UP School of Economics
Discussion Papers

**Shocks to Philippine households:
Incidence, idiosyncrasy and impact**

by

Joseph J. Capuno, Aleli D. Kraft, Stella A. Quimbo and Carlos Antonio R. Tan, Jr.

School of Economics, University of the Philippines

Shocks to Philippine households: Incidence, idiosyncrasy and impact

Joseph J. Capuno, Aleli D. Kraft, Stella A. Quimbo and Carlos Antonio R. Tan, Jr.[*]

University of the Philippines

Abstract

With their country located in the Pacific Ring of Fire and in the monsoon belt, Philippine households are perennially exposed to natural disasters and calamities. In addition, they face health, economic and sociopolitical risks. Using a nationally representative sample of households, we assess the overall incidence of different shocks, the extent to which they simultaneously affect households in the same area, and their impact. A huge majority of households experience shocks, with the incidence of different shocks being roughly the same for poor and rich households. Natural and economic shocks appear to affect more households simultaneously in the same area than sociopolitical shocks, health shocks and deaths. Health shocks and deaths lead to greater short-term and long-term impacts. Richer households are able to recover better than the poor. We draw some implications for the design and targeting of social health insurance, disaster management and other social protection programs.

JEL classification: D10, I38

Key words: Household shocks, coping mechanisms, welfare

---

1. Introduction

Every year, official statistics report the number of natural disasters and calamities, incidents like fires, accidents, epidemics and disease outbreaks, as well as loss of employment and earnings affecting hundreds of thousands of households. These statistics also record the damage caused by such events in terms of loss of life and property amounting to billions of pesos. Exposure to such unanticipated events threatens households with reductions in their income and consumption, or adversely impact their health, lives or welfare. Such shocks could worsen poverty, making the poor even poorer and causing vulnerable but otherwise well-off households to fall into destitution. The literature shows, however, that the effects of shocks depend in part on whether, and the types of shocks particular households are exposed to, the various coping strategies the latter employ in the face of such shocks, and the extent to which social protection programs can mitigate the impacts of these shocks.

Several studies have documented the incidence of shocks and the coping strategies adopted by households in various developing countries. Using household survey data from Bangladesh, Santos et al. [2010] found that the non-poor experience a larger share of shocks than the poor; that health shocks are the most common; and that households cope by dissaving, taking out loans, seeking assistance from friends, or selling assets. In Laos, Wagstaff and Lindelow [2010] find health shocks to be the more common type, that they are more concentrated among the poor, and are costlier due to unplanned medical expenses. The authors also find that households exposed to health shocks tend to get more assistance from NGOs and other households. In Vietnam, households who face health shocks are found to adjust their food and non-food consumption, and their consumption does not seem to smoothen despite health insurance coverage [Wagstaff 2005]. In Pakistan, households cope with health shocks by drawing down their savings, forgoing investments, or making their children stop schooling or transfer to another school [Heltberg and Lund 2009]. Such coping strategies are not limited to health shocks. In the face of contingencies affecting their livelihoods, farm households in Zimbabwe seek assistance or borrow from the friends or neighbors, sell assets like

land, machinery, animals or housing, or bring in the harvest early [Hoddinott 2006]. Broadly the same types of coping mechanisms were adopted by households in rural Laguna, Philippines in wake of typhoon Milenyo [Sawada et al. 2009]. In a more recent study [Safir, Piza and Skoufias 2013], an unanticipated reduction in the amount of rainfall relative to its long-run average triggered a reduction in household food consumption, although households with access to highways or fixed-phone lines appeared to be protected from such consumption adjustments.

The literature indicates that households attempt to smooth their consumption or income in the face of shocks, although they are not always successful [Murdoch 2005, Gertler and Gruber 2002]. Attempts to smooth consumption may come at the expense of future productivity and income, as when households divest themselves of assets and when the education of their children is compromised. A valid cause of concern is when the present and future consumption of the poor are compromised as a result of their disproportionate exposure to shocks that inflict debilitating losses.

The foregoing studies also indicate that whenever they can, households protect themselves from such risks or undertake actions to cushion the adverse impacts. Households seek assistance from their relatives, friends and neighbors. However, given a limited risk pool, a household's social network may not provide adequate protection in the face of covariate risks, i.e., shocks that simultaneously affect several households located in a particular area. Against such risks, formal institutions like banks, credit unions, charitable institutions, or the government 's social protection agencies become more ideal providers of protection against shocks because of their ability to manage risks and diversify sources of assistance..

Consequently, the appropriate design of social protection programs will depend on the types and frequencies of shocks that households encounter, which households are especially vulnerable to what types of shocks, the extent of losses inflicted by the shocks, and households' responses to such contingencies.

This paper aims to contribute to the literature by exploring Philippine households' exposure to and losses from such shocks. We seek to answer three sets of questions: first, who are exposed to different types of shocks? Are the poor more

vulnerable to shocks than the rich? Second, which shocks affect households in the same area simultaneously? Third, what are the impacts of the shocks to household welfare? What determines the ability of households to recover from shocks? The first two sets of questions deal with households' exposure to shocks, in terms of household income and spatial location, respectively; the third deals with household losses from such shocks.

To answer these questions, we supplement aggregate measures by using household-level information from a nationally-representative survey and apply both univariate and multivariate statistical techniques on the survey dataset to generate our measures of incidence and loss.

We find that a huge majority of households do experience shocks, and that the incidence of various shocks is roughly the same for poor and rich households. However, natural and economic shocks appear to affect more households in the same area simultaneously than sociopolitical shocks, health shocks and deaths. Health shocks and deaths lead to greater short-term and long-term impacts. Richer households are able to recover better than the poor.

The rest of the paper is organized as follows. In the next section, we briefly review the occurrence of and damages from natural and man-made disasters using administrative data, as well as describing the social protection programs in the Philippines. In section 3, we describe the data and methods used. The succeeding three sections then present and discuss the incidence and inequality of exposure to shocks, their idiosyncrasy, and their impacts. The last section concludes and offers some policy guides and leads for further research.

2. Disasters and social protection programs in the Philippines

The Philippines' location in the tropics and the Pacific exposes it constantly to natural disasters that lead to significant losses in both lives and properties. According to the official tally (Table 1), for the years 2009, 2010 and 2011, the country was hit by 194, 234, and 374 natural disasters, respectively, including more than 200 earthquakes. These disasters affected hundreds of thousands of families, leaving thousands dead and tens of thousands of destroyed homes with damages

running into billions of pesos. Typhoons are by far the most destructive. The 20 or so typhoons occurring each year accounted for most of the economic damage and affected families.

Human-induced incidents are also inflicting an increasing economic toll, from ₱138.3 million in 2009 to ₱433.5 million pesos in 2011. Of these, fire, accidents, disease outbreaks and epidemics, and armed conflict have been the most devastating. In 2010, for example, fires accounted for nearly all of the ₱205 billion damages; vehicular accidents were responsible for nearly 60 percent of the 2,051 reported casualties; and disease outbreaks accounted for about 40 percent of the 34.9 thousand affected families. These figures, however, do not include other socioeconomic events and illnesses or injuries which, while not typically construed as national or major disasters, are nonetheless unanticipated and possibly just as disastrous to individual families.

[Insert Table 1 here.]

One such economic shock is the global financial crisis of 2008. According to some estimates [ASEAN Secretariat and WB East Asia and Pacific Region 2010], many Philippine households surveyed in May 2009 experienced a decline in their earnings and employment following the onset of the crisis. Many of the affected families suffered from reduced remittances from members working overseas. Apparently, the poor were also hit hard, forcing them as other affected families to cut down on their food consumption or choose cheaper food items.

To help cushion the impact of natural disasters and human-induced incidents, the government put in place a number of social protection programs. In a resolution dated13 February 2007, the government's Social Development Committee defined social protection as constituting "policies and programs that seek to reduce poverty and vulnerability to risks and enhance the social status and rights of the marginalized by promoting and protecting livelihood and employment, protecting against hazards and sudden loss of income, and improving people's capacity to manage risks." The same committee sees social protection programs as encompassing *labor market programs* that seek to improve the employment opportunities and protect the rights and welfare of workers, *social insurance*

5

programs that aim to "mitigate income risks by pooling resources and spreading risks across time and classes", *social welfare programs* that seek to "support the minimum basis requirements of the poor, particularly the poorest of the poor, and reduce risks associated with unemployment, resettlement, marginalization, illness, disability, old age and loss of family care", and *social safety nets* that are "stop-gap mechanisms or urgent responses that address effects on economic shocks, disasters and calamities on specific vulnerable groups". The official definition is intended to facilitate the adoption of a common framework in designing and implementing the various social protection programs, projects and activities of the national government agencies, local government units and other stakeholders.

In a review of social protection policy in the county, Manasan [2010] lists two major social insurance programs (social security schemes and social health insurance), ten major social welfare programs and social safety nets (including Pantawid Pamilyang Pilipino Program, Rice Price Subsidy, Food-for-School Programs and KALAHI-CIDSS), and six major active labor market programs (including Pangulong Gloria Scholarship, Work Appreciation Program, and Workers' Protection and Welfare Services). Further, she estimated that the national government and LGUs together allotted some ₱18.2 billion and ₱62.4 billion in 2007 and 2008, respectively on the non-contributory social protection programs. While each of these allotments account for less than one percent of the country's GDP, she noted problems in their allocation, particular the 29-percent share of the rice price subsidy program that is proven to be highly regressive.

Weaknesses in the coverage and effectiveness of the country's social protection programs have been noted in other studies as well. Using a composite index of social protection coverage, the Asian Development Bank [2013] reports that the Philippines's scored 0.085 in the Social Protection Index (SPI), placing it fifth in a list of eight Southeast Asian countries included in the analysis and below the regional average of 0.095. Among the three component indicators of the SPI, the Philippines scored best in social insurance and poorest in labor market programs. These findings are consistent with those of Orbeta [2010]. According to this earlier report, the coverage of the employed sector under the country's social security

6

program is virtually limited to those in the formal sector. And, while nearly all workers in the government sector are covered under the Government Social Security System (GSIS), less than half of those in the private sector from 2000 to 2009 are covered under the Social Security System. Further, the two social security programs extend pension benefits to less than half of the eligible population aged 60 years and above. In comparison, the country's social health insurance program has a wider coverage—as much as 83 percent of the population in 2012, according to the Philippine Health Insurance Corporation (PhilHealth). A lower coverage rate, however, is estimated from different official household surveys. More significantly, the financial protection implied by PhilHealth coverage is even more modest if one uses a summary measure of coverage, benefit utilization and reimbursement. PhilHealth's benefit delivery rate in 2010 is estimated to be only about 9 percent [Quimbo et al. 2013]. That is, only nine percent of the population in 2010 received effective financial protection from PhilHealth. These results further underscore the need to evaluate the impact of social programs if they are to fully realize their objectives.

Monitoring the impact of crisis, disasters, incidents and hazards is often hampered by lack of household-level data. The Annual Poverty Indicators Survey contains some information on the household's participation in or awareness of selected social protection programs (like the PhilHealth, GSIS/SSS, Pantawid Pamilyang Pilipino Program). However, their receipt of benefits under these programs is not tagged for the incidence of disasters, hazards or other contingencies. Hence it is hard to assess the particular risks against which the household beneficiaries are protected. The following section describes a special survey undertaken to collect detailed household-level information on the incidence of, coping with (including access to social protection programs) and impact of shocks.

3. Empirical framework

3.1 Data

The household-level data we use are culled from the baseline survey of the PhilHealth Prepaid Premium (3P) Study of the UPecon Foundation–Health Equity and Financial Protection in Asia (HEFPA) Project. The purpose of the 3P Study is to assess the effect of various subsidies on the voluntary enrollment of the informal sector in country's social health insurance program [Capuno et al. 2011]. Using a multi-stage cluster sampling design, a nationally-representative sample of 2,950 households was randomly drawn from 66 out of 86 provinces of the Philippines. These provinces are located in 16 out of the 17 regions with only the Autonomous Region of Muslim Mindanao being excluded (owing to security concerns). Undertaken in February–April 2011, the baseline survey was meant to collect pre-intervention information on the demographic characteristics, income and expenditures, assets and housing characteristics, health care utilization, participation in health insurance and other social protection programs, and vulnerability to shocks of the sample households.

The survey defines a shock as an unanticipated adverse event that can lead to reduction in income, a loss of assets, illness or injury, or a fall in consumption or welfare. The shocks module of the structured interview schedule was designed to elicit information on the incidence of shocks in each of the reference years 2008–2011; on the adverse consequences on expenditures, consumption, health, wealth and welfare of the sample households; and on the precautionary measures and coping mechanisms that households undertook to cope with these shocks (Figure 1). Shocks in the survey are self-reported incidents, and have not been checked against administrative or external data. The household respondent was first asked to recall cases of shocks that they experienced in each year from 2006 to 2011. Instead of the full twelve months, the recall period for 2011 was only for January–April (i.e., up to the time of the survey). Then, corresponding to each of the reported shocks from 2008 to 2011, follow-up questions were asked regarding the household's coping measures, losses and damages, and investments or consumption adjustments. No detailed information for the shocks in 2006–2008 was asked, in

order to minimize recall bias and reduce the interview time. The survey interviews resulted in a total of 8,901 shock incidents reported by households.

[Insert Figure 1 here.]

The various shocks are broadly classified as natural, economic, socio-political, health and death. Natural shocks include natural calamities like El Niño/La Niña, typhoons, floods and earthquakes, and biological hazards like Avian influenza, H1N1 and other epidemics. Economic shocks comprise unexpected increases or decreases in prices, loss of a job, collapse of business and fraud. Sociopolitical shocks include crime, estafa, lawsuit, confiscation of property, fire, divorce or dissolution of marriage. Illness and injury, on the other hand, are counted as health shocks.

Our classification of shocks is different in several respects from those reported in Table 1. First, we explicitly define shock as any realized risk that led to unanticipated losses, damages or adjustments in household income, wealth, expenditures or welfare. This is less explicit in the list of disasters, hazards or incidents in Table 1. Second, we count any shock incident to a household regardless of the number of affected households in a community. Last, we include more types of economic and sociopolitical shocks. It is hoped that a richer mapping of shocks will provide a more comprehensive assessment of the types, concentration and gravity of risks faced by households.

3.2 Methods

Our analysis uses both univariate and multivariate statistics. To measure the incidence and inequality of shocks, we report the frequency distribution of the shocks and their concentration indices. As defined in O'Donnell et al. [2008], the concentration index (CI) for a particular type of shock is

$$CI = \frac{2}{\mu} \text{cov}(s_i, r_i),$$

where s_i is the shock variable for the ith household, μ is its mean, $r_i = i/N$ is the fractional rank of the ith household in the distribution of the living standard, and N

9

is the total number of households. By convention, $r_i=1$ for the poorest and $r_i=N$ for the richest. Following Wagstaff [2005], we normalized *CI* by dividing it by $(1 - \mu)$ since our shock measures are binary indicators. If the shock indicator is a negative outcome (e.g., fire), a *CI* value close to –1 indicates a disproportionate concentration of the shock among the poor, while a *CI* close to 1 indicates a disproportionate concentration of the shock among the rich.

Instead of using the reported household income, which is often very sensitive to shocks, we constructed an asset index as our measure of living standards. The index is computed by principal component analysis on the reported assets and housing amenities of the household [Gwatkin et al. 2003, Filmer and Pritchett 2001]. We used the first principal component, which accounts for the highest percentage (12.9%) of the variance in the assets and housing amenities. Using the computed asset index, we then sorted the households according to their scores and grouped them into asset quintiles. The correlation coefficient between the asset index and the household income per capita is 27.46 percent.

In our analysis, we define a shock to be covariate if it simultaneously affects several households residing in the same community or location, i.e., if the experience of the shock is communal or shared. On the other hand, a shock is idiosyncratic if it affects one or only few isolated households, i.e., does not have a communal effect. Following Wagstaff and Lindelow [2005], we measure the communal effect of a particular type of shock by regressing a binary variable indicating the occurrence of the shock against a vector of location dummy variables using the linear probability model (LPM). We examine the breadth of the possible communal effect by considering alternative definitions of the common area of residence, namely barangays (villages), municipalities, provinces and regions. The resulting R^2 from the regression of the shock incidence then represents the proportion of the variations in the shock incidence that is explained by the vector of location fixed-effects. Effectively, therefore, a shock with a relatively high R^2 would be a highly covariate shock, while a shock with a relatively low R^2 (or high $1 - R^2$) would be highly idiosyncratic. Our household-level dataset includes 589 barangays,

248 municipalities and cities, 66 provinces, and 16 regions.[1]There are at most five sample households per barangay, and two barangays per municipality (or city). We report the $R^2$for a particular shock for each year in the 2008–2011period, and required that at least two cases of the shock were observed in the reference year. We analyze annual samples to avoid confounding our estimates of covariate shocks with intertemporal shocks affecting different households in the same location.

To measure a shock's impact on household welfare, we report the fall in the value of assets or unplanned medical and other expenditures, gross of possible assistance received from the government and other external sources, and then express these as a proportion of annual food consumption. Presumably, households with disproportionate losses suffer a greater reduction in welfare. Arguably, however, the welfare losses have both material and non-material or psychic dimensions. Thus, we also analyze the household's self-declared full recovery from a reported shock. "Full recovery" from shock is a subjective measure that could mean completely recouping resulting material and psychic losses. To identify the factors that affect the household's likelihood of full recovery, we estimate the following probit regression model using shock-level data,

$$R_{ik} = \alpha + \sum_k \beta_k s_{ik} + \sum_k \sum_t \theta_{kt}(s_{ik} \times Y_t) + \sum_t \delta_t Y_t + \boldsymbol{\varphi} \boldsymbol{X}_i + \varepsilon_i,$$

$$R_i = \begin{cases} 1, & R_i^* > 0 \\ 0, & R_i^* \leq 0 \end{cases},$$

where R_{ik} is a binary indicator of full recovery of the ith household from the kth shock, $s$is a binary indicator of shock incidence, Y is binary indicator of the timing of the relevant shock, $\boldsymbol{X}$ is a vector of household-level control variables, ε is the error term, and $R_i{}^*$ is latent variable indicating the extent of recovery from shock. The

---

[1] Since we are essentially estimating an ordinary least squares regression model, the R^2 increases with the number of explanatory variables. Hence, R^2 for the barangay-level fixed effects are necessarily higher than that for municipalities, provinces or regions. Caution must be taken in comparing estimated idiosyncrasy of a given shock across types of area-level fixed effects used.

parameters α, β, θ, δ and $\boldsymbol{\varphi}$ are regression coefficients (vectors in boldface). Since the unit of observation is a shock in our probit regressions, we adjusted for the common variation in the shocks experienced by the same household by accounting for household cluster effects in the estimated variances. In our analysis, we report only the table of marginal effects or the marginal probabilities obtained for a unit change in a particular explanatory variable.

3.3 Regression variables

Table 2 shows the definitions and summary statistics of the variables used in the probit regression. The total number of shocks here is 7,936, fewer by 43 than the total number reported for 2008–2011. The smaller sample is due to missing observations (i.e., non-response) for some of the explanatory variables (like age of the household head). The dependent variable is the binary indicator for the household's complete recuperation from a given shock (*full recovery*). The sample households claim to have fully recovered in about 58 percent of the shocks.

[Insert Table 2 here.]

The types of shock experienced are classified broadly into health (*if health shock*), death (*if death shock*), socio-political (*if socio-political shock*) or economic (*if an economic shock*). The default category is natural shock. About 13 percent and 37 percent of the reported shocks are health shocks and economic shocks, respectively. Death shocks and socio-political shocks each account for less than three percent.

We further classify the shocks in terms of self-reported severity (*shock is severe*) and year of occurrence (*Year 2009*, *Year 2010* and *Year 2011*), with 2008 as the base year. The expectation is that full recovery is more likely for less severe or temporally distant shocks. Nearly a third of the shocks are reported to be serious, and nearly half of them happened in 2009.

The household's capacity to withstand the shock is measured by several demographic and socioeconomic factors. Relative economic status is indicated with four dummy variables for the four upper asset quintiles, with the first asset quintile as the base classification. Households in the 2nd asset quintile account for about 24

12

percent of the shocks, while each of the three other asset quintiles accounted for about 17-19 percent of the shocks.

About 56 percent of the shocks occurred in households whose heads have PhilHealth coverage (*with national health insurance coverage*), and less than seven percent occurred in households covered by other insurance schemes (*with other insurance coverage*). In addition to insurance coverage, the household's access to a social network or to income from non-local sources should allow it to cope better. Thus, we further differentiate households according to whether they have a member who works overseas (*with OFW in the household*), is a Roman Catholic, or a member of non-faith based organization (*member of nonreligious group*). Of the total shocks, less than 6 percent and 15 percent were experienced by households with a member working outside the country and affiliated with a nonreligious group, respectively. However, most of the shocks were experienced by households that belong to the dominant religion (*Roman Catholic*). A household may have better access to a community support group the longer it has resided in the same community. To capture this notion, we also use a binary variable *stayed in the municipality for at 5 least years*. Around 87 percent of the shocks occurred in households that are long-time residents in their current municipalities.

The household head's characteristics are indicated further by age in years (*age of head*), gender (*head is female*), and marital status (*head is in union*). The mean age is about 45 years; less than two percent of the heads are females; and most (85 percent) are either married or living together with their partner. The variable *dependency ratio* effectively measures the proportion of non-working age members in the household.

Last, we introduce 16 region dummy variables to account for possible unobserved geographical or supply-side factors that determine the household's susceptibility or resiliency to shocks. In general, each region accounts for less than ten percent of the reported shocks. The base region is the National Capital Region.

4. Incidence and inequality

Of the 2,950 sample households, only around nine percent did not report to have experienced any shock in 2006-2011. The huge majority of these households reported a total of 8,901 cases of all types of shocks, with almost 90 percent of these shocks occurring in 2008-2011. Of those who faced shocks, 502 experienced only one shock, and around 1,500 experienced 2-4 shocks. Three households recounted a maximum of 11 shocks events.

With the Philippines being located in the Pacific Ring of Fire and in the monsoon belt, it is not unexpected that nearly three-fourths of the sample households report having experienced any natural shock (Table 3). Extreme heat, wet and dry conditions are most often reported. Estimated CI values are negative, although not too far from zero. The rich and poor are therefore likely to report these natural occurrences as shocks, with the poor slightly more so. This may hint that while the occurrence of these natural shocks is expected to affect the general population, the feeling of vulnerability to these shocks or the inability to cope with its adverse impacts is felt more by the poor. It may be that the relative equality in exposure may mask inequalities in how well households cope with or recover from these shocks.

[Insert Table 3 here.]

Economic shocks rank second in terms of incidence, with about two-thirds of households reporting having experienced these shocks. Nearly 60 percent of households cited unexpected price increases in food and essential items as a shock, indicating sensitivity of households to price movements. Estimated CIs for the various shocks are near zero, again indicating that the shocks are not too disproportionately concentrated on either the rich or the poor. However, we see both positive and negative CIs depending on the specific shock. The incidence of unexpected food and other non-food price increases is reported more by the poor than the rich, while fraud and collapse of business are reported more by the richer households. Fraud, collapse of business and unexpected increases in the prices of inputs and services are experienced as part of entrepreneurial and business activities. Mitigating the impacts of these shocks may not require social safety nets

but rather insurance mechanisms. On the other hand, mitigating the impacts of unexpected increases in food and non-food prices perhaps require an analysis of whether the price increases are due to localized supply shocks or to general inflationary pressures.

About a third of households reports having experienced illnesses while about four percent reports injuries. The CIs, although positive, are again not too far from zero indicating that illnesses do not disproportionately favor the rich or the poor. However, we observe health income gradients where the poor suffer from more adverse health outcomes and utilize less health services [Kraft, et al. 2013, Gwatkin et al. 2003]. A possible explanation for this conundrum is that our measure does not distinguish the types of illnesses that the households experienced. The health income gradients are more pronounced for infectious diseases and those related to housing and environmental factors, which may be offset by non-communicable and lifestyle related diseases suffered by the richer. On the other hand, it may be that while the occurrence of diseases is more randomly distributed among the rich and the poor, the barriers to seeking care and therefore the inability to recover from such illnesses are higher for the poor. In this case, the inequalities would be reflected in the utilization of treatment and the outcomes of treatment rather than the exposure.

Socio-political shocks are reported least frequently with less than ten percent of households reported having experienced any. However, it is in these shocks where we observe the most concentration. Confiscation of property and demolition or forced resettlement are concentrated on the poor. However, other socio-political shocks are concentrated on the rich. As most of the shocks involve crimes that involve losses in property and income, it is not unexpected that those with more income and properties would be more vulnerable to these shocks. These include family-related shocks like divorce, annulment, separation and other family disputes which are likely to be more problematic if they involve dissolution or division of properties. It can be noted that most of these shocks can be prevented (in the case of robbery and crime) or else their costs and impacts mitigated by well-functioning police and legal systems, including well-defined property rights.

Figure 2 summarizes the exposure of households and concentration index of these shocks. A cause of concern would be for high exposure or high frequency shocks that are at the same time concentrated on the poor. In the figure, these would be placed at the lower right. We see that the natural shocks, economic shocks and health shocks occur relatively frequently but are not too concentrated on the poor. Shocks which are relatively concentrated either on the rich or the poor affect less than 20 percent of households. This pattern may, at face value, not be too alarming. However, it bears investigating whether the inequalities are not in the exposure to the shock but on their idiosyncrasy or impacts.

[Insert Figure 2 here.]

5. Covariate and idiosyncratic shocks

Another important dimension of shocks, disasters or hazards is the extent to which they affect households living in the same barangay, municipality or city, province or region for the same year. Following Wagstaff and Lindelow [2010], we report in Table 4 the R^2 statistics of the estimated linear probability models with only community-level fixed effects. A few patterns can be discerned from the table. First, for the same location type, most of the shocks show high levels of R^2 (and, therefore, low degrees of idiosyncrasy) in 2008 than in any other year. However, shocks appear to be more covariate in 2011 than in 2010 or 2009.

Also, looking at the breadth of the catchment area, we note that the covariate effects are higher with barangay-level catchments, with a marked decrease in covariate effects when aggregating up to the level of municipalities. The seeming exceptions to this pattern are "floods, mudslides, storms, La Niña" and "earthquakes, volcanic eruptions, tsunami, lahar", which exhibited shared-area effects up to the level of the region. This may imply that risk pools to provide assistance for these types of shocks may have to be more expansive, maybe going as far as the national levels.

[Insert Table 4 here.]

As an aside, it may be of particular interest that in 2009, community-level death shocks are observable with barangay fixed effects accounting for

16

approximately 40 percent of household variation in reported death shocks. This may be possible if the death shocks referred to are secondary to other shocks, perhaps natural disasters or calamities that are more covariate. A notable pattern is that at the barangay level, health shocks are rather covariate. This may imply that illnesses suffered are related to environmental factors or are infectious in nature. This bears investigation as the response would be better preventive and promotive health care services. Crime also tends to be more covariate when reckoned at the barangay level. Perhaps household exposure to these particular shocks can be minimized with preventive measures such as more focused police presence in crime-prone barangays.

A closer look at shocks experienced in 2009 reveals that all the broad shock types—natural, economic, socio-political, health and death—had relatively similar levels of associated covariate effects. Among the specific shocks, "floods, mudslides, storms, La Niña" had the highest shared communal effect with barangay fixed effects accounting for around 50 percent of intra-household variation while "lawsuit" and "confiscation of property" tended to be the more idiosyncratic. . "Unexpected decline in prices or demand for commodities sold", crime and illness were the more covariate shocks for the broader economic, socio-political and health shock types, respectively.

In 2011, "floods, mudslides, storms, La Niña", "earthquakes, volcanic eruptions, tsunami, lahar" and "crime" tended to be the more communal shocks while "was cheated", "H1N1, Avian flu, livestock disease" and "lost by playing game, lottery, etc." tended to be the more idiosyncratic shocks. Crime and injury were the more covariate shocks for the socio-political and health broad shocks types, respectively.

In general, the extent of variation explained by area fixed effects is below 60 percent for major shocks, although this could be up to 75 percent for particular shocks. Thus, in most instances, shocks tend to impinge only on a few households simultaneously. Consistently, natural shocks and economic shocks each show higher degrees of communal effects (R^2) compared to either sociopolitical shocks or health shocks. Put differently, while a broad cross-section of the population is exposed to

17

natural disasters and economic crises, a narrower segment of the population simultaneously suffers health shocks and deaths. This may imply that households who confront health shocks and deaths can more readily tap their social capital for assistance while those affected by natural shocks would have to rely on institutional sources of assistance.

6. Impact and recovery

The onset of a shock will induce short-term and longer-term adjustments on the part of households. For example, households may immediately sell assets or cut down on food consumption to cover unplanned medical expenditures. The gravity of the shock, the adequacy of their coping mechanisms, including their access to social protection programs, will determine the extent and speed of their recovery from shock. Some of these issues are explored in this section.

Table 5 shows the impact of various general types of shocks in terms of total annual food expenditures. Death has the greatest impact on households, with its associated asset losses and unplanned expenditures amounting to up to 49 percent of total food expenditures. Health shocks also have relatively large impacts, with illness and injury respectively triggering asset losses and unplanned expenditures amounting to 29 and 35 percent of total food expenditures. These magnitudes suggest that households may have to substantially reduce their food consumption, unless they receive transfer payments and other forms of assistance to cover these expenses. Thus, consumption smoothing mechanisms are most needed for these types of shocks.

[Insert Table 5 here.]

Among the specific types of shocks, confiscation of property results in the largest asset losses. On the average, such losses are about 128 percent of food expenditures. On one hand, this figure can indicate a substantial sacrifice of households' food consumption, assuming that these confiscated properties are basic to survival and need to be immediately replaced, as is the case with housing. On the other hand, households with property to begin with might also have access to social

18

protection mechanisms (such as insurance), which can sufficiently cushion the impact on food consumption.

As expected, unplanned medical expenditures were highest for injuries, deaths, and illnesses. These expenditures are about 20-25 percent of food expenditures. Finally, other unplanned expenditures were largest for death (20 percent of food expenditures), which presumably, include expenses such as funeral costs. Divorce and similar family-related legal disputes also triggered relatively large unplanned expenditures (amounting to about 19 percent of food expenditures).

Table 6 presents the marginal effects on the probability of a household to have fully recovered after at most 3 years since experiencing the shock. The relative ease or difficulty of recovering from a shock is an alternative measure of shock impact. While Table 5 focuses mainly on the economic impact, Table 6 could also be reflecting non-economic impacts, such as psychic effects of a shock.

[Insert Table 6 here.]

Economic recovery requires regaining the lost asset as well as defraying the unplanned expenditures arising from the shock. Regaining lost assets will typically entail payment for the direct and indirect costs of the asset, plus the opportunity cost of time spent re-building or re-acquiring the asset. The impact patterns exhibited in Table 6 again may differ from those in Table 5, which reflects only the direct cost of lost assets. Thus, impacts implied by Table 5 might be interpreted as short-term, whereas those in Table 6 are longer-term and more expansive, including economic and non-economic impacts.

A third difference between Tables 5 and 6 arises because ease or difficulty of recovery depends on the amount of transfers or assistance available through formal and informal schemes of social protection. Formal schemes include government assistance programs such as PhilHealth and the social security agencies. Informal schemes refer to assistance provided by family and friends. As the amount and type of assistance available tend to differ across shocks—for example, relief efforts are formally available for natural disasters and health insurance is provided by government as protection against health shocks, whereas assistance for those

19

undergoing divorce is likely not available—the recovery patterns in Table 6 could reflect availability of protection against shock impacts. On the other hand, Table 5 reflects the gross values of asset loss and unplanned expenditures; as such, the figures do not reflect the effects of assistance and transfer payments.

The probability of full recovery from deaths is 25 percentage points lower compared to natural shocks. Deaths appear to be the shock with the most impact—whether in terms of losses and unplanned expenditures or likelihood of full recovery. Deaths cause economic displacement, particularly when the deceased is a primary source of income for the household. They could also have lasting psychic effects, perhaps especially for the young children or spouse left behind by the deceased.

Like deaths, full recovery from an economic shock is relatively difficult given a recovery probability that is 20 percentage points lower than that of natural shocks. Unlike deaths, however, the impact of economic shocks in terms of losses and expenditures is relatively small. Thus, while the collapse of a business will entail some asset losses and unplanned expenditures that are smaller compared to other types of shocks, the additional time and effort needed to recover (i.e., re-starting the business) are greater compared to other types of shocks. In addition, financial assistance is typically provided when a household member dies, largely through informal mechanisms as dictated by social norms (*abuloy* is the Filipino term referring to cash transfers given to the family of the deceased). On the other hand, relatively fewer safety nets are available for households facing economic shocks [Manasan 2010, ASEAN Secretariat and WB 2010].

Recovery from a socio-political shock is also less likely than from natural shocks, with a probability that is 12 percentage points lower than for natural shocks. The relative difficulty of recovering from socio-political shocks could also be due to few, if any, assistance programs for victims of crime or fraud. Another explanation is that when the shock involves a loss of property—as in the case of confiscation of property or demolition of housing—recovery, which could entail legal suits or re-construction, may take time.

Among the various types of shocks, full recovery from natural shocks is most likely to happen than for others. This could be due to the nature of natural disasters; in the case of typhoons, for example, many are affected but few are hit hard. In addition, local governments usually provide disaster relief and private sector initiatives in this undertaking are typically strong.

Health shocks are also relatively easier to recover from, at least compared to deaths, economic and socio-political shocks. While Table 5 indicates relatively large economic costs associated with health shocks, Table 6 suggests that relative ease in recovery could be due to the availability of both formal and informal mechanisms of transfer payments and assistance for households that need to cope with an illness or injury. A general and subjective notion of severity of shocks predicts a lower probability of recovery (6 percentage points lower than shocks that are "not severe").

The year dummy variables (with 2008 as the base year) suggest no clear pattern in the amount of time required for full recovery. While it is indeed less likely for full recovery to take place within one year (as indicated by the negative sign of the 2011 dummy variable), full recovery from a shock in 2008 should have been more likely than from a shock in 2009. The estimated negative coefficient of the 2009 dummy variable does not support the latter prediction.

We found that ownership of assets has non-linear effects. Belonging to the top two asset quintiles improves the likelihood of full recovery, but belonging to either the second or third asset quintiles predicted the same recovery probability as the lowest asset quintile. These support the hypothesis that the inequalities across income or wealth groups may be manifested in the outcomes of shocks rather than in exposure to them. The Roman Catholic variable predicts a lower recovery probability, perhaps suggesting that households belonging to other church groups have access to better mechanisms of assistance when faced with shocks.

Six of the fifteen regional dummy variables are significant predictors of recovery probability. Relative to NCR, shocks experienced by households in Davao Region, SOCKSARGEN, and the Cordillera Autonomous Region were predicted to be associated with higher recovery probabilities compared to the National Capital

Region. Our results on the covariate and idiosyncratic shocks are consistent with this finding. Because some shocks tend to be spatially correlated, then recovery patterns are expected to exhibit similar correlations. In addition, because some social protection programs are decentralized, then regional variations in recovery from shocks might be expected. For example, PhilHealth sponsorships of indigent households are done through local governments.

7. Conclusion and policy implications

Notwithstanding the limitation of our survey data, our analysis yields some findings in terms of the incidence, idiosyncrasy and impact of shocks that Filipino households faced in 2006–2011. First, natural shocks, economic shocks and health shocks generally have relatively high incidence among households and do not seem to disproportionately affect either the poor or the rich. This pattern may be viewed as somewhat encouraging in the sense that exposures to high-frequency shocks are not concentrated among the poor. However, it bears further investigation whether inequalities exist in coping with the outcomes of the shocks, which should then influence the direction of assistance programs.

Second, socio-political shocks, especially those related to property, have lower incidences but are more concentrated among the rich. As noted, well-functioning police and legal systems and well-defined property rights would be the recourses to prevent and mitigate such shocks. However, our results show that efforts to strengthen these systems would primarily benefit the richer households who are more exposed to these shocks.

Third, natural and economic shocks appear to be more covariate shocks than sociopolitical shocks, health shocks and deaths. Thus, our results support the current strategy to target social assistance and risk reduction operations for natural calamities to disaster-prone areas.

Fourth, shocks are generally more covariate at the barangay level than at municipal or provincial level. This means that barangays should be able to monitor if not readily respond to disasters, hazards or incidence as these affect their residents. This does not mean however that all barangays should be equipped with

ambulances, fire trucks, hospitals or any equipment or facility with significant economies of scale, or that they should be entirely dependent on their own resources. It only means that, in the face of covariate shocks, barangays should have a secure source of support for disaster management, possibly from the national, higher-level local governments, or external institutions.

Last, we find that deaths and health shocks have the largest short-term economic impacts. Deaths also have the largest long-term overall (economic and non-economic) impacts. Long-term effects of health shocks (at least those that are not persistent and thus, not leading to deaths) are perhaps being addressed by formal and informal programs of assistance. A policy implication is the importance of understanding the relative share of formal and informal programs in total assistance provided to households facing health shocks. If informal mechanisms are dominant, it makes economic sense to expand the formal mechanisms, particularly with the impending abolition of the "pork barrel" funds which have been a source of burial assistance provided by local politicians. One way is to increase the financial risk protection provided by social health insurance and social security agencies.

To provide a more nuanced guide to policy, further research can be pursued with the same or a new survey dataset along the following lines. First, there is a need to validate self-reported shocks against actual shocks as captured in administrative data (from, say, PhilHealth, Philippine National Police, National Disaster Risk Reduction and Management Council). Second, the different types of precautionary and coping mechanisms adopted and the propensities of households to use these mechanisms must also be explored. The types of shock and the household's ex-ante and ex-post responses will determine the appropriate type of social protection program. Third, the factors that influence the extent and speed f household recovery from shock should also be investigated. Finally, an evidence-based assessment of the effectiveness of social protection programs should be regularly undertaken, considering the persistently high number of casualties and value of damages to property that disasters, hazards and incidents inflict every year.

References

ASEAN Secretariat and World Bank East Asia and Pacific Region [2010] *Regional and country reports of the ASEAN assessment on the social impact of the global financial crisis: The Philippines.* Jakarta, Indonesia: ASEAN Secretariat.

Asian Development Bank [2013] *The Social Protection Index: Assessing results for Asia and Pacific.* Mandaluyong City: Asian Development Bank.

Capuno, J.J., A.D. Kraft, S.A. Quimbo, C.A.R. Tan, Jr., V.M. Fabella and F. Bundoc [2011] "The 3P Study: A randomized experiment to assess the impact of premium subsidies and insurance information on the enrollment of the informal sector in PhilHealth". Paper presented during the 1st M&E Forum organized by the National Economic and Development Authority and UNICEF held in Crowne Plaza Galleria Manila, Ortigas Center, Mandaluyong City on 7-8 November 2011.

De Weerdt, J. and S. Dercon [2006] "Risk-sharing networks and insurance against illness," *Journal of Development Economics* **81**(2):337-356.

Filmer, D. and L. H. Pritchett [2001] "Estimating wealth effects without expenditure data—or tears: An application to educational enrollments in states of India," *Demography* **38**(1): 115-132

Gertler, P., & Gruber, J. [2002] "Insuring consumption against illness," *American Economic Review* **92**(1):51-70.

Gwatkin, D.R., S. Rustein, K. Johnson, R. Pande and A. Wagstaff [2003] *Initial country-level information about socio-economic differentials in health, nutrition and population*, Volumes I and II. Washington, DC: The World Bank.

Heltberg, R. and N. Lund [2009] "Shocks, coping and outcomes for Pakistan's poor: Health risks predominate," *Journal of Development Studies* **45**(6):889-910.

Hoddinot, J. [2006] "Shocks and their consequences across and within households in rural Zimbabwe," *Journal of Development Studies* **42**(2):301-321.

Kraft, A.D., K.-H. Nguyen, E. Jimenez-Soto and A. Hodge [2013] "Stagnant neonatal mortality and persistent health inequality in middle-income countries: a case study of the Philippines" *PLoSONE* **8**(1): e53696. doi:10.1371/journal.pone.0053696

Manasan, R. G. [2010] "Reforming social protection policy: Responding to the global financial crisis and beyond," PIDS Research Paper Series No. 2010-01, Philippine Institute for Development Studies.

Murdoch, J. [1995] "Income smoothing and consumption smoothing," *Journal of Economic Perspectives* **9**(3):103-114.

O'Donnell, O., E. van Doorslaer, A. Wagstaff and M. Lindelow [2008] *Analyzing health equity using household survey data: A guide to techniques and their implementation*. Washington, DC: The World Bank.

Orbeta, Jr. A.C. [2011] "Social protection in the Philippines: Current state and challenges," PIDS Discussion Paper Series No. 2011-02, Philippine Institute for Development Studies.

Quimbo, S., A. Kraft, J. Capuno and C. Tan [2013] "How much protection does PhilHealth provide Filipinos," PCED Policy Notes, Philippine Center for Economic Development.

Safir, A., S.F. Piza and E. Skoufias [2013] "Disquiet on the weather front: The welfare impact of climatic variability in the rural Philippines," WB Policy Research Working Paper 6579, The World Bank.

Santos, I., I. Sharif, H.Z. Rahman and H. Zaman [2011] "How do the poor cope with shocks in Bangladesh? Evidence from survey data," WB Policy Research Working Paper 5810, The World Bank.

Sawada, Y., J.P. Estudillo, N. Fuwa and K. Kajisa [2009] "How do people cope with a natural disaster? The case of super typhoon Milenyo in the Philippines," in G. P. Carnaje and L.S. Cabanilla, eds., *Development, natural resources and the environment*. College, Laguna, Philippines: College of Economics and Management – University of the Philippines Los Baños.

Wagstaff, A. [2005a] 'The economic consequences of health shocks," WB Policy Research Working Paper 3644, The World Bank.

Wagstaff, A. [2005b] "The bounds of the concentration index when the variable of interest is binary, with an application to immunization inequality," *Health Economics* **14**(4):429–432.

Wagstaff, A. and M. Lindelow [2010] "Are health shocks different? Evidence from a multi-shock survey in Laos," WB Policy Research Working Paper 5335, The World Bank.

Table 1.Occurrences and damages of major natural disasters, typhoons and human induced incidents, 2009-2011

Disasters*	Occur-rence	Casualties (dead+injured +missing)	Affected families (in thousands)	Houses damaged (total + partial damaged)	Cost of damages (in PhP million)
2009	481	3237	2,911.9	354,261	45,771
Natural disasters	194	204	306.7	14,927	1,661.1
Typhoons	21	2129	2,595.4	336,326	43,971.3
Human-induced incidents	266	904	9,876	3,008	138.3
2010	556	2526	1,315.1	295,446	25,281.5
Natural disasters	234	121	736.8	2,250	12,684.2
Typhoons	11	354	543.3	287,416	12,392.0
Human-induced incidents	311	2051	34.9	5,780	205.4
2011**	645	9,745	2,690.7	200,939	25,294.2
Natural disasters	355	788	610	11,025	2,662.3
Typhoons***	19	8,103	2,065.4	187,207	22,198.5
Human-induced incidents	271	854	24.4	2,707	433.5

Sources of table: *Philippine Statistical Yearbook* 2011, 2012.
*Natural disasters include earthquake, volcanic activity, landslide, floods, El Niño, soil erosion, tornado, strong winds, whirlwind, pest infestation, thunderstorm and continuous rains. Typhoons are classified into destructive and non-destructive. Human-induced incidents include structural fires, sea and air mishaps, vehicular accidents, armed conflict, epidemic or disease outbreaks, bomb/grenade explosions, mining incidents, coal or oil spill, fish kill, electrocution, drowning, mountain climbing, food poisoning, collapsed structure.
**Preliminary.
***Include both destructive non-destructive cyclones.

Table 2. Variable definitions and summary statistics (*N*=7,936)

Variable	Definition	Mean	Std. Dev.	Min.	Max.
Full recovery	=1 if fully recovered from shock, 0 otherwise	0.582	0.493	0	1
If a health shock	=1 if shock is illness or injury, 0 otherwise	0.127	0.333	0	1
If a death shock	=1 if shock is a death shock, 0 otherwise	0.021	0.144	0	1
If a socio-political shock	=1 if shock is crime, law suit, lost by playing game, confiscation of property, demolition, fire or divorce, 0 otherwise	0.026	0.160	0	1
If an economic shock	=1 if shock is unexpected decline in prices or demand for commodities they sell, unexpected increase in prices, shortages in inputs they use, unexpected increase in prices of food and other essential commodities, unexpected loss of job, non-payment or delay in payment or income, collapse of business or fraud, 0 otherwise	0.366	0.482	0	1
Shock is severe	=1 if shock is severe, 0 otherwise	0.327	0.469	0	1
Year 2009	=1 if year is 2009, 0 otherwise	0.202	0.401	0	1
Year 2010	=1 if year is 2010, 0 otherwise	0.465	0.499	0	1
Year 2011	=1 if year is 2011, 0 otherwise	0.236	0.425	0	1
2nd asset quintile	=1 if belongs to 2nd asset quintile, 0 otherwise	0.237	0.426	0	1
3rd asset quintile	=1 if belongs to 3rd asset quintile, 0 otherwise	0.170	0.375	0	1
4th asset quintile	=1 if belongs to 4th asset quintile, 0 otherwise	0.194	0.396	0	1
5th asset quintile	=1 if belongs to 5th asset quintile, 0 otherwise	0.179	0.383	0	1
With national health insurance coverage	=1 if head is a beneficiary of PhilHealth, 0 otherwise	0.559	0.497	0	1
With other insurance coverage	=1 if head is covered by other health insurance, 0 otherwise	0.064	0.245	0	1
With OFW in the household	=1 if any member of the household is working abroad, 0 otherwise	0.061	0.239	0	1
Roman Catholic	=1 if respondent is a Roman Catholic, 0 otherwise	0.877	0.328	0	1
Member of nonreligious group	=1 if respondent is a member of nonreligious group, 0 otherwise	0.150	0.357	0	1
Age of head	Age of household head (in years)	45.420	12.656	20	96
Head is female	=1 if household head is female, 0 otherwise	0.016	0.127	0	1
Head is in Union	=1 if household head is in union, 0 otherwise	0.845	0.362	0	1
Head has at least high school education	=1 if household head has at least high school education, 0 otherwise	0.553	0.497	0	1
Dependency ratio	Number of household members who are below 21 or above 65 years old over the total number of household members	0.376	0.222	0	1
Stayed in the municipality for at least 5 years	=1 if stayed in the municipality for at least 5 years, 0 otherwise	0.871	0.335	0	1
Ilocos Region	=1 if Ilocos Region, 0 otherwise	0.067	0.251	0	1
Cagayan Valley	=1 if Cagayan Valley, 0 otherwise	0.006	0.076	0	1
Central Luzon	=1 if Central Luzon, 0 otherwise	0.105	0.306	0	1
Bicol	=1 if Bicol, 0 otherwise	0.050	0.217	0	1
Western Visayas	=1 if Western Visayas, 0 otherwise	0.097	0.296	0	1
Central Visayas	=1 if Central Visayas, 0 otherwise	0.077	0.266	0	1
Eastern Visayas	=1 if Eastern Visayas, 0 otherwise	0.047	0.211	0	1
Zamboanga Peninsula	=1 if Zamboanga Peninsula, 0 otherwise	0.022	0.147	0	1
Northern Mindanao	=1 if Northern Mindanao, 0 otherwise	0.044	0.204	0	1
Davao Region	=1 if Davao Region, 0 otherwise	0.083	0.275	0	1
SOCSKSARGEN	=1 if SOCSKSARGEN, 0 otherwise	0.074	0.262	0	1
Cordillera Administrative Region	=1 if Cordillera Administrative Region, 0 otherwise	0.018	0.133	0	1
ARMM	=1 if Autonomous Region of Muslim Mindanao, 0 otherwise	0.019	0.136	0	1
CALABARZON	=1 if CALABARZON, 0 otherwise	0.133	0.340	0	1
MIMAROPA	=1 if MIMAROPA, 0 otherwise	0.020	0.140	0	1

Table3. Incidence and inequality of shocks, household level, 2006-2011

Type of shocks	Freq.	Household proportions (N=2950)	Mean	Normalized Concentration Index
No shock	**270**	**9.15**	**0.092**	**0.114**
Natural shocks	**2,166**	**73.42**	**0.734**	**-0.136**
Drought/El Niño	984	33.36	0.334	-0.175
Floods, mudslides, storms, La Niña	1,305	44.24	0.442	-0.010
Earthquakes, volcanic eruptions, tsunami, lahar	289	9.80	0.098	-0.092
Extreme heat	1,177	39.90	0.399	-0.010
Pest infestation, crop diseases	311	10.54	0.105	-0.237
H1N1, Avian flu and livestock diseases	40	1.36	0.014	-0.038
Economic shocks	**1,990**	**67.46**	**0.675**	**-0.031**
Unexpected decline in prices or demand for commodities sold	255	8.64	0.086	-0.060
Unexpected increase in prices/shortages of inputs/services used	480	16.27	0.163	0.063
Unexpected increase in prices of food/other essential commodities consumed	1,750	59.32	0.593	-0.029
Unexpected loss of job	363	12.31	0.123	0.014
Non-payment/delay in payment of income	144	4.88	0.049	0.178
Collapse of business	122	4.14	0.041	0.154
Fraud	64	2.17	0.022	0.188
Socio-political shocks	**228**	**7.73**	**0.077**	**0.192**
Crime (robbery, theft, murder, physical abuse)	68	2.31	0.023	0.188
Was cheated (e.g. estafa, pyramiding scam, insurance fraud)	35	1.19	0.012	0.496
Law suit	28	0.95	0.009	0.229
Lost by playing game, lottery, etc.	73	2.47	0.025	0.220
Confiscation of property	11	0.37	0.004	-0.136
Demolition or forced resettlement/evict	22	0.75	0.007	-0.170
Fire	35	1.19	0.012	0.059
Divorce, annulment, separation, abandonment, or internal or extended family disputes	28	0.95	0.009	0.228
Health shocks	**1,055**	**35.76**	**0.358**	**0.024**
Illness	995	33.73	0.337	0.024
Injury	121	4.10	0.041	0.050
Death	**201**	**6.81**	**0.068**	**0.069**

Source of raw data: UPecon-HEFPA Survey. Authors' estimates.

Table 4. Idiosyncrasy of shocks

	All years* (N=8901)	2008 (N=779) Freq.	Barangay	Municipal	Province	Region	2009 (N=1,614) Freq.	Barangay	Municipal	Province	Region	2010 (N=3,709) Freq.	Barangay	Municipal	Province	Region	2011 (N=1,881) Freq.	Barangay	Municipal	Province	Region
Natural shocks	**4,141**	**454**	**0.540**	**0.336**	**0.165**	**0.058**	**1,024**	**0.386**	**0.207**	**0.086**	**0.032**	**1,722**	**0.188**	**0.103**	**0.049**	**0.026**	**470**	**0.397**	**0.298**	**0.203**	**0.125**
Drought/El Niño	984	138	0.460	0.283	0.142	0.071	217	0.385	0.249	0.133	0.065	428	0.181	0.111	0.062	0.033	26	0.215	0.102	0.035	0.006
Floods, mudslides, storms, La Niña	1,305	137	0.643	0.497	0.329	0.112	522	0.503	0.362	0.270	0.191	351	0.216	0.148	0.090	0.067	192	0.518	0.424	0.325	0.277
Earthquakes, volcanic eruptions, tsunami, lahar	289	30	0.484	0.314	0.104	0.036	28	0.308	0.185	0.101	0.049	101	0.168	0.108	0.062	0.033	86	0.546	0.480	0.412	0.229
Extreme heat	1,177	102	0.434	0.244	0.063	0.009	185	0.353	0.246	0.116	0.051	669	0.161	0.082	0.039	0.024	120	0.272	0.163	0.081	0.032
Pest infestation, crop diseases	311	34	0.416	0.237	0.066	0.022	49	0.335	0.208	0.086	0.027	151	0.177	0.111	0.053	0.022	42	0.314	0.241	0.135	0.037
H1N1, Avian flu and livestock diseases	40	7	0.368	0.187	0.102	0.042	15	0.296	0.117	0.027	0.005	11	0.175	0.103	0.052	0.013	3	0.181	0.095	0.016	0.005
Economic shocks	**3,178**	**191**	**0.524**	**0.341**	**0.183**	**0.048**	**367**	**0.377**	**0.210**	**0.096**	**0.028**	**1,401**	**0.192**	**0.105**	**0.054**	**0.028**	**963**	**0.342**	**0.220**	**0.118**	**0.066**
Unexpected decline in prices or demand for	255	17	0.439	0.271	0.071	0.019	32	0.401	0.250	0.083	0.024	126	0.142	0.083	0.046	0.019	58	0.222	0.132	0.033	0.013
Unexpected increase in prices/shortages of inputs/services used	480	38	0.355	0.254	0.112	0.018	43	0.293	0.125	0.033	0.013	216	0.130	0.070	0.029	0.006	152	0.236	0.149	0.049	0.020
Unexpected increase in prices of food/other essential commodities consumed	1,750	72	0.463	0.259	0.114	0.036	167	0.361	0.212	0.100	0.035	762	0.190	0.093	0.048	0.022	669	0.313	0.190	0.088	0.038
Unexpected loss of job	363	33	0.454	0.273	0.074	0.034	68	0.310	0.131	0.041	0.014	156	0.163	0.079	0.027	0.016	39	0.242	0.121	0.030	0.015
Non-payment or delay in payment of income	144	8	0.415	0.187	0.028	0.016	18	0.341	0.159	0.047	0.012	70	0.131	0.048	0.015	0.006	28	0.245	0.095	0.023	0.009
Collapse of business	122	20	0.438	0.239	0.062	0.018	26	0.259	0.149	0.043	0.013	50	0.155	0.071	0.015	0.006	10	0.201	0.086	0.014	0.005
Fraud	64	3	0.314	0.139	0.023	0.008	13	0.294	0.129	0.042	0.008	21	0.118	0.047	0.015	0.004	7	0.296	0.155	0.019	0.007
Socio-political shocks	**265**	**26**	**0.564**	**0.240**	**0.061**	**0.035**	**35**	**0.297**	**0.118**	**0.035**	**0.017**	**77**	**0.189**	**0.071**	**0.021**	**0.010**	**70**	**0.280**	**0.125**	**0.037**	**0.016**
Crime (robbery, theft, murder, physical abuse)	68	4	0.317	0.154	0.019	0.008	11	0.412	0.132	0.033	0.009	27	0.211	0.071	0.021	0.009	14	0.491	0.124	0.062	0.007
Was cheated (e.g. estafa, pyramiding scam, insurance fraud)	35	4	0.393	0.171	0.045	0.016	2	0.305	0.177	0.039	0.002	15	0.203	0.051	0.009	0.003	2	0.128	0.106	0.017	0.007
Law suit	28	2	1.000	0.248	0.023	0.023	6	0.164	0.075	0.020	0.010	9	0.148	0.080	0.043	0.004	2	0.291	0.113	0.057	0.009
Lost by playing game, lottery, etc.	73	3	0.278	0.193	0.039	0.018	5	0.206	0.100	0.015	0.005	13	0.119	0.056	0.010	0.004	46	0.199	0.110	0.029	0.013
Confiscation of property	11	2	0.749	0.373	0.090	0.068	2	0.111	0.029	0.013	0.005	2	0.155	0.120	0.024	0.004	0	.	.	.	.
Demolition or forced resettlement/evict	22	6	0.692	0.213	0.041	0.024	4	0.397	0.063	0.009	0.005	5	0.159	0.029	0.012	0.005	5	0.277	0.161	0.023	0.006
Fire	35	6	0.692	0.195	0.061	0.016	8	0.283	0.100	0.043	0.027	11	0.164	0.044	0.013	0.005	1	.	.	.	.
Divorce, annulment, separation, abandonment, or internal or extended family disputes	28	5	0.732	0.446	0.066	0.016	5	0.135	0.048	0.011	0.008	6	0.158	0.053	0.009	0.002	1	.	.	.	.
Health shocks	**1,116**	**82**	**0.560**	**0.331**	**0.120**	**0.046**	**143**	**0.372**	**0.187**	**0.067**	**0.023**	**426**	**0.209**	**0.106**	**0.053**	**0.030**	**363**	**0.297**	**0.179**	**0.069**	**0.029**
Illness	995	70	0.584	0.333	0.108	0.047	123	0.387	0.183	0.065	0.021	371	0.194	0.096	0.044	0.024	342	0.287	0.169	0.069	0.028
Injury	121	12	0.388	0.289	0.074	0.013	20	0.302	0.169	0.045	0.017	55	0.155	0.066	0.033	0.010	21	0.332	0.249	0.073	0.008
Death	**201**	**26**	**0.591**	**0.400**	**0.135**	**0.028**	**45**	**0.405**	**0.202**	**0.058**	**0.016**	**83**	**0.229**	**0.105**	**0.037**	**0.016**	**15**	**0.283**	**0.162**	**0.032**	**0.003**

Source of raw data: UPecon-HEFPA Baseline Survey. Authors' estimates.

Note: The covariateness figures are the estimated R-squared statistics of linear probability models estimated with only location-fixed effects. The idiosyncrasy estimate is 1 minus the R-squared.

*For years 2006 - 2011 (Jan- Apr).

"." means covariateness is not computed.

Table 5. Income losses and costs associated with shocks, as % of annual food expenditure

Type of shock	Freq. of shock inci-dence	As % of annual food expenditure			
		Amount of asset loss	Amount of unplanned medical expenses	Amount of other unplanned expenses	Total costs
Natural shocks	**3,667**	**2.83**	**0.34**	**0.95**	**4.11**
Drought/El Niño	809	3.25	0.12	0.86	4.23
Floods, mudslides, storms, La Niña	1,202	4.34	0.38	1.50	6.19
Earthquakes, volcanic eruptions, tsunami, lahar	245	0.00	0.00	0.03	0.03
Extreme heat	1,074	0.56	0.56	0.33	1.44
Pest infestation, crop diseases	275	5.80	0.07	2.24	8.10
H1N1, Avian flu and livestock diseases	36	1.34	0.54	0.37	2.25
Economic shocks	**2,921**	**0.63**	**0.15**	**0.47**	**1.26**
Unexpected decline in prices or demand for commodities sold	233	1.44	0.08	1.85	3.37
Unexpected increase in prices/shortages of inputs/services used	449	0.13	0.27	0.11	0.51
Unexpected increase in prices of food/other essential commodities consumed	1,670	0.17	0.08	0.29	0.54
Unexpected loss of job	296	0.40	0.29	0.67	1.36
Non-payment or delay in payment of income	124	0.00	0.27	0.52	0.78
Collapse of business	106	7.75	0.58	0.99	9.32
Fraud	43	5.22	0.00	0.97	6.19
Socio-political shocks	**208**	**7.74**	**0.02**	**2.43**	**10.14**
Crime (robbery, theft, murder, physical abuse)	56	10.95	0.00	0.01	10.95
Was cheated (e.g. estafa, pyramiding scam, insurance fraud)	23	1.04	0.00	1.95	2.99
Law suit	19	0.00	0.05	0.85	0.90
Lost by playing game, lottery, etc.	67	0.08	0.00	0.64	0.72
Confiscation of property	6	128.21	0.46	0.66	107.84
Demolition or forced resettlement/evict	20	15.85	0.00	3.71	19.56
Fire	26	11.11	2.34	0.10	13.55
Divorce, annulment, separation, abandonment, or internal or extended family disputes	17	0.11	0.00	18.85	18.97
Health shocks	**1,014**	**2.97**	**21.00**	**5.98**	**29.80**
Illness	906	2.90	20.54	5.84	29.13
Injury	108	3.56	24.94	7.15	35.42
Death	**169**	**4.82**	**24.97**	**19.66**	**48.54**

Source of raw data: UPecon-HEFPA Baseline Survey. Authors' estimates.

31

**Table 6.Factors that affect the probability of full recovery from shocks**

Explanatory variables	dy/dx	Standard Error	$p>|z|$
If a health shock	-0.062	0.018	0.000
If a death shock	-0.255	0.038	0.000
If a socio-political shock	-0.116	0.035	0.001
If an economic shock	-0.204	0.012	0.000
Shock is severe	-0.064	0.010	0.000
Year 2009	0.039	0.022	0.069
Year 2010	-0.004	0.021	0.860
Year 2011	-0.050	0.024	0.036
Asset quintile			
2nd asset quintile	0.019	0.026	0.462
3rd asset quintile	0.009	0.031	0.766
4th asset quintile	0.071	0.030	0.018
5th asset quintile	0.134	0.033	0.000
With national health insurance coverage	0.014	0.019	0.459
With other insurance coverage	-0.025	0.037	0.503
With OFW in the household	0.037	0.038	0.334
Roman Catholic	-0.052	0.027	0.055
Member of non-religious group	0.012	0.026	0.651
Age of head	0.000	0.001	0.731
Head is female	0.014	0.082	0.865
Head is in union	0.005	0.025	0.853
Head has at least high school education	0.030	0.020	0.136
Dependency ratio	0.000	0.041	0.998
Stayed in the municipality for at least 5 years	0.011	0.026	0.684
Region			
Ilocos Region	0.023	0.042	0.592
Cagayan Valley	-0.185	0.081	0.022
Central Luzon	-0.002	0.039	0.964
Bicol	-0.017	0.049	0.726
Western Visayas	-0.095	0.041	0.019
Central Visayas	0.066	0.042	0.112
Eastern Visayas	0.072	0.048	0.131
Zamboanga Peninsula	0.010	0.058	0.861
Northern Mindanao	-0.099	0.056	0.075
Davao Region	0.140	0.042	0.001
SOCKSARGEN	0.191	0.039	0.000
Cordillera Administrative Region	0.296	0.053	0.000
ARMM	-0.029	0.059	0.620
CALABARZON	-0.053	0.036	0.134
MIMAROPA	-0.162	0.062	0.008

Notes:

"dy/dx" is the estimate of the marginal effect (marginal probability) of a unit change in the explanatory variable.

Standard errors in the probit model are adjusted for household-level clustering.

Figure 1. Diagram for the shocks module in the baseline survey
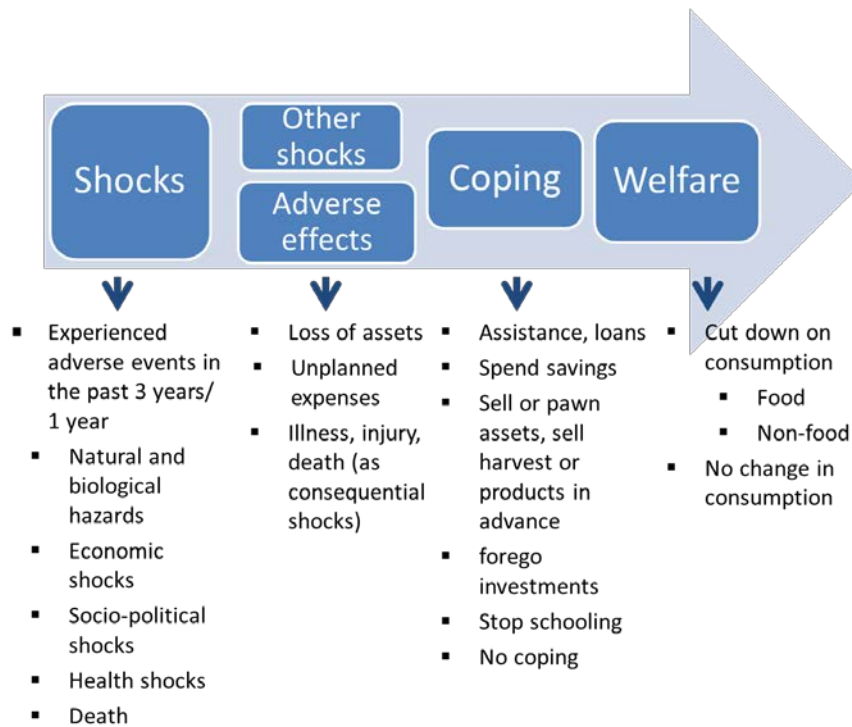
Figure 2. Mapping of shock frequency and concentration index