; and cooperating with neighbors/friends in preparing for disasters. These activities, when combined with reactive and anticipatory behavior that households already adopt on their own significantly reduce recovery time when disaster strikes.

Households benefit from practical knowledge on how to prepare for disaster well in advance, what to do when it strikes, and how to cope. Actual flood experience has proven to be a good teacher but media can also influence choices in coping strategies. However, knowing the right thing to do does not always translate to actually doing it. Indicators of income and wealth are positively correlated to the adoption of preventive measures. Storing food and medicine or preparing emergency equipment may be a "luxury" that poorer households simply could not afford. Governments and charitable organizations may explore the possibility of equipping vulnerable households with these supplies in advance, such as at the beginning of the monsoon season, rather than waiting for disaster to strike and then providing relief.

The findings of the study also support the effectiveness of flood warning systems. The current alarm system in Marikina City has proven to be of critical importance. It is recommended that this system be properly maintained and expanded to cover a wider area. Of course, imperative to the effectiveness of this warning system is proper education on siren warnings and their meanings.

Recommendations can also be made with regard to postdisaster management. Close to a third of respondents had to borrow through informal channels, either relying on social/family ties or having to pay high interest rates charged by loan sharks. Governments and charitable organizations interested in improving recovery rates from damage to household property are recommended to think beyond relief aid, which provides important but temporary support. Easing financial constraints such as by facilitating access to credit have a greater impact on long-term recovery. Government should thus continue expanding the reach and availability of low-interest rate calamity loans through PAG-IBIG, SSS, and GSIS.

## References


Blaikie, P., T. Cannon, I. Davis, and B. Wisner. 1994. *At risk: natural hazards, people's vulnerability and disasters*. London: Routledge.

Brooks, N. and W. N. Adger. 2005. Assessing and enhancing adaptive capacity, pp. 165-181. In *Adaptation policy frameworks for climate change: developing strategies, policies and measures*, edited by B. Lim and E. Spanger-Siegfried. Technical paper. Cambridge, UK: Cambridge University Press and UNDP-GEF.

Dalziell, E.P. and S.T. McManus. 2004. Resilience, vulnerability, and adaptive capacity: implications for system performance. Paper presented at the International Forum for Engineering Decision Making (IFED), December 6-8, Stoos, Switzerland. http://ir.canterbury.ac.nz/handle/10092/2809

Dewi, A. 2007. Community-based analysis of coping with urban flooding: a case study in Semarang, Indonesia. Master's thesis, International Institute for Geo-information Science and Earth Observation, University of Twente, The Netherlands. http://www.itc.nl/library/papers_2007/msc/upla/anggraini.pdf

Folkman, S. and R. S. Lazarus. 1980. An analysis of coping in a middle-aged community sample. *Journal of Health and Social Behavior* 21 (September): 219-239.

Francisco, H.A., C.D. Predo, A. Manasboonphempool, P. Tran, R. Jarungrattanapong, B.D. The, L. Peñalba, N.P. Tuyen, T.H. Tuan, D. Elazegui, Y. Shen, and Z. Zhu. 2011. Determinants of household decisions on adaptation to extreme climate events in Southeast Asia. Economy and Environment Program for South East Asia (EEPSEA) Research Report No. 2011-RR5. Singapore: EEPSEA. http://www.eepsea.net/index.php?option=com_k2&view=item&id=411:determinants-of-household-decisions-on-adaptation-to-extreme-climate-events-in-southeast-asia&Itemid=265

Greenglass, E. 2002. Proactive coping, pp. 37-62. Chapter 3 in *Beyond coping: meeting goals, vision, and challenges*, edited by E. Frydenberg. London: Oxford University Press.

Harrison, P. and T. Boney. 2002. Best practices in the assessment of adaptive behavior. In *Best practices in psychology*, edited by A. Thomas and J. Grimes. Maryland: National Association of School Psychologists.

Patnaik, U. and K. Narayanan. 2010. Vulnerability and coping to disasters: a study of household behaviour in flood prone region of India. MPRA Paper No. 21992. Bombay: Indian Institute of Technology. http://mpra.ub.uni-muenchen.de/21992/

Peñalba, L. and D. Elazegui. 2011. Adaptive capacity of households, community organizations and institutions for extreme climate events in the Philippines. Economy and Environment Program for South East Asia (EEPSEA) Research Report No. 2011-RR3. Singapore: EEPSEA. http://www.eepsea.net/pub/rr/2011-RR3-Linda%20M%20Penalba%20and%20Dulce%20D%20Elazegui.pdf

Pillai,P., B. R. Philips, P. Shyamsundar, K. Ahmed, and L. Wang. 2010. Climate risks and adaptation in Asian coastal megacities: a synthesis report. Washington, DC: World Bank. http://siteresources.worldbank.org/EASTASIAPACIFICEXT/Resources/226300-1287600424406/coastal_megacities_fullreport.pdf

Predo, C. and B. Dragantes. 2010. Adaptation of community and households to climate-related disaster: the case of storm surge and flooding in Ormoc and Cabalian Bay, Philippines. EEPSEA Technical Report. Singapore: EEPSEA. http://www.preventionweb.net/english/professional/publications/v.php?id=14816

Schwarzer R. and A. Luszczynska. 2008. Reactive, anticipatory, preventive, and proactive coping: a theoretical distinction. *The Prevention Researcher* 15, no. 4 (November): 22—24.

Schwarzer, R. and C. Schwarzer. 1996. A critical survey of coping instruments, pp. 107-132. In *Handbook of coping: theory, research and applications*, edited by M. Ziedner and N.S. Endler. New York: Wiley.

Smit, B. and O.Pilifosova. 2001. Adaptation to climate change in the context of sustainable development and equity. In *Climate change 2001: impacts, adaptation and vulnerability*, edited by J.J. McCarthy and O.F. Canziani, Contribution of Working Group III to the 3rd Assessment Report of the Intergovernmental Panel on Climate Change.

Twigg, J., 2004. Disaster risk reduction: mitigation and preparedness in development and emergency programming. Good Practice Review. London: Overseas Development Institute. http://www.preventionweb.net/english/professional/trainings-events/edu-materials/v.php?id=8450

**Appendix.** Survey Instrument

Barangay: _____ Barangay code: [ ][ ]

We are conducting a survey on the effects of the heavy rains and flooding that occurred in August 7-9, 2012, brought about by the southwest monsoon (*Habagat*). We would like to ask you some questions about your family's experiences of the event. The interview usually takes 30 minutes to complete. Any information that you provide will be kept strictly confidential and will not be shown to other people. Participation is voluntary. However, we hope that you will participate since your views and experiences are important to our research.

| | | | | |
|---|---|---|---|---|
| Date of interview: | Day | [ ][ ] | Enumerator ID | [ ][ ] |
| | Month | [ ][ ] | | Y N |
| | Year | 2013 | Interview competed | 1 2 |

Name of respondent (optional): _____

Address: _____

Telephone/Mobile Number: _____

1 Sex of respondent: Male..... 1 2 What is your age? [ ][ ]

Female..... 2

---

3 How often does it flood in this area?

| | |
|---|---|
| Less than once every 5 years..... | 1 |
| About once in 5 years..... | 2 |
| More than once in 5 years..... | 3 |
| About once a year..... | 4 |
| More than once a year..... | 5 |

---

| | Y | N | Can't recall |
|---|---|---|---|
| 4 Did you or any member of your household experience flooding in this area or barangay during the onslaught of the southwest monsoon (*Habagat*) in August 2012? | 1 | 2 | 99 |

---

5 On a scale of 1 to 10 how well do you think you remember the details of what happened during that event? [ ][ ] *Number between*

| | |
|---|---|
| | *1 to 10* |
| 6 As much as you recall, how high did the floodwaters reach in this area in early August 2012? | [ ][ ] meters<br>*"99" if can't recall.* |

| | |
|---|---|
| 7 As much as you recall, how high did the floodwaters reach inside your house? | [ ][ ] meters<br>*"99" if can't recall.* |

| | | | |
|---|---|---|---|
| 8 Did you or any member of your household receive warning before the floodwater reached your area? | Y<br>1 | N<br>2 | Can't recall<br>99 |

| | | |
|---|---|---|
| 9 How did you receive this flood warning?<br><br>*Do not read out options.*<br>*Record all mentioned.* | Radio…….. | 1 |
| | Television……. | 2 |
| | Newspaper…….. | 3 |
| | Mobile phone……. | 4 |
| | Word of mouth…… | 5 |
| | Others: _____ | 6 |

| | | |
|---|---|---|
| 10 From whom did you receive this information?<br><br>*Do not read out options*<br>*Record all mentioned.* | National Government… | 1 |
| | City government…….. | 2 |
| | Barangay office…….. | 3 |
| | NGO (Red Cross, etc.)… | 4 |
| | Relatives/neighbors….. | 5 |
| | Others: _____ | 6 |

| | | |
|---|---|---|
| 11 Did you understand the message when you first received the warning? | Y<br>1 | N<br>2 |

| | |
|---|---|
| 12 In the future, who do you think would be the best source of such information? | [ ] *Choose from options in Q10. Read out all options.* |

| | |
|---|---|
| 13 How many hours after receiving the warning did the floodwaters reach your area? | [ ][ ] hours<br>*"99" if can't recall.* |

14 What did you do upon receiving the warning?

*Do not read out options. Record all mentioned.*

| | |
|---|---|
| Wait for another warning…… | 1 |
| Move belongings/documents to higher ground… | 2 |
| Evacuate self and family to safe shelter…….. | 3 |
| Prepare emergency equipment and supplies……. | 4 |
| Construct sandbag dikes; reinforce shelter……. | 5 |
| Help neighbors/relatives…….. | 6 |
| Contact neighbors/relatives to spread warning... | 7 |

14B *If "**1**" was chosen,*

After receiving how many warnings did you decide to act?

[ ][ ]

*"99" if no action*

---

15 How long did it take for you and your household to finish everything you mentioned in the previous question?

[ ][ ] hours
*"99" if can't recall.*

---

16 As soon as the flood reached your house, what did you do?

*Do not read out options. Record all mentioned.*

| | |
|---|---|
| Nothing; the flood didn't reach our house…… | 8 |
| Nothing; we had already evacuated by then…….. | 9 |
| Evacuate to safe shelter or higher ground…….. | 3 |
| Move belongings/documents to higher ground… | 2 |
| Prepare emergency equipment and supplies……. | 4 |
| Construct sandbag dikes; reinforce shelter……. | 5 |
| Help neighbors/relatives…….. | 6 |
| Contact neighbors/relatives to spread warning... | 7 |

16B *If "**3**" was chosen,*

How long was it before you were able to return to your home?

[ ][ ] hours

*"99" if can't recall*

---

17 How long did it take for the floodwaters to subside?

[ ][ ] hours
*"99" if can't recall.*

---

18 What did you do **within 24 hours** as soon as the floodwaters subsided or upon returning to your home?

*Do not read out options. Record all mentioned.*

| | |
|---|---|
| Secure belongings and important documents……. | 2 |
| Start cleaning…….. | 2 |
| Repair damages…….. | 10 |
| Reinforce shelter; rebuild sandbag dikes…….. | 5 |
| Prepare emergency equipment and supplies……. | 4 |
| Help neighbors/relatives…… | 6 |

Contact neighbors/relatives…….. 7

19 How did you pay for the expenses related to these activities?

*Do not read out options. Record all mentioned.*

Had money with me or other household members… 1
Withdrew money from ATM or bank…….. 2
Borrowed money from neighbors/relatives…….. 3
Others; please specify _____ 4

20 Please tell me if your household had any of the following assets before the flood, whether they were damaged, destroyed or lost during the flood, an estimate of how long before you were able to repair or replace it, and the approximate cost/value to replace or repair it.

Code for 20C:

1 Less than 1 month
2 Within 1 - 2 months
3 Within 3 - 4 months
4 Within 5 - 6 months
5 Not yet repaired/replaced
6 Cannot afford to repair/replace

| | 20A | | 20B | | 20C | 20D |
|---|---|---|---|---|---|---|
| | Before flood | | Damaged or lost | | Repaired or replaced within... | Total cost in PHP |
| | Y | N | Y | N | | *SUM up if multiple items* |
| Radio…… | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Television…….. | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Mobile Phone…….. | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Computer/laptop….. | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Camera/videocam… | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Bicycle…….. | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Motorcycle…….. | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Car…….. | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Refrigerator…….. | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Microwave oven…... | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Sewing machine…… | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Washing machine… | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Cart…….. | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Table…….. | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Chair/sofa…… | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |
| Bed/mattress…… | 1 | 2 ↓ | 1 | 2 ↓ | [ ] | _____ |

Jewelry/art work… 1 2 ↓ 1 2 ↓ [ ] _____

Can you please tell me whether parts of your house were damaged or destroyed during the flood, an estimate of how long before you were able to repair or replace them, and how much you estimate that it had or will cost?

21

| Main Material of Floor | | Damaged or destroyed | | | How | |
|---|---|---|---|---|---|---|
| A | | B | | | D | |
| NATURAL FLOOR | | Y | 1 | | Better than before… | 1 |
| Earth, sand, clay…….. | 1 | N | 2 | → *22* | Same as before…… | 2 |
| | | DK | 9 | → *22* | Less than before…… | 3 |
| RUDIMENTARY FLOOR | | | | | | |
| Wood planks…… | 2 | ↓ | | | | |
| Palm, bamboo…….. | 3 | Repaired/replaced within | | | Estimated Cost | |
| | | C | | | | |
| FINISHED FLOOR | | [ ] | | | PHP | |
| Parquet, polished wood… | 4 | | | | | |
| Vinyl, linoleum tiles……. | 5 | *If "**4**" or "**5**", skip to Q22* | | | | |
| Ceramic tiles…….. | 6 | | | | | |
| Marble, granite tiles……. | 7 | Code for Q21C | | | | |
| Cement…….. | 8 | 1 | Less than 1 month | | | |
| | | 2 | Within 1 – 2 months | | | |
| | | 3 | Within 3 – 4 months | | | |
| | | 4 | Within 5 – 6 months | | | |
| | | 5 | Not yet repaired/replaced | | | |

22

| Main Material of Roof | | Damaged or destroyed | | | How | |
|---|---|---|---|---|---|---|
| A | | B | | | D | |
| NATURAL ROOF | | Y | 1 | | Better than before… | 1 |
| Bamboo, palm, thatch…..... | 9 | N | 2 | → *23* | Same as before…….. | 2 |
| | | DK | 9 | → *23* | Less than before…… | 3 |
| RUDIMENTARY ROOF | | | | | | |
| Wood planks…….. | 10 | ↓ | | | | |
| Corrogated Tin (*Yero*)…... | 11 | Repaired/replaced within | | | Estimated Cost | |
| | | C | | | | |
| FINISHED ROOF | | [ ] | | | PHP | |
| Metal, colored steel……. | 12 | | | | | |
| Cement…….. | 13 | *If "**4** " or "**5**", skip to Q23* | | | | |
| Ceramic tiles…….. | 14 | | | | | |
| Clay tiles…….. | 15 | Code for Q21C | | | | |
| Others: _____ | 16 | 1 Less than 1 month | | | | |
| | | 2 Within 1 – 2 months | | | | |
| | | 3 Within 3 – 4 months | | | | |
| | | 4 Within 5 – 6 months | | | | |
| | | 5 Not yet repaired/replaced | | | | |

23

| Main Material of Walls | | Damaged or destroyed | | | How | |
|---|---|---|---|---|---|---|
| A | | B | | | D | |
| NATURAL WALLS | | Y | 1 | | Better than before… | 1 |
| Bamboo, palm, thatch…..... | 17 | N | 2 | → *24* | Same as before…….. | 2 |
| | | DK | 9 | → *24* | Less than before…… | 3 |
| RUDIMENTARY WALLS | | | | | | |
| Plywood…….. | 18 | ↓ | | | | |
| Reused woor or metal…... | 19 | Repaired/replaced within | | | Estimated Cost | |
| | | C | | | | |
| FINISHED WALLS | | [ ] | | | PHP | |
| Finished/painted cement.. | 20 | | | | | |
| Cement blocks…….. | 21 | *If "**4** " or "**5**", skip to Q24* | | | | |
| Stone with cement…… | 22 | | | | | |
| Bricks…….. | 23 | Code for Q21C | | | | |
| Wood planks/shingles…… | 24 | 1 Less than 1 month | | | | |
| | | 2 Within 1 – 2 months | | | | |
| | | 3 Within 3 – 4 months | | | | |
| | | 4 Within 5 – 6 months | | | | |

5 Not yet repaired/replaced

24 Overall, how long would you say did it take your household to repair or replace everything that was damaged or lost during the flood? [ ][ ] weeks

*"99" if can't recall.*

---

25 How did you finance these repairs/replacement?

*Do not read out options. Record all mentioned.*

| | |
|---|---|
| Own money; savings…….. | 1 |
| Borrowed money from friends/relatives…….. | 2 |
| Borrowed money from bank/credit card…….. | 3 |
| Borrowed money from government/SSS/GSIS… | 4 |
| Gifts/donations from friends/relatives…… | 5 |
| Gifts/donations from government/NGOs…… | 6 |
| Others: _____ | 7 |

---

26 Did you or anyone in your household experience any of the following ailments/symptoms during or immediately after the flood?

| | |
|---|---|
| Fever…… | 1 |
| Cough or colds…….. | 2 |
| Headache or body pains……. | 3 |
| Diarrhea or stomach upset... | 4 |
| High-blood pressure…….. | 5 |
| Others: _____ | 6 |

---

27 Did you receive medical attention from a physician or community health officer regarding any of these ailments/symptoms?

| | |
|---|---|
| Y…….. | 1 |
| N…….. | 2 |
| Can't recall… | 99 |

27B *If respondent answered yes ("**1**"),*

What was the doctor's diagnosis?

_____

_____

---

28 How many days of work did you miss during and immediately after the flood? [ ][ ] days

*"99" if can't recall.*

29 How soon after the flood were you and all other members of your household able to return to normal activities? (e.g., work, school, leisure and recreation)

| | |
|---|---|
| After 1 – 3 days…….. | 1 |
| After 4 – 7 days…….. | 2 |
| After 1 – 2 weeks…….. | 3 |
| More than 2 weeks later….. | 4 |

---

30 Did you receive any help from others during or soon after the flood? If so, who helped you?

*Do not read out options. Record all mentioned.*

| | |
|---|---|
| We did not receive any help…….. | 7 |
| Government…….. | 1 |
| Community organizations (non-religious)… | 2 |
| Religious organizations…….. | 3 |
| Neighbors/friends…….. | 4 |
| Relatives…….. | 5 |
| Others: _____ | 6 |

30B *If "**2**" or "**3**" was chosen,*

Are you or anyone in your family a member of this this organization?

| Y | N | Don't Know |
|---|---|---|
| 1 | 2 | 99 |

---

31 What kind of help did you receive from those you mentioned earlier?

*Do not read out options. Record all mentioned.*

| | |
|---|---|
| Information on flood warnings, evacuation centers, etc… | 1 |
| Shelter…….. | 2 |
| Food, water, clothing…….. | 3 |
| Medicine…….. | 4 |
| Communication, transportation…….. | 5 |
| Financial support…….. | 6 |
| Others: _____ | 7 |

---

32 Was there safe shelter accessible to you and your family at the time of the flood?

| Y | N | Can't recall |
|---|---|---|
| 1 | 2 | 99 |

*32B If yes ("**1**"),*

About how many minutes walk is it from your house?

[ ][ ] minutes.

| 33 Did you or any member of your household evacuate during the flood? | | Y | N | Can't recall |
|---|---|---|---|---|
| | 1 | 2 | 99 | |

*If respondent evacuated (chose "**1**") proceed to Q34A*
*If respondent <u>did not</u> evacuate (chose "**2**") proceed to Q34B*

34A Where did you or your family evacuate to?

*Do not read out options. Record all mentioned.*

| | |
|---|---|
| Government building or designated evacuation center…... | 1 |
| Church or other places of worship…… | 2 |
| Neighbor's/friend's/relative's house…….. | 3 |
| Others: _____ | 4 |

34B Why didn't you evacuate?

*Do not read out options. Record all mentioned.*

| | |
|---|---|
| No need; own house if safe…… | 1 |
| No safe shelter available or accessible…….. | 2 |
| Didn't want to leave personal belongings and property…. | 3 |
| Too late; more difficult/dangerous to leave the house…… | 4 |
| Others: _____ | 5 |

---

35 Have you attended training seminars or workshops on how to prepare for or cope with disasters before the flood of early August 2012?

| Y | N | Can't recall |
|---|---|---|
| 1 | 2 | 99 |

35B *If yes ("**1**),*

Who organized it?

| | |
|---|---|
| Government…….. | 1 |
| NGO, community organization….. | 2 |
| Religious org……. | 3 |

---

36 Apart from these formal seminars and workshops, what other sources of information helped you to prepare for or cope with disasters such as this?

*Do not read out options. Record all mentioned.*

| | |
|---|---|
| Radio/TV/print media…….. | 1 |
| Neighbors/friends/relatives…… | 2 |
| Past experience…….. | 3 |
| Others: _____ | 4 |

37 In your judgment, how prepared were you for this flood?

| | |
|---|---|
| Very well prepared…….. | 1 |
| Adequately prepared…….. | 2 |
| Not very prepared…….. | 3 |
| Not prepared at all…….. | 4 |

---

| 38 Did you have firsthand experience of flooding during tropical storm *Ondoy* in 2009? | Y | N | Can't recall |
|---|---|---|---|
| | 1 | 2 | 99 |

38B *If respondent said yes ("**1**")*

Comparing your experiences, how prepared were you for the flood of August 2012 (*Habagat*) compared to *Ondoy* in 2009?

| | |
|---|---|
| More prepared…… | 1 |
| Just as prepared…. | 2 |
| Less prepared…….. | 3 |

---

39 Which of the following measures did you take in preparation for the typhoon season in 2012?

| | Y | N | Can't recall |
|---|---|---|---|
| Regularly check on weather updates and flood warnings... | 1 | 2 | 99 |
| Buy and store food, medicines and emergency supplies..... | 1 | 2 | 99 |
| Reinforce or repair house…… | 1 | 2 | 99 |
| Build mezzanine, second/third floor or roof deck…… | 1 | 2 | 99 |
| Move family members to a different location…….. | 1 | 2 | 99 |
| Attend disaster-preparedness seminars/workshops…….. | 1 | 2 | 99 |
| Help neighbors or community to prepare for disasters……. | 1 | 2 | 99 |
| Cut/trim trees near the house to prevent damage…… | 1 | 2 | 99 |
| Prepare an evacuation plan for your family…….. | 1 | 2 | 99 |
| Buy insurance against property damage…….. | 1 | 2 | 99 |

---

40 In a scale of 1 to 5, how effective do you think each of these measures are?

| | |
|---|---|
| Regularly check on weather updates and flood warnings... | [ ] |
| Buy and store food, medicines and emergency supplies..... | [ ] |
| Reinforce or repair house…… | [ ] |
| Build mezzanine, second/third floor or roof deck…… | [ ] |
| Move family members to a different location…….. | [ ] |
| Attend disaster-preparedness seminars/workshops……. | [ ] |
| Help neighbors or community to prepare for disasters……. | [ ] |
| Cut/trim trees near the house to prevent damage …… | [ ] |
| Prepare an evacuation plan for your family…….. | [ ] |
| Buy insurance against property damage…….. | [ ] |

---

41 After experiencing the flood of August 2012, have you taken any of the following measures in preparation for the next typhoon season? If not please indicate if you plan to adopt them this year (2013).

| | Y | N | Plan to |
|---|---|---|---|
| Regularly check on weather updates and flood warnings... | 1 | 2 | 3 |
| Buy and store food, medicines and emergency supplies..... | 1 | 2 | 3 |
| Reinforce or repair house…… | 1 | 2 | 3 |
| Build mezzanine, second/third floor or roof deck…… | 1 | 2 | 3 |
| Move family members to a different location…….. | 1 | 2 | 3 |
| Migrate to other areas that are less prone to flooding……. | 1 | 2 | 3 |
| Attend disaster-preparedness seminars/workshops……. | 1 | 2 | 3 |
| Help neighbors or community to prepare for disasters……. | 1 | 2 | 3 |
| Cut/trim trees near the house to prevent damage …… | 1 | 2 | 3 |
| Prepare an evacuation plan for your family…….. | 1 | 2 | 3 |
| Buy insurance against property damage…….. | 1 | 2 | 3 |

---

At this point, we will be asking some questions about your household. Please rest assured that all the information you will be sharing with us will be held in strict confidence and will not be used for purposes other than the objectives of this research study.

---

42 Are you married?

| | |
|---|---|
| Single…….. | 1 |
| Married…….. | 2 |
| Widowed……. | 3 |
| Separated…….. | 4 |

---

43 What is the highest level of education you have attained?

*Please indicate number of years if not completed*

| | | |
|---|---|---|
| No formal schooling…….. | 1 | |
| Elementary…….. | 2 | [ ] |
| High school…….. | 3 | [ ] |
| Vocational…….. | 4 | [ ] |
| College/University…….. | 5 | [ ] |
| Master's degree (MA, MS, MBA)…….. | 6 | [ ] |
| Higher than master's degree (PhD, MD, JD)… | 7 | [ ] |

---

44 How many people are there in your household? [ ][ ]

---

45 Do you have children 12 years old or below in your household?

| Y, how many? | N |
|---|---|
| 1 : [ ] | 2 |

---

46 Does your family own this house?

| Y | N |
|---|---|
| 1 | 2 |

46B *If yes ("**1**"),*

How much do you think you can rent it out for every month? PHP _____

46C *If no, ("**2**"),*

How much do you pay for rent every month? PHP _____

---

| | Y | N |
|---|---|---|
| 47 Does your family own the land as well? | 1 | 2 |

48 How many floors/storeys does this house have? [ ][ ]

| | Y | N |
|---|---|---|
| 48 Do you have a piped water connection? | 1 | 2 |

| | Y | N |
|---|---|---|
| 49 Does this household have electricity? | 1 | 2 |

50 How much did you pay for electricity last month? PHP _____
*(If bill is shared, ask for household's monthly share)*

51 What is your occupation?

| | |
|---|---|
| Employee in private firm…….. | 1 |
| Government employee…….. | 2 |
| Self-employed…….. | 3 |
| Unemployed…….. | 4 |
| Retired…….. | 5 |

51B
*If "**1**" or "**2**" was chosen,*

How many years have you been working with this company?

[ ][ ] years

52 How many in your household, including yourself, earn income? [ ][ ]

| | Y | N |
|---|---|---|
| 53 Do you have family members working abroad? | 1 | 2 |

| | Y | N |
|---|---|---|
| 54 Are you a member of a local community organization or religious/parish organization? | 1 | 2 |

55 How much do you agree or disagree with the following statements?

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| There is little I can do to protect my family from natural disasters since the occurrence of such disasters are beyond anyone's control. | 1 | 2 | 3 | 4 | 5 |
| Preparing for natural disasters is important in ensuring the safety and well-being of my family. | 1 | 2 | 3 | 4 | 5 |
| What happens to me and my family during calamities is ultimately God's will. | 1 | 2 | 3 | 4 | 5 |
| I can depend on others to help my family during times of calamity and emergency. | 1 | 2 | 3 | 4 | 5 |
| It is my responsibility to prepare myself and my family for unforeseen emergency. | 1 | 2 | 3 | 4 | 5 |

56 What is your household's average **monthly** income? Please rest assured that this information will be held in strict confidence.

| | | | |
|---|---|---|---|
| Less than PHP 5,000..... | 1 | PHP 65,001 – 70,000..... | 15 |
| PHP 5,000 – 10,000..... | 2 | PHP 70,001 – 75,000..... | 16 |
| PHP 10,001 – 15,000..... | 3 | PHP 75,001 – 80,000..... | 17 |
| PHP 15,001 – 20,000..... | 4 | PHP 80,001 – 85,000..... | 18 |
| PHP 20,001 – 25,000..... | 5 | PHP 85,001 – 90,000..... | 19 |
| PHP 25,001 – 30,000..... | 6 | PHP 90,001 – 95,000..... | 20 |
| PHP 30,001 – 35,000..... | 7 | PHP 95,001 – 100,000..... | 21 |
| PHP 35,001 – 40,000..... | 8 | More than PHP 100,000... | 22 |
| PHP 40,001 – 45,000..... | 9 | | |
| PHP 45,001 – 50,000..... | 10 | | |
| PHP 50,001 – 55,000..... | 11 | | |
| PHP 55,001 – 60,000..... | 12 | | |
| PHP 60,001 – 65,000..... | 13 | | |

**End of Survey**