WP-18

HEFPA working paper

Institute of Health Policy & Management

# Impact of health shocks on household welfare in Vietnam - Estimates using fixed effects estimation

Sarah Bales

ERASMUS UNIVERSITEIT ROTTERDAM
INSTITUTE OF
HEALTH POLICY & MANAGEMENT

# Impact of health shocks on household welfare in Vietnam – Estimates using fixed effects estimation

Sarah Bales

National University of Singapore, Singapore
Research Development Center for Community Health Strategy, Hanoi, Vietnam.
November 18, 2013

## Abstract:

This paper assesses the welfare impacts of health shocks and coping strategies used by households in Vietnam. The analysis uses household panel data from the Vietnam Household Living Standards (VHLSS) survey for 2004-06 and 2006-08, and applies fixed effect Poisson regression to assess impact of severe illness, adult death and onset of disability. Results indicate that labor supply of poor households is significantly reduced in the case of disability and among the non-poor in the case of severe illness among insured family member. Poor households also face reductions in non-farm self-employment income in the case of insured illness and disability, while non-poor households actually see an increase in wage income. Out-of-pocket health spending increased significantly among the poor and non-poor faced with illness and disability, although social health insurance did mitigate these high costs to some extent for the insured. The decrease in health spending resulting from a death was offset by large increases in funeral and death rite costs. Despite these effects on income generation and health spending, household per capita non-medical consumption was not affected by the shocks. There was little reliance on formal transfers or remittances, but poor households facing a death did rely on charity. Loans were a primary coping mechanism used in the case of death for both poor and non-poor households, and insured illness among the poor, while the better off could rely on dissavings in the case of uninsured illness.

**Keywords:** consumption smoothing, health shocks, fixed effects, Vietnam

**Corresponding author:** Sarah Bales – sarahb1965@gmail.com

## Acknowledgements and disclaimer

The research reported in the paper was supported by a grant from the European Union's FP7 program to the "Health Equity and Financial Protection in Asia" project (HEALTH-F2-2009-223166). Thanks to Dao Thanh Huyen for her general support and Azad Singh Bali and Robert Sparrow for econometrics advice. The findings, interpretations and conclusions expressed in this paper are entirely those of the author, and do not necessarily represent the views of the National University of Singapore or the Center for Community Health Strategy.

# 1. Introduction

Major global efforts are underway to achieve universal health coverage, which should ensure not only basic primary and preventive care, but also offer financial protection to households faced with risks adversely affecting health. Adverse health shocks induce utilization of health services that can impose high costs on households at a time when household ability to earn income is hampered due to inability to work of the ill individual and family caregivers. Insurance mechanisms can help to share risk across households, either *ex ante* through formal health insurance or *ex post* through government transfer programs or though informal remittances or gifts to families facing health shocks. Households may also spread the risk over time through *ex ante* saving in anticipation of potential health shocks, or *ex post* borrowing then paying back after recovery from the health shock. These mechanisms can help to ensure the household objective of smoothing consumption over time, and avoiding impoverishment as a result of health shocks.

Vietnam is in the midst of a major effort to achieve universal health insurance coverage as a way to provide health financial protection. However, the Vietnamese policymaking process has tended to ignore important aspects of vulnerability and coping that could provide important insights into a more comprehensive policy design. For instance, it is important for policymakers to thoroughly understand the extent to which severe health shocks actually affect household welfare, whether these effects differ across socio-economic groups, whether the channels for health shocks to influence welfare are through high healthcare costs or through reduced income, and to what extent households rely on existing *ex ante* and *ex post* financial protection policies or informal coping mechanisms.

This study takes advantage of the availability of the VHLSS dataset with its longitudinal structure and rich set of variables to assess impact of health shocks – unanticipated and adverse health events including severe illness in adult, death to adult and onset of disability – on household labor supply and

income, health spending and non-medical consumption. In addition, it assesses the effect of the health shocks on the probability that the households use various risk management mechanisms including inter-household risk sharing (insurance, remittances, transfers and risk sharing over time (savings/dissaving, borrowing). The mitigating effect of health insurance is also analyzed through separating out the health shocks influencing insured versus uninsured individuals. Socio-economic differentials in impacts are examined through separate analysis of the poorest 40 percent of the population compared to the remaining 60 percent of the population. This update and comprehensive look at household welfare impacts of health shocks in Vietnam adds to the growing literature on vulnerability in developing countries and provides useful evidence to inform health financial protection policymaking.

## 2. Literature review

The study of health shocks and vulnerability generally relies on an inter-temporal consumption model with income uncertainty (Deaton 1992). This model assumes risk averse households faced with risky incomes attempt to maximize inter-temporal expected utility, which is a function of consumption. The theoretical result is that households adjust consumption so the marginal utility of current consumption equals the discounted expected marginal utility of future consumption. With additional assumptions, the model predicts that changes in consumption in one period are solely dependent on unexpected changes in permanent income (Grimm 2010). Health shocks are posited to negatively affect household labor supply, reduce incomes, increase health spending and reduce non-medical consumption. In the absence of credit and insurance market constraints, households are expected to attempt to insure consumption through various risk management mechanisms including inter-temporal risk smoothing through saving, dissaving and borrowing or inter-household risk sharing through insurance, transfers and remittances (Alderman and Paxson 1992), although these

may be less available for less well-endowed households. Morduch (1999) posited, that even in the absence of formal credit and insurance markets, informal risk management mechanisms may be available to poor households to insure consumption.

A growing number of empirical studies assess the extent to which health shocks affect incomes and consumption smoothing in developing countries. In Indonesia, Gertler and Gruber (2002) found that households faced with health shocks are unable to fully insure consumption, with lower smoothing found with more severe health shocks. Genoni (2012), taking into account the endogeneity of health shocks, found that illness events reduced individual and household earnings for prime-age individuals, but had little effect on consumption, which the author attributed to heterogeneity in effects not captured in the analysis. Another Indonesian study, found that in general, consumption was insured in the face of health shocks, except for the poor who saw reduced consumption. Evidence suggested that the economic risk from illness was channeled mainly through medical expenses rather than incomes, although there were some negative effects on components of income (Sparrow, Poel et al. 2013). In China, Lindelow and Wagstaff (2005) found that negative health shocks are associated with a significant reduction in income and labor supply and a significant increase in out-of-pocket health spending, with unearned income increasing for the poor thus providing a partial offset of income decline. They found little mitigating effect of health insurance on household welfare decline. In Vietnam, Wagstaff (2007) discovered that households faced declines in food consumption after health shocks, but that urban households were more vulnerable in terms of reduced earned income and increased out-of-pocket health spending. Similar to the study on China, unearned income served a partial mitigation role. Wagstaff and Lindelow (2013) found that health shocks in Laos were more prevalent among the poor, and although consumption regressions found close to full smoothing, household response to direct questions about the impact of the shocks indicated a high proportion had to cut back on consumption, negatively affecting welfare.

While much of the health shock literature examines measures of change in health status or self-reported illness duration, another important and extreme health shock facing households is death, particularly to prime-age adult household members. A number of studies analyze the impact of death, particularly to prime-age adults, in Africa where the HIV/AIDS epidemic has hit hard. Death to a prime-age adult member of the household has been found to reduce net value of household crop production in Kenya, primarily among poor households (Yamano and Jayne 2002); reduce land cultivated in Zambia, although without large declines in crop output except among the poor (Chapoto and Jayne 2005); reduce consumption in Tanzania in the first five years after an adult death, with effects being larger for female deaths (Beegle, De Weerdt et al. 2008). In all these studies results varied substantially depending on the individual who died. In other countries where AIDS mortality is less of the focus, deaths have also been analyzed as severe health shocks. In Vietnam, Wagstaff (2007) found that the death of an adult household member led to reductions in household earned income, food consumption and non-food consumption among urban households, with results somewhat sensitive to the equivalence scale used. Grimm (2010) found that Indonesian households were able to insure consumption when faced with death of an adult household member, although results were sensitive to whether the death was to a net consumer or net contributor to household income.

Disability has not yet been extensively researched in the health shocks literature, particularly in developing countries. Meyer and Mok (2013) rigorously examined the long-term impacts of disability onset in the United States and saw substantial declines in earnings, after-tax income and food and housing consumption, and that individual savings, family support and social insurance played only a partial and incomplete role in insuring consumption. Studies in developing countries so far do not examine disability as a shock, but rather as a characteristic of the individual, and find disability

associated with probability of being in the two poorest quintiles, explained largely by lower educational attainment of the disabled (Filmer 2008).

Many studies go beyond assessing whether households insure consumption to exploration of the coping mechanisms actually used. A wide variety of coping mechanisms are used, with substantial variation across countries and socio-economic groups. Sparrow, Poel et al. (2013) found that family assistance, asset sales and non-collateral loans were used by all Indonesian households, while decreased consumption, increased labor and use of savings were more prevalent coping mechanisms among poorer groups. Genoni (2012), on the other hand, found evidence of ill health event-induced transfers and increased labor supply of non-ill household members in response to adverse health events, but no evidence of asset depletion. Gertler, Levine et al. (2009) found that ability to smooth consumption was strongly related to proximity to financial institutions (higher access to savings and borrowing instruments). Grimm (2010), in examining deaths in Indonesia found households were able to insure consumption through dissaving or increasing household labor supply. Wagstaff and Lindelow (2013) found the most common coping strategies in Laos were dissaving and borrowing. In a similar study in Pakistan, Heltberg and Lund (2009) households relying mostly on self-insurance and informal credit to cope as private and public social safety nets offer little effective protection in Pakistan. In Kenya, households coped with working age adult mortality mainly through asset sales, including small animals, or equipment (Yamano and Jayne 2002), while in Zambia sale of cattle assets were important in dealing with death of a prime-age male head of household, but effect on off-farm income appeared minimal (Chapoto and Jayne 2005). Asadul Islam, Pushkar Maitra (2012) found in Bangladesh that microcredit can reduce reliance on sales of production assets, like livestock, to cope with health shocks. Lundberg, Over et al. (2000) found that resource-abundant households in Tanzania, when faced with the death of a prime-age member, rely more on private transfers with implicit contracts

for reciprocity, whereas resource-poor households rely more on credit. Precautionary savings were not found to be a widely used coping mechanism in Tanzania (Lundberg, Over et al. 2003).

A number of studies have looked at coping mechanisms in Vietnam in the face of shocks. Kemper, Klump et al. (2011), using cross-sectional data collected in 2007 in 3 provinces of Vietnam, found that credit rationing constraints on consumption smoothing in the face of shocks were not as severe as previously measured because of extensive networks of government-led group-based lending schemes and informal credit markets including family lenders and moneylenders. Wainwright and Newman (2011) using data from three rounds of the Vietnam Access to Resources Household Survey (VARHS 2006, 2008 and 2010 conducted in 12 provinces) find that health shocks (insurable idiosyncratic shocks) in rural Vietnamese households lead to depletion of liquid assets (with health insurance playing a mitigating role only for depletion of livestock holdings) and increased household borrowing. Dang (2011), using VARHS, found significant effects of illness and death on household poverty and persistence of poverty in Vietnam, with informal assistance, reduced consumption, informal credit and asset sales being the most prevalent coping mechanisms reported by households. Health insurance was found to have little impact on reducing impoverishment due to health shocks. This finding is similar to that of Sepehri, Sarma et al. (2006), who found, using the VLSS1992/93 and 1997/98, that while health insurance does reduce health spending of the insured, the reduction is only about 28 to 35 percent, thus even insured households are still heavily burdened with out-of-pocket health expenditures.

While there is a substantial literature on health shocks and coping in Vietnam, it relies on surveys implemented over 15 years ago, or on small selected samples of provinces. No analysis has examined socio-economic differentials in health-shock impact on household welfare and coping strategies in Vietnam. In addition, most of the analysis to date looks only at a limited number of household welfare outcomes or coping strategies, ignoring others.

# 4. Institutional setting and data

## *Institutional setting*

Vietnam is a densely populated country in Southeast Asia with a population in 2012 of 88.77 million people . Life expectancy in Vietnam is high at 73 years, and infant mortality rates are relatively low at 15.4 per 1000 live births (General Statistics Office 2013). GDP per capita in 2012 reached PPP$3635, just 2 years after becoming a lower middle income country (World Bank 2013). Poverty reduction efforts in Vietnam have been very successful leading to a reduction from 58 percent poverty in 1992 (World Bank 2003) to just 10.7 percent in 2010 (General Statistics Office 2011).

Vietnam's health service delivery system has maintained its strong efforts in public health and preventive medicine while strongly expanding and deepening investments in state-run curative care facilities. Primary care facilities are available in all communes, with 76 percent having a medical doctor. Over 1000 hospitals, including over 100 private hospitals, provide access to basic diagnostic services, surgery and inpatient care for almost all districts throughout the country. Health care utilization has also increased; the proportion of the population admitted to hospital rose from 5.7 to 8.1 percent between 2002 and 2010, while outpatient care use increasing from 14.2 percent to 37.1 percent in the same period. In 2010 36 percent of outpatient care and 5.4 percent of inpatient care was obtained from private modern medicine facilities (General Statistics Office 2011).

Health care spending has increased rapidly, more than tripling in real terms between 1998 and 2009 (Ministry of Health and World Health Organization 2011). A social health insurance system was set up in 1992, initially covering civil servants and gradually expanding to incorporate other groups. By 2004 health insurance covered 22.6 percent of the population, and with the introduction of fully subsidized premiums for the poor and a few other vulnerable groups by 2008 had doubled coverage (44.7 percent), continuing expansion of health insurance to reach 66.8 percent coverage by 2012.

There are, however, criticisms of the low level of financial protection afforded by the health insurance scheme. In 1992, 6.9 percent of the population live in households where health spending exceeded 40 percent of ability to pay (Wagstaff and Doorslaer 2003). More recent analysis estimated catastrophic spending declining to 3.9 percent in 2010 (Hoang Van Minh, Nguyen Thi Kim Phuong et al. 2012). While health insurance has been found to reduce out-of-pocket spending, it still provides only a low level of financial protection because of informal payments and indirect costs of seeking care (Sepehri, Sarma et al. 2006).

The Government has expanded formal social protection measures (Evans and Harkness 2008) including social insurance, subsidized microcredit for the poor, social assistance schemes for vulnerable groups like the elderly and disabled, although there are concerns about equitability of the safety net. Credit markets have developed including extension of subsidized microcredit for the poor and disadvantaged regions, and expanding state-run bank activities in rural areas, but informal credit (Pham and Lensink 2008), and savings schemes (Newman, Tarp et al. 2008) continue to predominate.

## *Data*

The Vietnam Household Living Standards Surveys (VHLSS) is a biennial survey implemented by the General Statistics Office. The cross-sectional sample in each round consists of 3 households selected in each of 3063 clusters selected to ensure that the sample is nationally and regionally representative. The survey includes a rotating panel, in which about half of the clusters are replaced in each survey round, while the remaining half of the clusters are retained to allow for re-interviews of the same households.

This analysis uses two-year panel datasets collected in 3 rounds of the survey. The 2004–06 panel, consists of a total of 4276 households, while the 2006–08 panel contained 4125 households. Attrition rates cannot be estimated directly from the dataset because the survey allows for replacement

of non-response households. However, comparing the sample size from the design (50 percent rotating panel) with actual panel size (from matched households) indicates relatively low attrition rates of 7 percent in 2004-6 and 10.2 percent in 2006–08. It is not possible to identify attrited households, however comparison between the panel and full sample in baseline year indicates that the panel is slightly less urban and less likely to be in the two richest regions, but differences are small. This suggests that the panel attrition in the VHLSS is not problematic for this analysis.

### *Health shocks*

Impact of health shocks is strongly affected by the variables used to identify them. (Gertler and Gruber 2002) detailed three important aspects of health shocks to be used in studies of vulnerability. First, the shock should be major, and not simply minor illness. Second, the construct validity of the health shock variable requires that assessment of health shock be the same across units in the sample and not subject to cultural conditioning that is likely to be found in self-assessment of health (Schultz and Tansel 1997). Third, the variables should represent unanticipated changes in health that have occurred after measurement of household welfare variables in the baseline, to fully capture changes resulting from the shock when comparing follow-up to baseline rounds of the survey.

In this study, three measures of health shock are identified. The first is adult illness, defined as the household reporting that one or more adult (age 15 to 60) household members were bedridden due to illness for 14 or more days in the 12 months before the follow-up round of the panel. The duration of illness and explicit criteria about severity of illness help to ensure that this is a more comparable measure across survey units than general self-reported illness (Islam and Maitra 2012), and taking a threshold of 2 weeks of bedridden illness addresses the issue of avoiding minor illness in the health shock variable. To exclude non-shock health events for which households are likely to have already adjusted incomes and consumption levels, cases bedridden all year, and cases reporting similar illness in the baseline year of the panel were not included. Information on the health insurance status of the

ill person at the time of illness was used to distinguish between insured and uninsured illness in order to estimate impact of health insurance. Potential biases of this approach will be discussed below. Overall 4.6 percent of households reported adult health shocks, of which 2.6 percent were insured and 2.0 per cent were not insured at the time of illness.

Two other severe health shock variables are used in the analysis –death to adult and onset of disability. Death to an adult (age 15 to 60) household member is identified in the questions in the follow-up round of the panel asking about why former household members of the panel are no longer in the household. Overall only 1.6 percent of households faced death of working age adults in the period between the two rounds of the survey. There may be some biases if attrition of households in the panel is related to the death that leads to dissolution of a household, although this is more likely in the case of a household consisting of only elderly people. Onset of disability is obtained only from the 2006 round of the survey where a special disability module was administered. Disability questions are asked with respect to sight, hearing, memory and concentration, walking and climbing stairs, self-care and understanding and making oneself understood. Only cases reporting inability or severe difficulty are included, and only cases reporting onset in the 24 months prior to the 2006 round of the survey are included. Overall, 1.7 percent of households faced onset of disability in the 2 years prior to the follow-up round of the survey.

The precise timing of health shocks is not known. Because health shocks identified in this data are quite rare events, the two panel datasets are stacked for illness and death, so the panel baseline year of the two panels are pooled, and similarly for the panel follow-up round yielding sample size of 8400 for illness and death, and 4276 for disability (only available in 2004-06).

### *Outcomes*

The outcome variables in this study focus on channels for health shock to affect consumption and coping mechanisms. The first channel is through reduced labor time and consequently reduced incomes resulting from health shocks. Household labor supply is measured by annual household work days.[1] Household income variables include earned income and subcategories of wage income, farm income and non-farm self-employment income. No measures of labor productivity were available to assess changes in productivity, which can also result from health shocks.

The second channel for health shocks to affect household consumption is through increased out-of-pocket health spending (and funeral costs in case of death), that can reduce funds available for other consumption needs. Household out-of-pocket health spending data were collected with separate questions on inpatient and outpatient use for each family member and an overall cost of self-medication and purchase of medical devices of the household. The questions ask specifically to include amounts paid by the household for hospital and doctor fees, drugs, gifts to practitioners, transport, devices, supplementary medication and hired caregivers, and excludes payments paid directly by health insurance. Household funeral spending is the annual amount spent on the household's death-related ceremonies and offerings including funerals, but also annual anniversary of death repasts and regular offerings. The non-medical/non-funeral expenditures include food and non-food spending. These items include cash outlays and value of home production, but exclude durable goods and housing values.

The unit of analysis is the household and both consumption and income are expressed in per capita terms, while labor supply is normalized by household size. Both consumption and incomes have been deflated to January 2006 national prices through use of monthly and regional price indices

[1] Alternative variables, including number of household members employed, total jobs held by household members and annual work hours, were also analyzed and results were very similar to annual work days.

calculated as part of the survey, and using the General Statistics Office CPI to adjust prices across rounds of the survey (General Statistics Office 2013). Summary statistics are reported in Table 1.

**Table 1: Descriptive statistics of health shocks and outcome variables**

| | Panel baseline | | Panel follow-up | | |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | n |
| **Health shocks** | | | | | |
| Adult illness not insured (=1) | 0 | 0 | 0.020 | 0.142 | 8400 |
| Adult illness insured (=1) | 0 | 0 | 0.026 | 0.165 | 8400 |
| Adult illness (=1) | 0 | 0 | 0.046 | 0.209 | 8400 |
| Adult death (=1) | 0 | 0 | 0.016 | 0.126 | 8400 |
| Disability onset (=1) | 0 | 0 | 0.017 | 0.130 | 4276 |
| **Impacts** | | | | | |
| Annual hh work days | 165 | 82 | 163 | 82 | 8400 |
| Real PC earned income ('000 VND) | 6026 | 6284 | 6056 | 9317 | 8400 |
| Real PC wage income ('000 VND) | 2258 | 3753 | 2572 | 4271 | 8400 |
| Real PC farm income ('000 VND) | 2259 | 4534 | 1704 | 6449 | 8383 |
| Real PC non-farm income ('000 VND) | 1516 | 3952 | 1785 | 6080 | 8399 |
| Real PC health expenditures ('000 VND) | 363 | 1035 | 371 | 1070 | 8400 |
| Real PC funeral expenditures ('000 VND) | 152 | 673 | 181 | 1200 | 8400 |
| Real PC non-medical expenditures ('000 VND) | 4530 | 3322 | 5142 | 4058 | 8398 |
| Real per capita food expenditures ('000 VND) | 2350 | 1275 | 2574 | 1378 | 8400 |
| Real per capita non-food, non-medical expenditures ('000 VND) | 2180 | 2356 | 2568 | 3135 | 8398 |

Note: All monetary values in January 2006 prices, per capita terms.

## *Coping mechanisms*

In the face of threats to welfare due to health shocks, a wide range of coping mechanisms have been identified in the literature, many of which can be proxied using information in the VHLSS. Summary statistics on these variables are presented in Table 2. Unearned income includes asset incomes like interest and rent, but also a range of different transfers including formal transfers: social security (pensions, but also death and disability benefits), social assistance programs, insurance (not including health insurance reimbursements to the household) and charity. Informal transfers covered include remittances from non-members of the household from overseas or Vietnam. In addition a variable is included in the survey asking about any funds given to the household for sick members. This includes a confounded mix of household estimates of health insurance reimbursements to

facilities for care received by sick family members and various transfers from family and friends. Household self-reported dissavings (withdrawal from savings, ROSCA, sales of stocks, jewelry and gold) and sales of assets (productive and consumer durables including livestock, machinery, dwelling, land) are also reported by households. Finally, household borrowing information was used to create three variables indicating any loan, loan from relatives and loan at high interest (>15 percent p.a.). Dissaving by taking from existing cash at home is not fully captured in these variables, even though there is evidence that this is a main source to pay for health shocks (Wainwright and Newman 2011). Unearned income from assets and transfers are also adjusted to January 2006 prices and per capita terms. The other coping variables are in the form of dummy variables indicating presence or absence of the source of transfer, debt or dissavings.

**Table 2: Summary statistics on coping mechanisms**

| | Panel baseline | | Panel follow-up | | |
|---|---|---|---|---|---|
| | **Mean** | **SD** | **Mean** | **SD** | **n** |
| **Value** | | | | | |
| Real PC unearned income ('000 VND) | 1766 | 4513 | 1864 | 4451 | 8400 |
| Real PC asset income ('000 VND) | 145 | 1195 | 142 | 1309 | 8400 |
| Real PC transfer income ('000 VND) | 1621 | 4270 | 1722 | 4175 | 8400 |
| **Use of coping mechanism** | | | | | |
| Social insurance benefits (=1) | 0.097 | 0.296 | 0.102 | 0.303 | 8400 |
| Social assistance benefits (=1) | 0.094 | 0.292 | 0.091 | 0.288 | 8400 |
| Other formal insurance *(not including health insurance) (=1)* | 0.009 | 0.097 | 0.006 | 0.076 | 8400 |
| Charity (=1) | 0.044 | 0.206 | 0.048 | 0.213 | 8400 |
| Remittances from relatives (=1) | 0.874 | 0.332 | 0.886 | 0.318 | 8400 |
| Amount received for sick household members (includes estimate of health insurance reimbursement) (=1) | 0.366 | 0.482 | 0.403 | 0.490 | 8400 |
| Any loans (=1) | 0.454 | 0.498 | 0.419 | 0.493 | 8400 |
| Loan from family (=1) | 0.129 | 0.335 | 0.107 | 0.309 | 8400 |
| Other loans (=1) | 0.364 | 0.481 | 0.348 | 0.476 | 8400 |
| High interest loan (>15 percent p.a.) (=1) | 0.083 | 0.275 | 0.116 | 0.320 | 8400 |
| Reported dissavings (=1) | 0.128 | 0.335 | 0.111 | 0.314 | 8400 |
| Reported sale of assets (=1) | 0.075 | 0.264 | 0.069 | 0.253 | 8400 |

Note: All monetary values in January 2006 prices, per capita terms.

### *Confounding variables*

Time variant explanatory variables that could be correlated with outcome variables with health shocks and insurance coverage have also been obtained from the dataset to serve as controls in the fixed effects regression including other shocks, household age-sex structure, and socio-economic variables. Households who self-reported no improvement in living standards compared to 5 years before the survey, were asked about the reasons, with possible responses including natural disaster or production risk, other disaster, funeral or illness. Households could have more than one category. In the analysis of sickness and disability all but the illness shock are included, while in the analysis of death, all but the funeral variable are included. Household age-sex structure variables are compiled from the household roster and include household size and number of members in different age/sex groups in order to capture changes in household composition resulting from births, marriages, in- and out-migration. Socio-economic variables include the number of members in accident prone occupations,[2] farming[3] and formal sector employment,[4] the number of working aged people (15–60 years) with primary or lower education and lagged poverty status.[5]. Urban/rural residence was interacted with the survey year to allow for changes in urban/rural effects over time. Summary statistics are reported in Table 3.

**Table 3: Summary statistics on other covariates**

| | Panel baseline | | Panel follow-up | | |
|---|---|---|---|---|---|
| Covariates | **Mean** | **SD** | **Mean** | **SD** | **n** |
| Urban =1 | 0.236 | 0.425 | 0.243 | 0.429 | 8400 |
| Natural disaster/ production risk (=1) | 0.024 | 0.154 | 0.026 | 0.159 | 8400 |
| Funeral (=1) | 0.007 | 0.084 | 0.009 | 0.095 | 8400 |
| Other disaster (=1) | 0.064 | 0.244 | 0.069 | 0.254 | 8400 |

[2] Main job occupation is skilled worker in mining, construction, metallurgy, machinist, machine assembly worker, driver, simple labor in mining, construction, industry or transport, military.
[3] Simple labor in farming
[4] Salaried workers working 180 or more days per year in Government, state owned enterprise, collective enterprise, private enterprise or foreign invested enterprise.
[5] Officially assessed poverty status of the household in the year prior to the reference period of the survey in each round

| Covariates | Panel baseline | | Panel follow-up | | n |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Self-reported illness shock (=1) | 0.070 | 0.256 | 0.062 | 0.241 | 8400 |
| Household size | 4.326 | 1.691 | 4.234 | 1.699 | 8400 |
| HH members aged <6 | 0.320 | 0.590 | 0.307 | 0.581 | 8400 |
| HH members aged 6-14 | 0.815 | 0.940 | 0.698 | 0.879 | 8400 |
| HH members aged 15-24 | 0.920 | 1.058 | 0.919 | 1.052 | 8400 |
| HH members aged 25-34 | 0.561 | 0.816 | 0.518 | 0.797 | 8400 |
| HH members aged 35-44 | 0.637 | 0.816 | 0.629 | 0.819 | 8400 |
| HH members aged 45-60 | 0.686 | 0.845 | 0.753 | 0.860 | 8400 |
| Male HH members aged 60+ | 0.159 | 0.368 | 0.165 | 0.374 | 8400 |
| Female HH members aged 60+ | 0.229 | 0.429 | 0.245 | 0.439 | 8400 |
| HH members with risky job | 0.372 | 0.693 | 0.373 | 0.701 | 8400 |
| HH members in farming | 1.418 | 1.426 | 1.310 | 1.399 | 8400 |
| HH members with formal wage job | 0.349 | 0.695 | 0.360 | 0.727 | 8400 |
| HH members with primary or lower education | 1.247 | 1.361 | 1.174 | 1.320 | 8400 |
| Lagged poverty (=1) | 0.114 | 0.318 | 0.136 | 0.343 | 8400 |

# 5. Econometric specification

Analysis of the impact of health shocks generally suffers from endogeneity, in which the health shock would actually be proxying some other omitted household characteristic that is the real cause of variation in household welfare. Fixed effects regression uses households to serve as their own controls, thus eliminating the influence of observable and unobservable differences between households in factors that don't vary over time, for example propensity to report an illness or latent health status. Time variant factors that differ across households and are correlated with health shocks and outcome variables can be controlled for through careful selection of covariates, as described in the data section above.

Fixed effects Poisson models with bootstrapped standard errors were used to assess the impact of ill health on labor supply, earned income, health expenditures and consumption, as well as coping through adjustment to household asset holdings and unearned income. Poisson regression is

appropriate in the case of non-negative and highly skewed dependent variables (Allison 2009) such as consumption and income. While log transformation of the dependent variable in a linear fixed effects model is a common approach to deal with the skewed dependent variable, a modified Wald test of the fixed effects log-linear model with our data indicates heteroskedasticity, which Silva and Tenreyro (2006) showed leads to inconsistency in log-linearized model estimates. With Poisson regression, Gourieroux, Monfort et al. (1984) have shown that when pseudo-maximum-likelihood estimation is used, all that is needed for the estimator to be consistent is correct specification of the conditional mean. It is not necessary that the $y_i$ be integers, nor that the data follow a Poisson distribution.

In the econometric specification of the models $y_{it}$ represents the outcomes (e.g. consumption or income) of household i at time t. The conditional mean in a fixed effects Poisson model can be expressed as:

$$E(y_{it}| h_{it}; x_{it}; \alpha_i) = \exp(\mu_t + \gamma h_{it} + x_{it}\beta + \alpha_i)$$

The health shock affecting household *i* at time *t* is represented by $h_{it}$. The model includes a time varying intercept ($\mu_t$) to measure time trends in consumption or income, observable time varying household factors ($x_{it}$) that influence outcomes and household fixed effects ($\alpha_i$) representing time invariant factors specific to households that influence their income and consumption outcomes.

Poisson models are prone to problems of underestimated standard errors due to overdispersion, in which variation in the dependent variable is more than expected with the Poisson distribution (Allison 2009). To deal with this problem, standard errors are estimated using the bootstrap method with 150 repetitions.

A linear probability model with household fixed effects was used to estimate the probability of a household using a particular coping mechanism in the face of different shocks and controlling for

other time varying factors. While the linear probability model has the drawback that estimated coefficients can predict probabilities outside of the unit interval, the main alternative – conditional logit models with fixed effects – suffers from severe loss of sample size because it uses only the observations for which the dependent variable varies over time. Conditional logits were run to test for sensitivity to the model and results were quite similar.

# 6. Results

### *Overall effects*

Results are presented in Table 4 in the form of coefficients of the health shock variables for the different welfare outcomes studied using multivariate Poisson regressions with household fixed effects and controlling for confounding factors found in Table 3 above. Results indicate that households faced with illness in a working age adult with health insurance significantly reduce household labor days worked in the past year, as did households faced with new onset of disability. Yet reduction in labor supply seemed to have no effect on earned income, whether from wage work, farming or non-farm self-employment. In the case of adult death, while there was no significant change in labor supply as a result of the death, wage income actually increased. This may result from household labor being engaged in self-employment work that complemented terminal patient care before the death, now being freed to participate in the wage labor market.

Health shocks had significant effects increasing out-of-pocket health spending in the case of illness and disability. In the case of death the dataset does not fully capture out-of-pocket spending of the dead person right before the death because the follow-up survey only asked about health care costs of members still living in the household. The impact on health spending was lower for households with health insurance than those without insurance in the case of major illness of adult household members. This suggests that insurance is partially mitigating the drain on the household budget to pay

for medical care in the face of health shocks and provides important evidence of benefits of health insurance. In the case of death, the costs of a funeral and other death rites rose considerably more than the decline in health spending occurring with the death.

Household consumption, food and non-food spending per capita were largely smoothed across all three types of health shocks. In fact, adult deaths led to increases in household non-food spending (for death shocks it is defined as consumption. items other than food, medical care and funeral and death rite costs).

**Table 4. Coefficients on health shock in Poisson models with household fixed effects to estimate impact on household labor, income, health spending, consumption and unearned income**

| | **Adult illness not insured** | | **Adult illness insured** | | **Adult death** | | **Onset of disability** | |
|---|---|---|---|---|---|---|---|---|
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| Annual work days | -0.060 | 0.037 | **-0.077**** | **0.030** | 0.012 | 0.039 | **-0.119*** | **0.062** |
| Earned income | 0.067 | 0.074 | -0.075 | 0.066 | 0.119 | 0.088 | 0.037 | 0.068 |
| Wage income | 0.060 | 0.078 | -0.020 | 0.054 | **0.190**** | **0.080** | 0.042 | 0.148 |
| Farm income | 0.012 | 0.138 | -0.111 | 0.120 | 0.178 | 0.138 | -0.053 | 0.098 |
| Self-employed non-farm income | 0.098 | 0.200 | -0.283 | 0.277 | 0.076 | 0.198 | 0.211 | 0.246 |
| Out-of-pocket health spending | **1.234***** | **0.171** | **0.782***** | **0.151** | **-0.821**** | **0.358** | **0.832***** | **0.300** |
| Funeral spending | | | | | **2.215***** | **0.230** | | |
| Non-medical consumption | 0.000 | 0.039 | 0.046 | 0.031 | 0.085 | 0.059 | -0.045 | 0.057 |
| Food spending | -0.006 | 0.029 | 0.008 | 0.027 | -0.008 | 0.041 | 0.002 | 0.039 |
| Non-food, non-medical spending (non-funeral) | 0.008 | 0.071 | 0.082* | 0.049 | **0.187*** | **0.102** | -0.108 | 0.100 |
| Unearned income | 0.160 | 0.182 | 0.105 | 0.117 | 0.055 | 0.182 | -0.227 | 0.159 |
| Asset income | 0.526 | 1.977 | 0.044 | 0.531 | 1.547 | 0.974 | -1.885 | 5.782 |
| Transfers | 0.115 | 0.207 | 0.127 | 0.103 | 0.042 | 0.176 | -0.187 | 0.156 |

Note: This table shows coefficients from Poisson models with household fixed effects. Covariates other than the health shocks are described in Table 3. Total sample size of the balanced panel is 8400 for illness and death and 4276 for disability. *** p<0.01, ** p<0.05, * p<0.1

The results from Table 4 suggest that the main channel for health shocks to be transmitted to households was through health spending rather than through income reductions. The fact that households are able to maintain consumption levels in the face of increased health spending means

that there must be some other mechanisms for households to find resources to cover these costs. Coefficients on health shocks from the linear probability model with household fixed effects are presented in Table 5. They indicate surprisingly, that reported dissavings, either withdrawal of fungible assets or sales of producer and consumer durables, was generally not an important source of funds, except for the case of uninsured adult illness.

Formal transfers from social security, private insurance or charity were important sources of funds for uninsured adults with illness, while charity was important in the case of an adult death in the household. Interestingly social assistance was not found to be an important source of assistance in the face of health shocks, and social security was not an important source in the case of death or disability. Remittances from non-members of households did not prove to be an important source of funding to aid in dealing with any of the health shocks.

Assistance given to household members when ill was significant and positive in the face of illness shocks and onset of disability, and negative and significant in the case of death when health care costs are no longer being paid. This variable includes household estimates of the value of health insurance reimbursements to facilities for their care, but also may include informal remittances or other transfers to the household for the patient. In the case of illness without health insurance, it is likely to represent informal transfers to the household, while in the case of people with health insurance, it measures an imprecise estimate of the value of health insurance and other transfers to the household.

Borrowing was also found to be important, particularly in the case of death, ostensibly to cover funeral costs. In addition, borrowing from family seemed to replace borrowing from non-family members in the case of households with insured ill individuals.

**Table 5: Coefficients on health shocks in linear probability models with household fixed effects to predict coping mechanisms**

| | Adult illness not insured | | Adult illness insured | | Adult death | | Onset of disability | |
|---|---|---|---|---|---|---|---|---|
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| **Transfers** | | | | | | | | |
| Social insurance benefits | **0.032**** | **0.016** | 0.001 | 0.017 | 0.012 | 0.020 | 0.006 | 0.014 |
| Social assistance | -0.001 | 0.023 | 0.012 | 0.028 | -0.035 | 0.028 | -0.000 | 0.047 |
| Insurance payments | **0.022**** | **0.010** | -0.014 | 0.009 | -0.008 | 0.011 | 0.002 | 0.002 |
| Charity | -0.024 | 0.019 | -0.034 | 0.021 | **0.064**** | **0.027** | 0.024 | 0.027 |
| Remittances from household non-members | -0.009 | 0.033 | -0.012 | 0.027 | -0.005 | 0.031 | -0.011 | 0.028 |
| Assistance given to hh for sick/injured member | **0.280***** | **0.048** | **0.324***** | **0.040** | **-0.128**** | **0.052** | **0.162**** | **0.073** |
| **Debt** | | | | | | | | |
| Any loans | 0.013 | 0.049 | -0.002 | 0.036 | **0.097*** | **0.052** | -0.025 | 0.060 |
| Loan from family | 0.013 | 0.040 | **0.080**** | **0.033** | 0.051 | 0.036 | -0.059 | 0.049 |
| Loan from other source | 0.004 | 0.048 | **-0.066*** | **0.038** | 0.047 | 0.053 | 0.001 | 0.064 |
| Loan at high interest (>15 percent p.a.) | 0.008 | 0.030 | 0.012 | 0.023 | 0.047 | 0.036 | 0.037 | 0.044 |
| **Asset sales** | | | | | | | | |
| Reported dissaving | **0.061*** | **0.034** | -0.021 | 0.031 | -0.014 | 0.040 | 0.035 | 0.041 |
| Reported asset sales | -0.016 | 0.030 | 0.015 | 0.026 | -0.044 | 0.032 | 0.054 | 0.038 |

Note: This table shows coefficients from linear probability models with household fixed effects. Covariates other than the health shocks are described in Table 3. Total sample size of the balanced panel is 8400 for illness and death and 4276 for disability. *** p<0.01, ** p<0.05, * p<0.1

## *Differential effects between the poor and non-poor*

Estimates of differential impact between the lowest two quintiles and the top three quintiles (assessed in the baseline year of the panel) are obtained from analysis of each of the subsamples using the same models as the overall analysis (Table 6). Observed decline in annual work days as a result of illness among insured adults was only significant among the non-poor, while decreased labor supply resulting from onset of disability was only significant among the poor. Overall unearned income is not affected by health shocks for either the poor or the better off. The increase in wage income resulting from adult death is only significant for the non-poor. Disaggregated analysis revealed, however that among the poor self-employed non-farm income was negatively affected by illness to uninsured adult

and onset of disability, but positively affected by the death of an adult in the household. This reflects substantial adjustments to household labor force activities as a result of health shocks, without negatively affecting overall incomes.

The patterns of the effects of health shocks on health spending and funeral spending for the poor and non-poor groups are similar to the results in the overall sample although the coefficients indicate that the poor suffered higher relative increases in health spending than the non-poor.

Both the poor and non-poor were equally able to insure consumption against all 3 health shocks, and actually overcompensate by increasing non-food spending in the case of death for the non-poor and in the case of insured adult illness among the poor.

Unearned incomes did not increase among the non-poor, but among the poor facing the death of a working age member, this source of funds appeared to partially cover the increase in spending for the funeral rites.

**Table 6. Health shock impact on household labor, income, health spending and consumption by living standards group**

| | **Severe illness no insurance** | | **Severe illness insured** | | **Adult death** | | **Onset of disability** | |
|---|---|---|---|---|---|---|---|---|
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| **Poorest 40 percent** | | | | | | | | |
| Annual work days | -0.085 | 0.053 | -0.070 | 0.046 | 0.045 | 0.056 | **-0.193*** ** | **0.059** |
| Earned income | 0.062 | 0.071 | 0.005 | 0.065 | 0.084 | 0.090 | -0.085 | 0.079 |
| -Wage income | 0.184 | 0.135 | 0.103 | 0.127 | 0.070 | 0.136 | 0.230 | 0.260 |
| -Farm income | 0.078 | 0.135 | -0.101 | 0.091 | 0.051 | 0.133 | -0.050 | 0.145 |
| -Self-employed non-farm income | **-0.498**** | **0.214** | 0.167 | 0.173 | **0.387*** | **0.200** | **-0.749**** | **0.327** |
| Out-of-pocket health spending | **1.495***** | **0.215** | **1.139***** | **0.273** | **-0.758***** | **0.242** | **0.883**** | **0.439** |
| Funeral spending | | | | | **2.361***** | **0.458** | | |
| Non-medical consumption | 0.048 | 0.041 | 0.069 | 0.054 | -0.005 | 0.062 | -0.058 | 0.059 |
| -Food spending | 0.050 | 0.040 | -0.035 | 0.036 | 0.026 | 0.039 | -0.079 | 0.051 |

| | Severe illness no insurance | | Severe illness insured | | Adult death | | Onset of disability | |
|---|---|---|---|---|---|---|---|---|
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| -Non-food, non-medical spending | 0.042 | 0.062 | **0.203**** | **0.095** | -0.054 | 0.137 | -0.025 | 0.122 |
| Unearned income | 0.143 | 0.237 | 0.212 | 0.157 | **0.432**** | **0.213** | -0.351 | 0.258 |
| -Asset income | .. | .. | .. | .. | .. | .. | .. | .. |
| -Transfers | 0.127 | 0.250 | 0.213 | 0.163 | 0.397* | 0.204 | -0.240 | 0.232 |
| **Non-poor 60 percent** | | | | | | | | |
| Annual work days | -0.037 | 0.048 | **-0.077*** | **0.042** | -0.013 | 0.045 | -0.060 | 0.109 |
| Earned income | 0.057 | 0.104 | -0.103 | 0.086 | 0.116 | 0.104 | 0.070 | 0.104 |
| -Wage income | -0.028 | 0.091 | -0.045 | 0.063 | **0.204**** | **0.089** | -0.058 | 0.189 |
| -Farm income | -0.039 | 0.180 | -0.127 | 0.200 | 0.211 | 0.217 | -0.049 | 0.169 |
| -Self-employed non-farm income | 0.275 | 0.233 | -0.363 | 0.308 | 0.018 | 0.240 | 0.637 | 0.395 |
| Out-of-pocket health spending | **1.138***** | **0.213** | **0.630***** | **0.165** | **-0.772*** | **0.408** | **0.693*** | **0.384** |
| Funeral spending | | | | | **2.038***** | **0.332** | | |
| Non-medical consumption | -0.042 | 0.057 | 0.026 | 0.043 | 0.095 | 0.072 | -0.056 | 0.074 |
| -Food spending | -0.051 | 0.039 | 0.013 | 0.039 | -0.041 | 0.057 | 0.027 | 0.055 |
| -Non-food, non-medical spending | -0.032 | 0.105 | 0.036 | 0.069 | **0.224*** | **0.120** | -0.164 | 0.135 |
| Unearned income | 0.146 | 0.209 | 0.034 | 0.113 | -0.076 | 0.246 | -0.264 | 0.181 |
| -Asset income | 0.451 | 1.050 | -0.009 | 2.001 | 1.359 | 3.817 | -1.805 | 7.346 |
| -Transfers | 0.086 | 0.234 | 0.060 | 0.111 | -0.078 | 0.233 | -0.231 | 0.183 |

Note: This table shows coefficients from Poisson models with household fixed effects. Covariates other than the health shocks are described in Table 3. Total sample size of the balanced panel for illness and death estimates among the poor is 3313 and among the non-poor is 5087. For disability sample size is 1692 for the poor and 2584 for the non-poor. *** p<0.01, ** p<0.05, * p<0.1

Analysis of coping mechanisms found in Table 7 reveals that the poor faced with a health shock did not rely on formal transfers from social insurance, social assistance or insurance, but did receive some assistance from charity in the case of the death of a working age household member. Remittances from non-household members actually fell in the case of insured sickness and disability in poor households. Among the non-poor there is some evidence of a decline in social insurance transfers in the case of onset of disability, and an increase in insurance receipts in the case of illness among uninsured adult. For both the poor and non-poor, households reported an increase in assistance given to household for sick member in the case of illness whether insured or not. Among the poor,

however, no assistance was given in the case of disability onset, while among the non-poor this was found to increase.

Borrowing for funerals was found in both the poor and non-poor households, although among the poor loans were primarily from family, while among the non-poor there was no significance in the source of the loans, only a significant increase in high interest loans. For illness and disability shocks, non-poor households did not resort to borrowing, but poor households were found to decrease market-based borrowing and increase borrowing from family.

Dissavings and sales of assets reported by households did not appear to be an important coping mechanism for the poor and for the non-poor dissavings was only important in the case of illness shock among uninsured adults.

**Table 7: Health shocks and coping mechanisms by living standards group**

| | **Adult illness no insurance** | | **Adult illness insured** | | **Adult death** | | **Onset of disability** | |
|---|---|---|---|---|---|---|---|---|
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| **Poorest 40 percent** | | | | | | | | |
| **Transfer income** | | | | | | | | |
| Social insurance benefits | 0.021 | 0.014 | -0.009 | 0.021 | -0.008 | 0.030 | 0.030 | 0.025 |
| Social assistance | -0.001 | 0.036 | 0.059 | 0.047 | -0.041 | 0.057 | -0.017 | 0.070 |
| Insurance payments | 0.001 | 0.002 | -0.020 | 0.013 | -0.017 | 0.018 | -0.005 | 0.004 |
| Charity | -0.017 | 0.031 | -0.042 | 0.036 | **0.147**** | **0.059** | 0.061 | 0.043 |
| Remittances from household non-members | -0.013 | 0.046 | **-0.077*** | **0.043** | 0.020 | 0.055 | **-0.061*** | **0.034** |
| Assistance given to hh for sick/injured member | **0.337***** | **0.069** | **0.294***** | **0.063** | -0.110 | 0.079 | 0.130 | 0.104 |
| **Debt** | | | | | | | | |
| Any loans | 0.039 | 0.077 | -0.013 | 0.052 | 0.083 | 0.086 | -0.133 | 0.095 |
| Loan from family | 0.064 | 0.061 | **0.152***** | **0.052** | **0.133**** | **0.068** | -0.081 | 0.066 |
| Loan from other source | -0.017 | 0.073 | **-0.148***** | **0.055** | -0.009 | 0.087 | -0.089 | 0.099 |
| Loan at high interest (>15 percent p.a.) | 0.042 | 0.048 | 0.006 | 0.033 | -0.009 | 0.044 | -0.027 | 0.055 |
| **Asset sales** | | | | | | | | |

| | Adult illness no insurance | | Adult illness insured | | Adult death | | Onset of disability | |
|---|---|---|---|---|---|---|---|---|
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| Reported dissaving | 0.009 | 0.051 | 0.037 | 0.039 | -0.042 | 0.033 | 0.032 | 0.040 |
| Reported asset sales | -0.034 | 0.040 | 0.023 | 0.027 | -0.070 | 0.053 | 0.029 | 0.040 |
| **Non-poor 60 percent** | | | | | | | | |
| **Transfer income** | | | | | | | | |
| Social insurance benefits | 0.042 | 0.026 | 0.012 | 0.026 | 0.028 | 0.027 | **-0.016*** | **0.009** |
| Social assistance | -0.001 | 0.030 | -0.026 | 0.033 | -0.032 | 0.024 | 0.014 | 0.061 |
| Insurance payments | **0.037**** | **0.018** | -0.009 | 0.011 | -0.003 | 0.013 | 0.004 | 0.004 |
| Charity | -0.029 | 0.023 | -0.028 | 0.024 | 0.001 | 0.006 | -0.021 | 0.029 |
| Remittances from household non--members | -0.011 | 0.045 | 0.033 | 0.035 | -0.037 | 0.034 | 0.018 | 0.050 |
| Assistance given to hh for sick/injured member | **0.227***** | **0.065** | **0.345***** | **0.052** | **-0.157**** | **0.069** | **0.171*** | **0.103** |
| **Debt** | | | | | | | | |
| Any loans | -0.007 | 0.064 | 0.008 | 0.050 | **0.116*** | **0.064** | 0.060 | 0.073 |
| Loan from family | -0.027 | 0.052 | 0.019 | 0.041 | -0.010 | 0.036 | -0.061 | 0.074 |
| Loan from other source | 0.018 | 0.063 | 0.005 | 0.051 | 0.098 | 0.067 | 0.075 | 0.080 |
| Loan at high interest (>15 percent p.a.) | -0.015 | 0.039 | 0.024 | 0.033 | **0.101*** | **0.054** | 0.093 | 0.069 |
| **Reliance on assets** | | | | | | | | |
| Reported dissaving | **0.096**** | **0.045** | -0.070 | 0.047 | 0.007 | 0.067 | 0.020 | 0.074 |
| Reported asset sales | 0.002 | 0.043 | 0.010 | 0.042 | -0.020 | 0.040 | 0.076 | 0.067 |

Note: This table shows coefficients from linear probability models with household fixed effects. Covariates other than the health shocks are described in Table 3. Total sample size of the balanced panel for illness and death estimates among the poor is 3313 and among the non-poor is 5087. For disability sample size is 1692 for the poor and 2584 for the non-poor. *** p<0.01, ** p<0.05, * p<0.1

# 7. Discussion

For the poor, reductions in labor supply and non-farm self-employment income combined with increased health spending and funeral costs were both important **channels transmitting health shocks to household welfare**, while for the non-poor, only increased out-of-pocket health spending and funeral costs were found to be important. For both, the health shock related to the death of a working age household appeared to relieve stress on the household by increasing incomes, reducing number of consumers in the household, but funeral costs were burdensome and it is likely that the health costs of the dead person were not fully captured in the survey. Recent research indicates that

high health spending is concentrated in the last years of life (Raitano 2006), so it is likely we are underestimating the effect of death on health spending. These results are generally consistent with results of health shocks in Vietnam in the 1990s (Wagstaff 2007), except that in the current study the death led to a significant reduction in health spending, while in the earlier study no significant change in household health spending was observed.

**The reductions in household labor supply** induced by health shocks surprisingly had little impact on incomes. This may be due to compensating increases in labor supply of other household members, changes in productivity, or the hiring of additional laborers to maintain income generating activities (Mark M Pitt and Mark R Rosenzweig April 1984). The fact that the death of a household member leads to increased wage income among better off households, while onset of disability leads to a reduction in household incomes from self-employment non-farm activities suggests substantial rearrangement of labor supply and employment activities in response to health shocks that may require greater allocation of time to caregiving. Morduch (1995) argued that households can smooth incomes through their choice of safer production technologies, however they pay a price in lower profits for lower risks.

Despite adverse impacts on income and health spending, households, both poor and non-poor, were able to **effectively insure per capita consumption** in the face of all three types of health shocks, with no significant declines in per capita food or non-food consumption, and even offsetting increases in per capita non-food consumption in relation to some shocks. Full consumption smoothing has been found in other studies as well, but as (Genoni 2012) noted, the consumption effects may be hiding substantial heterogeneity that could be revealed with different disaggregations, for instance the greater ability of rural households to smooth consumption than urban (Wagstaff 2007).

**Health insurance coverage** for working age adults faced with severe illness appears to have played some role in keeping out-of-pocket health spending increases lower than for individuals facing illness shocks without insurance. The variable encompassing assistance (both health insurance and informal transfers) to households with an ill individual increased more for the uninsured ill than for the insured ill among the poor, suggesting that some informal insurance mechanisms in the community is substituting to some extent for the absence of health insurance coverage for many poorer households. Despite these positive findings, household out-of-pocket spending burden even on the insured remains high for both the poorest two quintiles and the better off three quintiles. These results are also consistent with (Wagstaff 2007) and (Sepehri, Sarma et al. 2006) who both found some reductions in health spending among the insured compared to uninsured, but continued high out-of-pocket spending even among the insured.

Death of a household member entails a **substantial ritual and ceremonial burden** for the costs of the funeral and burial, but Vietnamese tradition also calls for a number of gatherings and repasts throughout the first year of death, an annual remembrance meal on the anniversary of death and continuous maintenance of a family author for all ancestors. Households suffering from the death of a working age household member experienced a dramatic jump in funeral and death rites costs compared to the baseline year when these costs are likely to have been related only to maintenance of a family altar. These costs are only high for a fixed and certain period of time, unlike medical treatment costs. For formal sector workers contributing to social security, part of the benefits includes a lump sum for funeral benefits, but results did not indicate any increase in social insurance benefits in the face of a death to working age household member, which may be due to long delays in the distribution of these benefits, or the small amounts received.

Risk management through **cross-household risk sharing arrangements** other than social health insurance is hardly evident in the results. In the case of death, charity from organizations,

humanitarian groups, associations and production units was found to be a statistically significant source of support, but only among poor. Results actually indicated that households faced with illness (among insured) and disability shocks experienced reductions in the real value of remittances received from non-members of the household. This is surprising given other reports of the importance of informal assistance in the literature (Dang 2011). It is likely that the formal response categories in the survey were inadequate to cover the full range of transfers, for example the in-kind value of gifts from neighbors is unlikely to be reported as a remittance, and the effort to estimate health insurance reimbursements for insured family members is likely to lead to less emphasis on aiding respondents to recall a large number of informal transfers. Under-reporting of transfers appears to be problematic for households surveys in general, although survey methodology can be improved to better capture these items (Meyer, Mok et al. 2009).

The main health-shock coping strategy appears to **be inter-temporal risk management** through savings and borrowing. Reported dissaving was found to be a significant coping strategy only for uninsured illness, which is consistent with the story of precautionary savings that are likely to be higher among households without insurance (Hubbard, Skinner et al. 1994). But among the poor uninsured this was not significant. A 2006 survey focused on savings behavior in Vietnam found that about 54 percent of households reported saving (most in the form of cash, gold and jewelry kept at home), and 82 percent of the savers reported the motivation for savings being at least partially to cover medical care costs (Newman, Tarp et al. 2008). (Wainwright and Newman 2011) found depletion of liquid assets, with some mitigation by health insurance, to be the key coping mechanism to deal with health shocks. These differences in findings suggest that the VHLSS is a poor survey instrument to gather information on household savings, and results here are likely to be an underestimate of dissavings as a health-shock coping mechanism.

Borrowing, on the other hand, was found to be an important coping strategy for households facing illness of an insured individual or death of an adult household member. These national level results are consistent with the smaller sample results of Kemper, Klump et al. (2011) and Wainwright and Newman (2011). Substantial variation was found across living standards groups. The poor increased reliance on loans from family members in the case of illness (among insured) and death. However, among the households facing illness, the increase in likelihood of borrowing from family was matched with a reduction in likelihood of borrowing from other sources. Among the better off, deaths led to an increase in borrowing, particularly borrowing at high interest. No borrowing was found to deal with disability, which is inconsistent with findings by (Palmer, Nguyen et al. 2011), who found substantial borrowing to pay for medical care costs among the disabled. The present study looks at onset of disability, while Palmer looked at existing disability, so it is possible that the group identified as facing disability shock in this study are still largely reliant on not-yet depleted savings.

## *Policy implications*

Strengthening the degree of financial protection social insurance offers to the poor could help them avoid having to take loans to cover health care costs not covered by insurance.

Alternatives to expanding health insurance to the informal sector can be considered, including increasing ease and security of savings and borrowing.

Assistance to help in the case of death to working age household members needs to be considered, primarily to deal with high funeral costs, for both poor and non-poor households, or find ways to reduce funeral cost burden through campaigns to encourage more modest funerals.

There is a need to review social insurance benefit processing to evaluate how payment of death and disability benefits could be improved, and expanded to the informal sector.

Attention needs to be focus on disability to encourage charities to assist families with disabled members, not only financially, but also in terms of caregiving to free up family time for income generation that is negatively affected by time spent in caregiving.

Data collection needs to be improved in the VHLSS in sections related to savings, dissavings, and transfers, in order to improve the ability to analyze their role in coping with shocks. Much can be learned from other surveys dedicated to the study of vulnerability in Vietnam (Dang 2011, Wainwright and Newman 2011).

## *Limitations*

While efforts were made to identify shocks occurring after the baseline, it is not possible to completely eliminate cases where the household anticipated the shock and changed behavior already in the baseline period. Only 15 percent of disability cases and 40 percent of adult deaths were preceded by 1 or more days bedridden due to illness in the baseline year of the panel. However, if the pre-shock outcome variables reflect household adjustments made in anticipation of the upcoming health shock, the coefficients would underestimate impact of the shock (Gertler and Gruber 2002, Donovan and Bailey 2006).

Variation in impact of health shocks in relation to the timing of the shock, and longer term impact on households cannot be examined with the data used in this study. While there appears to be consumption smoothing in the short-term, the longer term implications of indebtedness on household welfare, or impact of permanent disability requires further research.

Transfers to households are likely to be unreported leading to underestimates of the use of various coping mechanisms. In the US, (Meyer, Mok et al. 2009) found underreporting of transfers in household surveys, not only in dollar amounts received, but also whether or not they received transfers at all. They attributed underreporting to interviewee misremembering, forgetting, confusing

programs, or due to desire to reduce interview burden or avoid divulging sensitive income information, but noted that some survey designs were better at capturing transfers. It is likely that similar problems are present in the VHLSS questions asking about receipt of government programs, but also for similar reasons when asking about sales of assets and dissavings, estimating value of health insurance reimbursements paid directly to medical facilities, and even incomes.

The problems of reverse causality and time variant unobservable factors that simultaneously affect health events and outcome variables are not resolved with the fixed effects estimation strategy. There is potential for outcome estimates in the baseline to be low as a result of previous unobservable shocks. These lower levels of health spending (or consumption) may lead to inability to access health services, which causes further deterioration in health, and biased estimates of impact. The time varying covariates in the models include shocks considered by the household to have led to stagnant or declining living standards compared to 5 years previously,[6] thus eliminating a major potential cause of this econometric estimation problem. There may, however, be other unobservable factors that could lead to reverse causality that the analysis is unable to take into account.

[6] For example, in the death shock regressions, a variable from the dataset controls for serious illness leading to stagnation or decline in living standards in the survey year compared to 5 years previously.

# References

Alderman, H. and C. H. Paxson (1992). Do the poor insure?: a synthesis of the literature on risk and consumption in developing countries, World Bank-free PDF.

Allison, P. D. (2009). Fixed effects regression models. Thousand Oaks, Sage Publications, Inc.

Beegle, K., J. De Weerdt and S. Dercon (2008). "Adult mortality and consumption growth in the age of HIV/AIDS." Economic Development and Cultural Change **56**(2): 299-326.

Chapoto, A. and T. Jayne (2005). Impact of HIV/AIDS-related mortality on rural farm households in Zambia: implications for poverty reduction strategies. IUSSP Seminar on Interactions Between Poverty and HIV/AIDS, Cape Town, South Africa, December, document available at http://www. aec. msu. edu/agecon/fs2/zambia.

Dang, T. T. H. (2011). Poverty in Vietnam: the effects of shocks and sectoral growth patterns, University of Glasgow.

Deaton, A. (1992). Understanding consumption, Oxford University Press.

Donovan, C. and L. A. Bailey (2006). Chapter 6: Understanding Rwandan Agricultural Households' Strategies to Deal with Prime-Age Illness and Death: A Propensity Score Matching Approach. Highlights of the International Conference on HIV/AIDS and Food and Nutrition Security, . S. Gillespie. Durban, South Africa, April 14-16, 2005, Washington, D.C. International Food Policy Research Institute**:** 109-128.

Evans, M. and S. Harkness (2008). "Social protection in Vietnam and obstacles to progressivity." Asian Social Work and Policy Review **2**(1): 30-52.

Filmer, D. (2008). "Disability, poverty, and schooling in developing countries: results from 14 household surveys." The World Bank Economic Review **22**(1): 141-163.

General Statistics Office (2011). Result of the Vietnam Household Living Standards Survey 2010. Hanoi, Statistical Publishing House.

General Statistics Office. (2013). "Consumer Price Index month-on-month change." Retrieved 1/11/2013, from http://www.gso.gov.vn/default.aspx?tabid=393&idmid=3&ItemID=14531.

General Statistics Office (2013). Survey of Population Change and Family Planning, 1/4/2012- Main Results. Hanoi.

Genoni, M. E. (2012). "Health Shocks and Consumption Smoothing: Evidence from Indonesia." Economic Development and Cultural Change **60**(3): 475-506.

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

Gertler, P., D. I. Levine and E. Moretti (2009). "Do microfinance programs help families insure consumption against illness?" Health economics **18**(3): 257-273.

Gourieroux, C., A. Monfort and A. Trognon (1984). "Pseudo maximum likelihood methods: applications to Poisson models." Econometrica: Journal of the Econometric Society: 701-720.

Grimm, M. (2010). "Mortality Shocks and Survivors' Consumption Growth*." Oxford Bulletin of Economics and Statistics **72**(2): 146-171.

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

Hoang Van Minh, Nguyen Thi Kim Phuong and Priyanka Saksena (2012). Research Report : Assessment of Financial Protection in the Vietnam Health System: Analyses of Vietnam Living Standards Survey Data 2002-2010. Hanoi, World Health Organization in Vietnam and Hanoi Medical University.

Hubbard, R. G., J. Skinner and S. P. Zeldes (1994). "Expanding the Life-Cycle Model: Precautionary Saving and Public Policy." The American Economic Review **84**(2): 174-179.

Islam, A. and P. Maitra (2012). "Health shocks and consumption smoothing in rural households: Does microcredit have a role to play?" Journal of development economics **97**(2): 232-243.

Kemper, N., R. Klump, L. Menkhoff and O. Rungruxsirivorn (2011). Financial Shock-Coping in Rural Thailand and Vietnam. Vulnerability to Poverty: Theory, Measurement and Determinants. S. Klasen and H. Waibel. Basingstoke, Palgrave Macmillan**:** 258-282.

Lindelow, M. and A. Wagstaff (2005). "Health shocks in China: are the poor and uninsured less protected?" World Bank Policy Research Working Paper(3740).

Lundberg, M., M. Over and P. Mujinja (2000). "Sources of financial assistance for households suffering an adult death in Kagera, Tanzania." South African Journal of Economics **68**(5): 420-443.

Lundberg, M., M. Over and P. Mujinja (2003). "Do savings predict death? Precautionary savings during an epidemic." UNAIDS. Geneva. Processed.

Mark M Pitt and Mark R Rosenzweig (April 1984). "Agricultural prices, food consumption and the health and productivity of farmers." Bulletin of the Economic Development Center (University of Minnesota) **84-1**.

Meyer, B. D. and W. K. Mok (2013). Disability, earnings, income and consumption, National Bureau of Economic Research.

Meyer, B. D., W. K. Mok and J. X. Sullivan (2009). The under-reporting of transfers in household surveys: its nature and consequences, National Bureau of Economic Research.

Ministry of Health and World Health Organization (2011). National Health Account Implementation in Vietnam Period from 1998-2010. Hanoi, Statistical Publishing House.

Morduch, J. (1995). "Income smoothing and consumption smoothing." The journal of economic perspectives **9**(3): 103-114.

Morduch, J. (1999). "Between the state and the market: Can informal insurance patch the safety net?" The World Bank Research Observer **14**(2): 187-207.

Newman, C., F. Tarp, D. Broeck, T. Quang and D. Khai (2008). "Household Savings in Vietnam: Insights from a 2006 rural household survey." Vietnam economic management review **34**(1): 1-8.

Palmer, M., T. Nguyen, T. Neeman, H. Berry, T. Hull and D. Harley (2011). "Health care utilization, cost burden and coping strategies by disability status: an analysis of the Viet Nam National Health Survey." The International journal of health planning and management **26**(3): e151-e168.

Pham, T. T. T. and R. Lensink (2008). "Household Borrowing in Vietnam A Comparative Study of Default Risks of Formal, Informal and Semi–formal Credit." Journal of Emerging Market Finance **7**(3): 237-261.

Raitano, M. (2006). "The impact of death-related costs on health care expenditure: a survey." ENEPRI Research Reports(17).

Schultz, T. P. and A. Tansel (1997). "Wage and labor supply effects of illness in Cote d'Ivoire and Ghana: Instrumental variable estimates for days disabled." Journal of development economics **53**(2): 251-286.

Sepehri, A., S. Sarma and W. Simpson (2006). "Does non-profit health insurance reduce financial burden? Evidence from the Vietnam living standards survey panel." Health Economics **15**(6): 603-616.

Silva, J. S. and S. Tenreyro (2006). "The log of gravity." The Review of Economics and Statistics **88**(4): 641-658.

Sparrow, R., E. V. Poel, G. Hadiwidjaja, A. Yumna, N. Warda and A. Suryahadi (2013). "Coping with the economic consequences of ill health in indonesia." Health economics.

Wagstaff, A. (2007). "The economic consequences of health shocks: evidence from Vietnam." Journal of Health Economics **26**(1): 82-100.

Wagstaff, A. and E. v. Doorslaer (2003). "Catastrophe and impoverishment in paying for health care: with applications to Vietnam 1993–1998." Health economics **12**(11): 921-933.

Wagstaff, A. and M. Lindelow (2013). "Are health shocks different? evidence from a multishock survey in Laos." Health Economics.

Wainwright, F. and C. Newman (2011). 'Income Shocks and Household Risk Coping Strategies: Evidence from Rural Vietnam.', IIIS Discussion Paper.

World Bank (2003). Vietnam Development Report 2004 - Poverty. Washington, D.C.

World Bank (2013). World Development Indicators Online database.

Yamano, T. and T. S. Jayne (2002). Measuring the impacts of prime-age adult death on rural households in Kenya, Department of Agricultural Economics, Michigan State University East Lansing, Michigan.

Erasmus Universiteit Rotterdam
institute of Health Policy & Management

Visitors address
Burgemeester Oudlaan 50
3062 PA Rotterdam

Postal address
Postbus 1738
3000 DR Rotterdam

Tel. (010) 408 8555
Internet www.bmg.eur.nl
E-mail research@bmg.eur.nl

ERASMUS UNIVERSITEIT ROTTERDAM
INSTITUTE OF
HEALTH POLICY & MANAGEMENT