

# AUTHOR ACCEPTED MANUSCRIPT

## FINAL PUBLICATION INFORMATION

Are Health Shocks Different?

The definitive version of the text was subsequently published in

Health Economics, 23(6), 2014-06

Published by Wiley and found at <http://dx.doi.org/10.1002/hec.2944>

**THE FINAL PUBLISHED VERSION OF THIS ARTICLE  
IS AVAILABLE ON THE PUBLISHER'S PLATFORM**

This Author Accepted Manuscript is copyrighted by the World Bank and published by Wiley. It is posted here by agreement between them. Changes resulting from the publishing process—such as editing, corrections, structural formatting, and other quality control mechanisms—may not be reflected in this version of the text.

You may download, copy, and distribute this Author Accepted Manuscript for noncommercial purposes. Your license is limited by the following restrictions:

- (1) You may use this Author Accepted Manuscript for noncommercial purposes only under a Attribution for non-commercial purposes in accordance with Wiley Terms of Conditions license <http://olabout.wiley.com/WileyCDA/Section/id-820227.html>.
- (2) The integrity of the work and identification of the author, copyright owner, and publisher must be preserved in any copy.
- (3) You must attribute this Author Accepted Manuscript in the following format: This is an Author Accepted Manuscript of an Article by Wagstaff, Adam; Lindelow, Magnus *Are Health Shocks Different?* © World Bank, published in the Health Economics 23(6) 2014-06 Attribution for non-commercial purposes in accordance with Wiley Terms of Conditions <http://olabout.wiley.com/WileyCDA/Section/id-820227.html> <http://dx.doi.org/10.1002/hec.2944>

*Forthcoming in Health Economics*

## Are Health Shocks Different? Evidence from a Multi-Shock Survey in Laos

by

Adam Wagstaff<sup>a</sup> and Magnus Lindelow<sup>b</sup>

<sup>a</sup> Development Research Group, The World Bank, Washington DC, USA

<sup>b</sup> Latin America and Caribbean Region, The World Bank, Washington DC, USA

June 2012

### **Abstract**

Using primary data from Laos, we compare a broad range of different types of shocks in terms of their incidence, distribution between the poor and better off, idiosyncrasy, costs, coping responses, and self-reported impacts on well-being. Health shocks are more common than most other shocks, more concentrated among the poor, more idiosyncratic, more costly, trigger more coping strategies, and highly likely to lead to a cut in consumption. Household members experiencing a health shock lost, on average, 0.6 points on a 5-point health scale; the wealthier are better able to limit the health impacts of a health shock.

**Corresponding author and contact details:** Adam Wagstaff, World Bank, 1818 H Street NW, Washington, D.C. 20433, USA. Tel. (202) 473-0566. Fax (202)-522 1153. Email: [awagstaff@worldbank.org](mailto:awagstaff@worldbank.org).

**Keywords:** Shocks; health; self-reported well-being; Laos.

**Acknowledgements:** The survey tool that was used to collect the data presented in this paper was jointly developed with Caridad Araujo, Valarie Kozel, Shubham Chaudhuri, and Jamele Rigolini. The field work was implemented by Indochina Research, and the research undertaken when Magnus Lindelow was based in the World Bank's Vientiane office. Our thanks go to Natsuko Kiso and Helle Alvesson for assistance with the data analysis, and to Martin Ravallion and two referees for helpful comments on an earlier version. The findings, interpretations and conclusions expressed and any errors are entirely ours; the views expressed do not necessarily represent those of the World Bank, its Executive Directors, or the countries they represent.

## I. INTRODUCTION

While there is a growing literature on the incidence and consequences of shocks in developing countries, most of the studies to date take a partial approach, analyzing one particular shock or set of shocks.<sup>1</sup> Using primary data from Laos, we add to the relatively slim literature examining multiple shocks by comparing a broad range of different types of shocks in terms of their incidence, distribution between the poor and better off, idiosyncrasy, costs, coping responses, and the degree to which households are able to smooth consumption following shocks. We also add to the multi-shock literature in two ways. First, we present data on households' own assessments of the impacts of shocks on well-being: our survey asks households whether they cut back consumption following a shock, how far it affected household welfare, and how far the household had recovered from the shock by the time of the interview. This 'softer' evidence is potentially a useful complement to the 'harder' evidence from consumption-smoothing regressions, and is also a useful substitute in situations like ours where panel data are not available and hence a traditional consumption-smoothing approach cannot be employed.<sup>2</sup> Second, we explore the health impacts of health shocks. Analyses of non-health shocks routinely inquire about the asset losses associated with shocks, e.g. the lost or damaged equipment and infrastructure associated with weather-related shocks. Analyses of health shocks, by contrast, often do not, focusing instead on the consumption and sometimes labor-market

---

<sup>1</sup> For example, Kochar (1999) looks at agricultural shocks in India, Hoddinott (2006) looks at the effects of drought in Zimbabwe, Gertler and Gruber (2002) look at the effects of health shocks in Indonesia, and Friedman and Thomas (2009) look at the effects of the 1997 financial crisis in Indonesia. Exceptions that look at multiple shocks include Kenjiro (2005), who compares crop failure and illness in Cambodia, and Heltberg and Lund (2009), who report the results of a multi-shock study in Pakistan, covering natural and agricultural shocks, economic shocks, law and order-related shocks, family shocks, and health shocks. Similar "shocks surveys" have also been implemented elsewhere (see Hoddinott and Quisumbing 2003; Dercon *et al.* 2005).

<sup>2</sup> , since, as Chetty and Looney (2006) have noted, a zero coefficient in a consumption-smoothing regression is consistent with households adopting strategies to smooth consumption that may have negative consequences for their long-term welfare (e.g. taking children out of school)

consequences of health shocks (Gertler and Gruber 2002; Wagstaff 2007). Yet a health shock is likely to result in some depletion of an individual's health 'capital'. In this paper, we shed light on the magnitude of this depreciation and on the factors affecting its size. We hypothesize that some groups are likely to be especially disadvantaged, e.g. those living far from health facilities and other amenities that are conducive to people recovering their health following a health shock.<sup>3</sup>

Our paper, like that of Heltberg and Lund (2009), uses a cross-section retrospective survey instrument designed specifically to get the incidence and consequences of the full gamut of shocks experienced by households in a typical developing country. We find that health shocks are more common than other shocks and (in contrast to non-health shocks) more pronounced among the poor. We also find that health shocks are more idiosyncratic than non-health shocks, i.e. more specific to the individual and less "shared" by the broader community. We find that, factoring in direct costs (extra spending on health care and other household budget items), indirect costs (lost income) and asset losses, health shocks entail considerably larger costs, on average, than non-health shocks. We find that government and NGO programs provide assistance in only a very small fraction of shocks; where government assistance occurs, it is disproportionately to the better off. If it comes, assistance is largely from other households. The most common coping strategy is dissaving, but borrowing is also quite common, as are—albeit to a lesser extent—selling assets and delaying plans. Dissaving is more likely and borrowing is less likely following a covariate shock like an agricultural shock. Health shocks stand out from other shocks in triggering multiple coping strategies. We find that the majority of households had to cut back consumption following a shock, and said it affected their welfare, with a mean score

---

<sup>3</sup> This aspect of the paper builds on research in the US on the health impacts of health shocks (Smith 1999; Goldman and Smith 2002).

of 3.2 on a 4-point scale ranging from 1 (not at all) to 4 (a lot). Finally, we find that household members experiencing a health shock did not recover their former subjective health following a health shock, losing, on average, 0.5 points on a 5-point scale.

## II. THE SETTING

Laos is one of the poorest countries in South East Asia, with an ethnically diverse and predominantly rural population. In many parts of the country, economic integration is limited, with 30 percent of villages in the Northern and Southern parts of the country having no wet season road access (World Bank 2010). Although Laos has witnessed rapid economic growth and poverty reduction over the past 15 years, the incidence of poverty remains high in remote rural areas, in the uplands, and among ethnic minorities. Vulnerability to poverty is also a significant concern. In the nationally representative Lao Expenditure and Consumption Survey, a large proportion of village leaders identified natural shocks, particularly insect infestations and animal disease, as constraints on income growth, and a growing share of villages also report lack of jobs as a constraint. Studies also highlight the importance of natural resources to livelihoods and the risks associated with loss of land and agriculture related shocks, while also illustrating the widespread and sometimes devastating effect of illness, injury and deaths on household welfare.<sup>4</sup>

In the Lao context, risks translate into significant vulnerabilities due to the limited access to formal insurance institutions and safety nets. While there are donor-supported programs for providing food relief in the event of disasters, there are no programs to systematically support

---

<sup>4</sup> Relevant studies include a vulnerability assessment in three provinces (Committee for Planning and Cooperation and UNCRD 2002) and qualitative poverty assessments (Asian Development Bank/National Statistics Center 2001; Asian Development Bank/National Statistics Center 2006).

households during the agricultural low-season or in the event of crop failure or livestock disease. Similarly, poor and near-poor households affected by food price increases, reductions in wages or remittances, or unemployment are also largely uncovered. Hence, when shocks materialize, households tend to rely on precautionary savings and informal networks to manage risks.

The financial costs associated with health care are particularly problematic, both because they are unpredictable, and because they are sometimes very substantial. In the past, government provided free health care services, although both the range of services and the geographic coverage of the provider network were limited. However, cost-sharing has been a formal government policy since the 1990s, initially through the introduction of revolving drug funds and later through a national policy on user fees. With the growing importance of user fees, combined with the steady expansion of the private health care sector, out-of-pocket payments have come to play an increasingly important role in financing health care (74% of total health expenditures (World Health Organization 2011)). These expenditures include payment of user fees in public facilities, as well as expenditures on health care and drugs from private providers (clinics, pharmacies, drug vendors, traditional practitioners, etc.) within Laos and abroad. The Health Care Law includes provisions for health care to be provided for free to poor patients. However, in practice, these provisions are rarely implemented, and coverage of formal health protection schemes is less than 10%.<sup>5</sup>

---

<sup>5</sup> Schemes include (i) the Civil Service Health Insurance (CSHI), (ii) the Social Health Insurance Fund (SHIF), (iii) Community Based Health Insurance (CBHI), and (iv) Health Equity Funds (HEF)

### III. THE SURVEY

The survey was implemented in three provinces (Vientiane Capital, Phonsaly, and Attapeu) in Laos between March and June 2008. Both Attapeu and Phonsaly are poor and predominantly rural. Vientiane Capital, by contrast, contains the largest urban center in the country, but also peri-urban and rural areas surrounding the city. The incidence of poverty in Vientiane is lower, and livelihoods tend to be more diverse. Hence, although the survey is not nationally representative, it includes locations that reflect the demographic and socioeconomic diversity of the country.

The clustered random sample includes 600 households from 30 randomly selected enumeration areas, stratified to permit an analysis of how outcomes and coping strategies vary across urban and rural settings (see details in Table 1). In each of the 30 communities the household survey was administered to 20 randomly selected households. Sample weights were calculated and used in the analysis to account for the oversampling in urban areas, and in Attapeu and Phonsaly.

The survey was administered to household heads, but spouses were also encouraged to participate. The survey instruments contained a detailed shocks module that inquired about natural and biological hazards (such as floods, mudslides, earthquakes and pest infestation), economic shocks (such as price changes and inability to find work), socio-political shocks (such as crime and ethnic or religious conflict), family shocks (such as divorce), and health shocks (serious illness, injury and death).<sup>6</sup>

---

<sup>6</sup> In the event, some of the shocks asked about in the survey had not been experienced at all, or had but only by a very few households: no earthquake occurred in the areas sampled during the previous twelve months, and no household reported to having been the victim of ethnic or religious conflict.

The enumerators inquired about the incidence of shocks over the previous 12 months, the timing of shocks, and the costs in terms of lost income, asset losses, and additional expenditures, including health expenses. They also asked about assistance with the costs of shocks, and about coping strategies employed. Finally, households were asked to assess the impacts of shocks on their family's well-being, and the impacts of health shocks on health status.

Data on shocks were complemented with modules to capture information on household composition and characteristics, housing characteristics and asset ownership, employment and livelihoods, household expenditures and consumption<sup>7</sup>, prevention and mitigation activities and government/NGO programs.

#### IV. INCIDENCE, INEQUALITY AND IDIOSYNCRASY OF SHOCKS

Table 2 shows the frequency of different types of shocks in the previous 12 months, as reported by households themselves. Pest infestation and crop/livestock disease are commonest, hitting 25 per cent of households. Illness is the next commonest shock, hitting 23 per cent of households, followed by drought which affected 16 per cent of households. Floods and mudslides are also relatively common, as, surprisingly, is death which affected 3 per cent of households. Shocks linked to natural and biological hazards and to family and health events are far more common than economic and socio-political shocks in Laos.<sup>8</sup>

---

<sup>7</sup> Consumption data included both food and non-food consumption. Estimates of food consumption were based on questions about the number of months in a year households consume a particular item, the amount consumed in a typical month, and the typical price paid per unit. Information was collected for both purchased food and own production. Data on non-food consumption is based on monthly recall for high-frequency items and annual recall for low-frequency items.

<sup>8</sup> To some degree, the variation in incidence of differences types of shocks may reflect differences in the extent to which different types of shocks can be objectively observed. For example, it might be argued that illness shocks are more subjective than natural and biological shocks, and that households may apply different reporting thresholds. A couple of points are worth noting. First, most shocks—including natural and biological shocks—are to some degree subjective. When does a preponderance of pests become an infestation? When does rainfall become a storm? When does a household determine that it has become "impossible" to find work? Second, in this survey, efforts were made to focus on serious illnesses and injuries (enumerators were asked to probe and exclude events such as common colds that did not have a significant

Although comparisons across countries and surveys are at best indicative due to differences in the survey modules, recall periods, and so forth, the results are similar to those reported from a risk and vulnerability survey in Guatemala, where agriculture shocks (pests and bad harvests) predominated (Tesliuc and Lindert 2002). Accidents of breadwinner were reported by over 8 percent of households, but the survey does not contain information about other forms of health shocks. Agriculture shocks were also frequent in Tanzania (Christiaensen *et al.* 2007) and Ethiopia (Dercon *et al.* 2005), although many households also report deaths and serious illness. In contrast, Heltberg and Lund (2009) found that health shocks dominated other shocks in Pakistan.

To get at the question of which shocks disproportionately hit the poor (Table 2), we measure wealth by applying Principal Components Analysis (PCA) to a vector of housing characteristics, e.g. type of floor, type of roof, etc. (cf. e.g. Filmer and Pritchett 2001). These are likely to change relatively slowly, and in response to long-term trends in incomes rather than to shocks. We use the first principal component, which we can infer is increasing in wealth from the fact that Vientiane has a higher mean score than the other sampled areas. Ranking households by their wealth index and computing the concentration index<sup>9</sup> of the shock variable, we find that the commonest shocks are also disproportionately concentrated among the poor, as reflected in a highly negative concentration index. The other highly unequally distributed shock is “divorce, abandonment, or internal or extended family disputes”, which is among the least common shocks in Laos but the shock that is most disproportionately concentrated among the poor.

---

impact on household welfare). Nonetheless, if health shocks *are* singularly vulnerable to the subjectivity problem and hence underreported, health shocks in reality are likely to be even more important in their frequency than they appear in Table 2.

<sup>9</sup> The concentration index is analogous to the Gini coefficient except that individuals or households are ranked by (in this case) wealth and inequality in the variable of interest is assessed relative to the wealth ranking. See e.g. Kakwani *et al.* (1997).

Heltberg and Lund (2009) also found a wealth gradient for health shocks but not agricultural shocks. Tesiluc and Lindert (2002) also report an association between the incidence of shocks and household characteristics such as poverty status or the gender and ethnicity of the household head, with poor, indigenous, and male-headed households being more likely to experience bad harvests, droughts and pest infestations, while the reverse is true for worsening terms of trade, falling incomes, and lost jobs. In the case of rural Ethiopia (Dercon *et al.* 2005), illness shocks are more commonly reported by male-headed households, while better off households are more likely to report pest, input and output shocks. However, the incidence of other types of shocks does not differ markedly by characteristics such as sex or age of head, household size or dependency ratios, or socioeconomic status.

Turning to question of whether health shocks are more or less idiosyncratic than other types of shock, Table 2 reports the  $R^2$  from regressions of the respective shocks on a vector of village effects. The results show that village fixed effects account for nearly 40 percent of the inter-household variation in whether a household experienced an unexpected decline in prices of or demand for commodities they sold and whether or not a household experienced a pest infestation. By contrast, village fixed effects account for only 5 percent of the inter-household variation in whether a household had been subjected to a crime. The low  $R^2$  figures for health shocks suggest that they are, for the most part, more idiosyncratic than agricultural and economic shocks.

These results are broadly in line with those from earlier studies. Dercon *et al.* (2005) assess the idiosyncrasy by asking households about the extent to which other households in the community and area have been affected. They find that drought, input and output shocks are

covariate (most households indicate that the entire village was affected), while theft or other crimes, death or illness are described in more than 90 per cent of cases as idiosyncratic, and pests and diseases affecting crops or livestock appearing to be a mix of idiosyncratic and covariate shocks. In contrast, Tesiluc and Lindert (2002) find that most shocks, with the exception of “inflation”, in Guatemala are idiosyncratic, with less than 10 percent of households in the primary sampling unit reporting a shock in most cases.

## V. INCOME LOSSES AND OTHER COSTS ASSOCIATED WITH SHOCKS

As can be seen Table 3, which shows costs expressed as a percentage of average annual per capita food consumption, the average cost of shocks in terms of lost assets can be considerable. Among those suffering from a crime, the loss of assets amounts to 180 percent of average annual per capita food consumption. Natural and biological shocks result in average asset losses of around 100 percent of average annual food consumption. Income losses occur following both health and non-health shocks, with falls in selling prices and illness leading to the biggest income losses. The medical expenses associated with health shocks—particularly a death—are appreciable. But so too are the “other expenditures” associated with health shocks, which far exceed those associated with non-health shocks.<sup>10</sup> Overall, health shocks entail considerably larger costs, on average, than non-health shocks. An illness, on average, entails costs equal to 250 per cent of annual average per capita food consumption, with a death costing nearly 400 percent of average annual food consumption. The last column shows that, for the most part, the costs of shocks are higher for the better off; presumably this is because they have more assets and a larger income stream at risk and have more resources to purchase medical care

---

<sup>10</sup> In the case of health shocks, the high expenditures likely reflect funeral costs in the case of a death, the transport costs associated with receipt of medical care, and perhaps expenditures associated with other amenities whose use increases caring for a sick family member.

and other goods and services. It is noteworthy that the costs associated with injury are, however, larger among the poor.

In terms of the *expected* costs of different types of shocks (i.e. the probability of a shock times the cost if it occurs), the gap between health and non-health shocks in expected costs is smaller than is the case for actual costs for households actually experiencing shocks. This reflects the fact that health shocks are only slightly more common than non-health shocks, and that the commonest shock (pest infestation) is also fairly costly. However, the expected annual cost associated with illness is equal to 60 percent of annual average per capita food consumption—a considerable amount. This expected cost, however, is larger among the better off, reflecting the greater expenditures on medical care and other goods and services by the better off in the event of an illness.<sup>11</sup>

## VI. COPING WITH SHOCKS

Table 4 shows the frequency of use of different coping strategies, broadly interpreted to include assistance from government, NGOs and other households, and health insurance reimbursement, as well as the more ‘traditional’ coping strategies, such as dissaving, selling assets, and pawning possessions. On average, a shock resulted in 1.6 coping strategies being employed. Health shocks trigger more coping strategies than non-health shocks—more than two, on average. Dissaving is the most frequently used coping strategy, being used in 85 percent of shocks. Borrowing and getting help from others are the second most common, each being used in around one quarter of shocks. Very uncommon coping strategies include: getting helped by the

---

<sup>11</sup> Full results on the expected cost of shocks are reported in the working paper version of this paper (Wagstaff and Lindelow 2010).

government; getting help from an NGO; health insurance; selling assets; harvesting early; and pawning possessions.

Some differences in the reliance on different coping strategies are evident across shocks. Government assistance is confined to just four shocks: drought; floods and mudslides; pest infestation; and death. NGO assistance is also confined to just four shocks, two of which are drought and pest infestation. Being helped by others is commonest in the cases of frost and extreme cold, and a death, and least common in the cases of pest infestation, and crime. Dissaving is common across all shocks with the exceptions of frost, a decline in selling prices, and non-payment of income. Borrowing is the coping strategy with the largest coefficient of variation across shocks: it is commonest in the cases of frost, a decline in selling prices, and being unable to fund work, and least common in the cases of pest infestation, crime, and divorce. The importance of selling assets as a coping strategy also varies across shocks, being most common in the case of a death, and not used at all in the case of several shocks.

## VII. IMPACTS OF SHOCKS ON WELL-BEING

Traditionally, the welfare cost of shocks—and hence the potential value of formal insurance programs—has been analyzed through consumption-smoothing regressions (cf. e.g. Townsend 1994; Gertler and Gruber 2002; Asfaw and von Braun 2004).<sup>12</sup> The Laos survey does not allow us to estimate a consumption-smoothing regression because it does not contain pre-shock consumption. Instead, we explore a complementary approach, namely to ask people about the impacts of shocks, in much the same way as poverty analysts complement quantitative

---

<sup>12</sup> The (log of the) change in consumption is regressed on a vector of shocks, and a significant negative coefficient on the shock variables is considered evidence of an inability to smooth consumption in the face of shocks and hence a positive value of formal insurance arrangements

poverty assessments with evidence on how people assess their own living standards (cf. Pradhan and Ravallion 2000; Deaton 2010).

The first line of Table 5 indicates that among the poorest quintile (in terms of the asset index), 62 percent resulted in the household cutting back its consumption; the figure for the richest quintile was 51 percent. For each shock, households were asked on a 4-point scale (where 1 is the minimum and 4 the maximum) how far the shock affected the family's well-being *at the worst moment*; the mean response was 3.3, with the poorest quintile averaging 3.3 and the richest quintile averaging 2.9. For each shock, the household was asked how far it had recovered, with 1 being the least progress and 4 being a complete recovery: the mean response was 3.0, with the poorest quintile averaging 3.1 and the richest quintile 2.7 (implying a *higher* recovery rate for the poor). These numbers suggest an initial appreciable impact of shocks, with some—but less than full—recovery.

The rest of Table 5 asks whether some shocks were more likely than other shocks to cause families to cut back their consumption, and whether some shocks led to larger self-reported changes in well-being and a more incomplete recovery. The numbers presented are marginal effects, estimated from a regression model that includes interactions between the shocks and wealth, a number of household characteristics and village fixed effects. Among the poorest 20 per cent only the three health shocks were more likely than the omitted shock (drought) to lead to a statistically significant cut in consumption, while only illness and death were more likely than drought to result in welfare being affected “a lot”. Among the richest 20 per cent, the picture is different in reported cuts in consumption: no shock is more likely than drought to lead to a cut in consumption, but one (crime) was less likely to lead to a cut in

consumption. However, similarly to the poor, death is the only shock more likely than a drought to result in welfare being affected “a lot”. Finally, among the poorest 20 per cent only a death has a lower probability than a drought of the household having completely recovered from a shock. This pattern is not, however, seen in the richest quintile. per cent

The self-reported data on the effects of shocks thus lead to three conclusions: shocks do result in households cutting consumption and having adverse effects on their welfare; only health shocks are worse than a drought in terms of the likelihood of a family being forced to cut back consumption and in terms of the shock affecting a family’s well-being “a lot”; the poor are especially disadvantaged in terms of the greater damage that health shocks inflict on household well being.

### **VIII. HEALTH IMPACTS OF HEALTH SHOCKS**

This section explores the question of whether health shocks result in a reduction in health ‘capital’, or whether people are, on average, able to recover their health following a health shock. It seems likely that a health shock will result in some depletion of an individual’s health ‘capital’, either because people ‘choose’ to reduce their health stocks following an unexpectedly high user cost of health capital, or because they are unable to instantaneously adjust their health stocks to the optimal level (cf. Grossman (1972; 2000) and Wagstaff (1993)); the latter explanation is likely to be particularly relevant when the health shock in question is an injury or the onset of a chronic condition. Recent research from a number of disciplines confirms that

health shocks have lasting impacts on health.<sup>13</sup> It seems plausible that the amount by which health status deteriorates following a health shock will depend on the person's circumstances and characteristics, with individuals in more favorable circumstances better able to recover their health following a health shock or at least limit its impact on their health status.<sup>14</sup> While some studies from high-income countries downplay the role of wealth and remoteness in explaining the persistence of health shocks (although not the incidence of shocks), these factors seem likely to have some importance in a country like Laos, where health insurance is minimal and distance to health facilities often considerable.

Respondents in our survey were asked to rate the health of the person experiencing the health shock on a five-point scale before the health shock and “after the recovery”, with 1 being least healthy and 5 being most healthy. Table 6 shows that, on average, there was a statistically significant decline in the health status of people experiencing health shocks of 0.6 points on the 5-point scale. The first regression in Table 6, which includes village fixed effects, suggests that illness results in a smaller decline in health status than an injury, wealthier households experienced a smaller loss of health capital following a health shock, and elderly people experienced a larger loss. The results are consistent with the hypothesis that education helps limit the impact of a health shock on health status, although the coefficients do not increase monotonically with education level. The last column replaces the village fixed effects by an estimate of the number of hours it takes people living in the respondent's village to get to the closest health facility (which could be a dispensary/health post or a hospital—whichever is

---

<sup>13</sup> For example, Smith (1999) has shown that health events in the US—particularly major ones—cause people to revise downwards their life expectancy, while Case et al. (2005) have shown that poor health in childhood in South Africa increases the likelihood of poor health in adulthood.

<sup>14</sup> See, for example, Smith (1999). Goldman and Smith (2002) have emphasized the role of education, hypothesizing that people with higher levels of education are better able to adhere to treatment and disease management regimes following the onset of a chronic condition. Along similar lines, Currie and Hyson (1999) propose a number of mechanisms by which low socio-economic status may interact with health shocks to create a “double jeopardy” for children from poor households (higher likelihood of shocks and lower likelihood of recovery).

closer). Although the most obvious explanation of the coefficient on distance to health facility is that people living far from a health facility do not get medical care soon enough after a health shock or do not get it at all, the distance variable may simply capture remoteness.<sup>15</sup>

## IX. CONCLUSIONS

Results from three provinces in Laos with very different topographic, demographic, and socio-economic characteristics indicate that health- and agriculture-related shocks are not only very common but have a substantial impact on household welfare. More than 30 percent of households report a death, injury or serious illness in the household over the last 12 months, while nearly 40 percent report drought, pest, other crop-loss, or livestock disease. In both cases, shocks are concentrated among the poor. Agriculture-related shocks primarily result in asset losses, equivalent to nearly 100 percent of per capita food consumption. Health shocks, in contrast, tend to impact on households primarily through loss of income and, in particular, medical and nonmedical expenditures.

The survey also highlighted that, in the Lao context, there are very few formal safety net programs (government, donor, or NGO supported) to help households manage the risks. Dissaving, borrowing, sale of assets, and support from other households are the predominant coping mechanisms, and it is known that some of these strategies can have long-lasting impacts. For instance, Van Damme et al. (2004) found that 62% of individuals who borrowed to pay for dengue treatment in Cambodia were still paying off their debt and its interest after one year. Subjective ratings of the impact of shocks and the extent they have recovered indicate that many

---

<sup>15</sup> When this time measure is replaced by a variable capturing the number of hours it takes to reach the closest secondary school, the results are qualitatively similar, though the coefficient is around 30 percent smaller in absolute value. For a detailed discussion, see Wagstaff and Lindelow (2010).

of the shocks resulted in reduced consumption and had lasting impacts. Hence, from a policy perspective, it will be important to complement efforts to sustain poverty reduction in Laos with policies and programs aimed at reducing household vulnerability. Given the pattern of shocks, programs focused on income protection in the face of agriculture shocks (e.g. public works programs) and on reducing out-of-pocket expenditures associated with illness (e.g. direct or indirect subsidies to reduce the cost of health care services) would seem particularly pertinent.

From a methodological perspective, the paper has highlighted the value of comprehensive risk and vulnerability surveys. These surveys provide comparable data across several types of shocks, including on prevalence, risk management strategies, and impacts. The Lao survey also included notable innovations to capture pre- and post-shock measures of subjective welfare and health status, which allowed for an analysis of subjective welfare impacts, and provided evidence on the extent to which health (and other) shocks result in a long-term loss of human capital. The use of retrospective data (collected after a health shock) on health status before and after the shock ought to reduce reporting biases. Just as one ought to worry about different people having different thresholds affecting whether they report their health as, say, “good” or “excellent” so one ought to worry about people’s thresholds varying over time; this would limit the scope for getting accurate estimates of the impacts of health shocks using self-assessed health status data collected at different points in time.

Table 1: Sample design

	Communities			Households		
	Rural	Urban	Total	Rural	Urban	Total
Vientiane Capital	3	5	8	60	100	160
Phonsaly	8	3	11	179	41	220
Attapeu	9	2	11	180	40	220
Total	20	10	30	419	81	600

Table 2: Incidence, inequality and idiosyncrasy of shocks

	Mean	Inequality	Idiosyncrasy
<i>Natural and biological hazards</i>			
Drought	0.156	-0.346	0.254
Floods, mudslides, storms	0.072	-0.258	0.203
Frost, extreme cold	0.015	0.097	0.063
Pest infestation, crop and livestock diseases	0.248	-0.358	0.383
<i>Economic shocks</i>			
Unexpected decline in prices or demand for commodities that you sell	0.043	-0.138	0.387
Impossible to find work	0.034	0.242	0.068
Non-payment or delay in payment of income	0.031	0.269	0.063
<i>Socio-political shocks</i>			
Crime (robbery, theft)	0.035	0.007	0.047
<i>Family and health events</i>			
Divorce, abandonment, or internal or extended family disputes	0.005	-0.555	0.064
Injury	0.046	0.069	0.075
Illness	0.231	-0.208	0.115
Death	0.032	-0.301	0.070

Notes: 'Inequality' captures the extent to which the shock in question is higher among the poor (as measured by the housing-based wealth index). The degree of inequality is measured by the concentration index which is a Gini-like measure where the concentration curve plots the cumulative fraction of persons being affected by the shock against the cumulative fraction of the sample ranked by the wealth index. A positive value indicates higher values, on average, among the better off; a negative value indicates higher values, on average, among the less well off. 'Idiosyncrasy' captures the degree to which the risk of the shock varies across households at the village level. It is measured here by the  $R^2$  from a linear-probability regression of the shock on a vector of village dummies. High values of the  $R^2$  indicate that where the household lives explains a high fraction of the inter-household variation in the risk of the shock.

Table 3: Income losses and costs associated with shocks among households affected by shocks, as % of average per capita food consumption

	No. HHs hit by shock	Asset loss	Income loss	Medical expense s	Other expense s	Total costs	CI
<i>Natural/biological hazards</i>							
Drought	120	87%	13%	1%	9%	109%	0.146
Floods, mudslides, storms	62	96%	26%	0%	2%	124%	0.004
Pest infestation, etc.	240	98%	23%	1%	4%	126%	0.218
<i>Economic shocks</i>							
Decline in selling prices	29	0%	107%	0%	33%	139%	0.124
Impossible to find work	10	0%	51%	0%	24%	74%	-0.002
Non-payment of income	10	0%	29%	0%	16%	45%	0.015
<i>Socio-political shocks</i>							
Crime (robbery, theft)	18	180%	12%	1%	9%	202%	0.324
<i>Family and health events</i>							
Divorce, etc.	6	0%	0%	3%	5%	8%	2.203
Injury	17	0%	30%	67%	48%	145%	-0.179
Illness	176	0%	84%	134%	33%	251%	0.405
Death	31	0%	13%	219%	151%	383%	-0.013

Notes: No. households in sample is 600.

Table 4: Number of coping strategies and average use of specific strategies, by type of shock

	No. coping strategies	Help from govt.	Help from NGO	Help from others	Health insurance	Dissaved	Borrowed	Sold assets	Early harvest	Pawned possessions	Delayed plans
Drought	1.490	0.069	0.026	0.242	0.000	0.826	0.228	0.057	0.006	0.000	0.036
Floods, mudslides, storms	1.410	0.066	0.000	0.141	0.000	0.806	0.211	0.009	0.009	0.058	0.115
Frost, extreme cold	1.711	0.000	0.042	0.626	0.000	0.416	0.584	0.000	0.000	0.000	0.042
Pest infestation, etc.	1.148	0.024	0.017	0.067	0.000	0.953	0.059	0.020	0.000	0.000	0.008
Decline in selling prices	1.924	0.000	0.000	0.462	0.000	0.625	0.558	0.118	0.000	0.000	0.161
Impossible to find work	2.037	0.000	0.000	0.519	0.000	0.880	0.568	0.000	0.000	0.000	0.139
Non-payment of income	1.395	0.000	0.000	0.395	0.000	0.605	0.395	0.000	0.000	0.000	0.000
Crime (robbery, theft)	1.052	0.000	0.000	0.052	0.000	0.857	0.026	0.000	0.000	0.000	0.117
Divorce, etc.	1.129	0.000	0.000	0.314	0.000	0.814	0.000	0.000	0.000	0.000	0.000
Injury	2.352	0.000	0.089	0.374	0.177	0.898	0.305	0.102	0.000	0.108	0.299
Illness	1.973	0.000	0.003	0.397	0.042	0.817	0.380	0.115	0.020	0.024	0.175
Death	2.346	0.020	0.000	0.553	0.020	0.872	0.375	0.277	0.000	0.000	0.229
Overall	1.611	0.023	0.014	0.265	0.020	0.846	0.257	0.063	0.007	0.016	0.100

Table 5: Self-reported impacts on consumption (marginal effects)

	Did household cut back consumption?		How far did shock affect household welfare?		How far has household recovered from shock?	
	No (0), yes (1)		Not at all (1), some (2), much (3), a lot (4)		Not at all (1), some (2), a lot (3), yes completely (4)	
	Poorest 20%	Richest 20%	Poorest 20%	Richest 20%	Poorest 20%	Richest 20%
Mean	0.616	0.514	3.287	2.904	3.078	2.698
<i>Shocks</i>						
Floods, mudslides, storms	0.221 (0.78)	-0.527 (-1.09)	-0.445* (-1.72)	-0.116 (-0.15)	0.408 (1.17)	-0.684 (-0.63)
Frost, extreme cold	1.121 (1.31)	-1.103 (-1.20)	-0.529 (-0.83)	0.827 (1.14)	-0.135 (-0.11)	-1.772* (-1.94)
Pest infestation, etc.	0.128 (0.71)	-0.619 (-1.02)	-0.149 (-0.92)	0.051 (0.11)	0.053 (0.33)	-0.771 (-1.37)
Decline in selling prices	-0.892 (-1.62)	0.945 (1.12)	-1.072 (-1.47)	-0.458 (-0.78)	-0.266 (-0.69)	-0.593 (-0.82)
Impossible to find work	-1.993 (-1.38)	-0.995 (-1.17)	0.173 (0.15)	-1.550*** (-2.58)	1.339 (1.50)	-1.145 (-1.62)
Non-payment of income	-1.861 (-1.23)	-0.474 (-0.58)	-3.050** (-2.09)	-2.413*** (-2.84)	-0.779 (-0.78)	1.207 (1.42)
Crime (robbery, theft)	-0.417 (-0.90)	-2.900*** (-2.89)	-1.637*** (-2.97)	-1.462** (-2.09)	0.247 (0.44)	3.268*** (3.10)
Divorce, etc.	-0.820 (-0.95)	1.452 (0.39)	-0.116 (-0.33)	1.038 (0.32)	-0.129 (-0.28)	-3.052 (-1.53)
Injury	2.846** (2.14)	-0.946 (-1.10)	-0.763 (-0.91)	-0.550 (-0.89)	0.079 (0.13)	0.503 (0.60)
Illness	0.698*** (3.33)	-0.964 (-1.39)	0.438*** (2.52)	-0.909* (-1.70)	-0.198 (-1.00)	0.171 (0.23)
Death	0.813** (2.14)	-1.545 (-1.62)	1.090*** (3.35)	2.462*** (2.87)	-0.760*** (-2.98)	1.223 (1.21)

Notes: First row shows the mean of the dependent variable. Remaining rows are the results of a regression analysis. The first model is a probit, the rest are ordered probits. All models include, in addition to the shock dummies, pre-shock wealth, each of the shock dummies interacted with wealth, the age of the household head (entered as a vector of dummies), a dummy indicating whether the household head is female, the ethnic group of the household (four groups), the education levels of the household head and the spouse (a series of dummies), the marital status of the head (also a series of dummies), the size of the household (seven dummies), dummies indicating whether grandparents live in the house, and village fixed effects. The first number in the pair is the marginal effect evaluated at the mean wealth score of the quintile in question and for the highest category (i.e. 1 in the first column, and 4 in the second and third columns). Numbers in parentheses are t-statistics. The omitted shock is drought. \*\*\* p<.01, \*\* p<.05, \* p<.1.

Table 6: Self-reported impacts of health shocks on health status

	(1)	(2)
Mean change in health status		-0.590
Illness	1.088*** (3.69)	0.440 (1.10)
Wealth	1.082*** (4.40)	0.235 (0.89)
Ethnic minority	-0.189 (-0.27)	0.583** (1.97)
Age	-0.015*** (-3.12)	-0.013** (-2.45)
Male	-0.230 (-1.15)	-0.391* (-1.82)
Incomplete primary schooling	-0.002 (-0.01)	0.177 (0.85)
Complete primary schooling	2.966*** (2.77)	1.717** (2.33)
Incomplete lower secondary schooling	-0.323 (-0.54)	0.302 (0.91)
Complete lower secondary schooling	1.070** (2.38)	0.516 (1.45)
Incomplete upper secondary schooling	1.065* (1.74)	0.892* (1.68)
Complete upper secondary schooling	0.793 (1.21)	0.141 (0.25)
Hours to nearest health facility		-0.090*** (-2.63)
N	186	181
Adjusted/pseudo R <sup>2</sup>	0.218	0.071
p-value joint significance of education variables	0.015	0.196

Notes: First row shows the mean of the dependent variable. Remaining rows are the results of a regression analysis. The dependent variable is constructed from the question: "Imagine a set of five steps for health where on the bottom, the first step, stand the sickest and frailest, and on the highest step, the fifth, stand people in perfect health. Where on the staircase would you place the victim before your illness/injury, where when the worst and where after recovered?" The variable is the difference between the reported values before and after the health shock. Both models are ordered probits. The first includes village fixed effects. The omitted shock is injury. Numbers in parentheses are t-statistics. \*\*\* p<.01, \*\* p<.05, \* p<.1.

## References

- Asfaw, A. and J. von Braun (2004). "Is Consumption Insured against Illness? Evidence on Vulnerability of Households to Health Shocks in Rural Ethiopia." Economic Development and Cultural Change **53** 1: 115-29.
- Asian Development Bank/National Statistics Center (2001). Participatory Poverty Assessment PPA. Manila, ADB.
- Asian Development Bank/National Statistics Center (2006). Participatory Poverty Assessment II PPA. Manila, ADB.
- Case, A., A. Fertig and C. Paxson (2005). "The lasting impact of childhood health and circumstance." Journal of Health Economics **24**(2): 365-389.
- Chetty, R. and A. Looney (2006). "Consumption smoothing and the welfare consequences of social insurance in developing economies." Journal of Public Economics **90**(12): 2351-2356.
- Christiaensen, L., V. Hoffmann and A. Sarris (2007). Gauging the welfare effects of shocks in rural Tanzania. Washington, DC, World Bank #4406.
- Committee for Planning and Cooperation and UNCRD (2002). Study on integrating human security concerns in local development. Vientiane.
- Currie, J. and R. Hyson (1999). "Is the impact of health shocks cushioned by socioeconomic status? The case of low birthweight." American Economic Review **89**(2): 245-250.
- Deaton, A. (2010). "Price Indexes, Inequality, and the Measurement of World Poverty." American Economic Review **100**(1): 5-34.
- Dercon, S., J. Hoddinott and T. Woldehanna (2005). "Consumption and shocks in 15 Ethiopian Villages, 1999-2004." Journal of African Economies **14**: 559-585.
- Filmer, D. and L. Pritchett (2001). "Estimating wealth effects without expenditure data or tears: An application to educational enrollments in states of India." Demography **38**(1): 115-132.
- Friedman, J. and D. Thomas (2009). "Psychological Health Before, During, and After an Economic Crisis: Results from Indonesia, 1993-2000." World Bank Economic Review **23**(1): 57-76.
- Gertler, P. and J. Gruber (2002). "Insuring consumption against illness." American Economic Review **92**(1): 51-76.
- Goldman, D. P. and J. P. Smith (2002). "Can patient self-management help explain the SES health gradient?" Proceedings of the National Academy of Sciences of the United States of America **99**(16): 10929.
- Grossman, M. (1972). The Demand for Health: A Theoretical and Empirical Investigation. New York, NBER.
- Grossman, M. (2000). The human capital model. In: North Holland Handbook in Health Economics. A. Culyer and J. Newhouse (ed). Amsterdam, Netherlands, North Holland: 1804-1862.
- 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.

- Hoddinott, J. (2006). "Shocks and Their Consequences across and within Households in Rural Zimbabwe." Journal of Development Studies **42 2**: 301-21.
- Hoddinott, J. and A. Quisumbing (2003). "Data sources for microeconomic risk and vulnerability assessments." Washington, DC: IFPRI. Manuscript.
- Kakwani, N., A. Wagstaff and E. van Doorslaer (1997). "Socioeconomic Inequalities in Health: Measurement, Computation, and Statistical Inference." Journal of Econometrics **77 1**: 87-103.
- Kenjiro, Y. (2005). "Why Illness Causes More Serious Economic Damage than Crop Failure in Rural Cambodia." Development and Change **36 4**: 759-83.
- Kochar, A. (1999). "Smoothing Consumption by Smoothing Income: Hours-of-Work Responses to Idiosyncratic Agricultural Shocks in Rural India." Review of Economics and Statistics **81 1**: 50-61.
- Pradhan, M. and M. Ravallion (2000). "Measuring Poverty Using Qualitative Perceptions of Consumption Adequacy." Review of Economics and Statistics **82 3**: 462-71.
- Smith, J. (1999). "Healthy bodies and thick wallets: the dual relation between health and socioeconomic status." Journal of Economic Perspectives **13**: 145-66.
- Tesliuc, E. and K. Lindert (2002). Vulnerability: A Quantitative and Qualitative Assessment. Guatemala Poverty Assessment Background Paper. Mimeo.
- Townsend, R. M. (1994). "Risk and Insurance in Village India." Econometrica **62(3)**: 539-91.
- Van Damme, W., L. Van Leemput, I. Por, W. Hardeman and B. Meessen (2004). "Out-of-pocket health expenditure and debt in poor households: evidence from Cambodia." Trop Med Int Health **9(2)**: 273-80.
- Wagstaff, A. (1993). "The demand for health: an empirical reformulation of the Grossman model." Health Econ **2(2)**: 189-98.
- Wagstaff, A. (2007). "The economic consequences of health shocks: Evidence from Vietnam." Journal of Health Economics **26(1)**: 82-100.
- Wagstaff, A. and M. Lindelow (2010). Are health shocks different? Evidence from a multi-shock survey in Laos. The World Bank, Policy Research Working Paper Series, 5335.
- World Bank (2010). Vulnerability and Social Safety Nets in Lao PDR. Vientiane, World Bank.
- World Health Organization. (2011). "National Health Accounts (NHA) data." Retrieved 20 May 2011, from <http://www.who.int/nha/en/>.