Chapter 10

The Vulnerability of the Uninsured to Health Shocks in Peru

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Juan José Diaz[i], Martin Valdivia[ii]

I. Introduction

Equitable health financing to offer adequate financial protection to the poor against health shocks has been gaining importance as a policy priority in Latin America (Baeza & Packard, 2006; ECLAC, 2008). Indeed, the World Health Organization (WHO) has included protection from catastrophic health expenditure as a key indicator of fairness in health system financing (WHO, 2000).

Many factors explain the significant progress in reducing fertility and infant mortality[1] over the past two decades, including long-term urbanization trends and increased education, especially of women, as well as the implementation of publicly-financed targeted health interventions (Cutler, Deaton, & Lleras-Muney, 2006). Indeed, innovations in delivery and financing mechanisms have been important in shaping healthcare policies to provide preventive and basic services to the most vulnerable, in most cases for reproductive health and early childhood development. Many of these interventions, however, were organized circumventing the health sector that continued to supply low-quality healthcare for other health issues, and for the rest of the uninsured population. Moreover, the non-eligible, uninsured were exposed to the risk of large health expenditures in the event of a serious health shock, resulting in drastic, and sometimes permanent, reductions in welfare.

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1. See reports by the UN Statistics Division on monitoring progress towards the Millennium Development Goals (MDGs). Available at: *http://mdgs.un.org/unsd/mdg/Host.aspx?Content=Products/ProgressReports.htm*. Valdivia (2006) reports a summary table based on those estimates. Progress in the reduction of maternal mortality, though, has remained slow in many Latin American countries.

The large proportion of informal employment in low and middle income countries (LMICs) is a major explanatory factor for the large segments of populations living without health insurance. Consequently, the past decade saw an increasing number of studies discussing the different implications of this disadvantage for the health status and use of health services by the poor. These studies used different indicators to show that the poor were spending a larger share of their budgets on out-of-pocket (OOP) health expenditures than the rich.[2]

This chapter first discusses the advantages and limitations of recent research on catastrophic health expenditures. Next, section III discusses the key characteristics of the Peruvian health sector focusing on financial protection. section IV presents the estimates of catastrophic health expenditures for Peru, a country that has been omitted in several of the previous regional studies. The research then uses longitudinal data to analyze the relative impact of catastrophic health expenditures, compared to reductions in non-medical consumption and income losses, as the key consequence of large health shocks for those who are not fully insured (section V). The paper ends with a summary and a discussion of the limitations of the analysis, and the policy implications for reducing the financial vulnerability of the Peruvian, uninsured poor to large health shocks.

II. Health Shocks and the Vulnerability of the Poor: A Review of Recent Literature

Health shocks can have dramatic effects on the way a family interacts and operates to obtain a certain living standard. Specific adjustments differ depending on the type of shock being considered, the severity of the illness, and the cost of medical treatment. If OOP expenditures are large in relation to the household disposable income, then catastrophic health expenditures occur. However, even if medical treatment costs are not large, there may be a catastrophic financial shock induced by illness if the family experiences a large income loss as a result of lost wages.

2. See Chapter 2: Household Health Spending, Equity and Poverty: A Literature and Methodology Review by Knaul FM, Arreola-Ornelas H, Pleic M, & Wong R in this Volume.

An illness by a working adult, for instance, may imply several days out of work, which would imply an income loss if the individual is self-employed or is not affiliated to a standard system of social security (as is the case for about 3 out of every 4 Peruvian workers).[3] If the illness or injury is mild, a few days of rest may be enough, but otherwise the individual would need to see a doctor who might prescribe medications or even hospitalization, which would imply large OOP payments if they are not affiliated to a health insurance scheme that covers such an ailment.[4] If the sick individual is a non-working child or elderly person or becomes dependent due to illness, income losses may still occur as a working adult may need to take time off work to care for the ill family member, or accompany them to medical appointments. The burden often falls most heavily on women. If OOP health expenditures are large in relation to household disposable income, then catastrophic health expenditures occur. However, even if medical treatment costs are not large, there may be a catastrophic health shock if the working individual experiences a large income loss as a result of lost wages.

If the treatment of illness or injury demands large OOP payments, the uninsured family may pursue a combination of strategies in order to afford such expenses. If payments are relatively small, a temporary adjustment in other household expenditures may suffice; but if they are larger, the household may need to *dis-save*, or sell off some of their assets. If medical costs are larger than their savings, households may still be able to borrow money to afford such payments, either from a formal or informal lender, or through their social network (relatives, neighbors, and friends). If savings or credit is relatively easy to access, the household may not need to sacrifice much current consumption to afford the corresponding OOP expenditures.

Most likely, however, poor and uninsured households will need to drastically adjust their current consumption to afford large OOP health expenditures. Furthermore, these temporary adjustments may have permanent consequences. If food expenditures are reduced, children's nutrition may suffer, with possibly permanent effects on their learning abilities, thus affecting their future performance at school and in the labor market. Children may also be forced to drop out of school altogether, or change from a private to a public school if the

3. Only employment-based social insurance covers disability. Other insurance schemes tend to limit their coverage to health expenditures.

4. In reality, affiliation to public health insurance in Peru, and other LMICs, may not be enough to avoid OOP expenditures since public and social security health centers are often under-budgeted and therefore need to ask insured patients to pay for some medications or exams if they want quality and timely treatment.

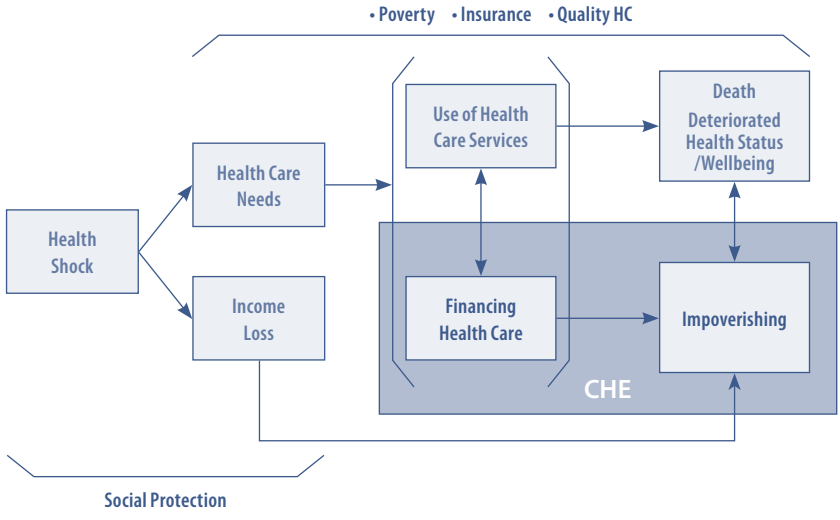
health shock lasts long enough. In any event, either catastrophic health expenditures or income losses may push the family of a severely ill or injured person into poverty. That is, households may need to shrink their non-medical expenditures below the poverty line.[5]

Another possible, yet excruciating, decision would be for the household to forgo the required medical expenditures, hoping that time will help the healing process. The potential consequences of the injury or illness can lead to permanent disability, or permit a disease to turn into a chronic condition or even premature death. These painful trade-offs are considered by household members and decisions are affected by the preferences and bargaining power of the different members. **Figure 1** summarizes the different mechanisms through which a large health shock can affect the welfare of an individual or family. Nevertheless, the recent literature on financial protection from health shocks has focused on the impoverishing consequences of a family having to absorb large OOP health expenditures, i.e., catastrophic health expenditures (CHE). This is often because of the absence of either longitudinal or even cross-sectional data on income and other losses from ill health. The dotted lines in **Figure 1** indicate the subset of issues that are discussed by this literature while at the same time illustrating the mechanisms that are omitted.

The recent focus of health financing literature on CHE is based on the idea that the largest impact of living without health insurance is that households have to pay large health costs direct and OOP in the event of a serious illness or accident. However, as discussed above, households need to have some resources to afford such expenses, either by selling their household or business assets or by borrowing from friends, neighbors, village banks, the healthcare provider or formal credit institutions. Households that are poor in assets or social capital are not able to do so. Moreover, quality healthcare is often not available in their neighborhoods. Thus, when the poorest households face a serious health shock, they often have to assume deteriorated health conditions, permanent disabilities or even death. Another aspect often underemphasized in studies of CHE are the severe temporary or permanent income losses. All of these factors are typically ignored when discussing policy options around universal health insurance.

5. Official poverty measures in Peru are defined as per capita household expenditures that fall below a poverty line estimated by the costs to buy a food basket (extreme poverty line) or a consumption basket (regular poverty line). Impoverishment effects may thus be underestimated as a household's total expenditures may remain high precisely as a result of out-of-pocket health expenditures.

Figure 1
The Vulnerability of the Poor/Uninsured to Health Shocks



Source: Authors elaboration.

III. Access and Financing of Healthcare in Peru

The Peruvian health system includes a mixture of private and public funders, insurers and providers. The main insurers are *EsSalud* and the Integral Health Insurance (SIS). *EsSalud* is part of the social security system which covers formal sector workers who contribute a proportion of their salary to health insurance and the pension system. Under social security health insurance, contributions can be split between *EsSalud* and other previously defined and contracted private providers, called healthcare provider enterprises (EPS), with the latter usually offering health plans that cover mainly low complexity care. *EsSalud*, however, covers all levels levels of care at their own network of health facilities and cannot use exclusionary policies or copayments.

SIS is a Ministry of Health (MOH) decentralized agency funded by fiscal resources directly provided by the Ministry of Economics and Finance. It fully subsidizes the poor population but with a benefit package that is much more

restricted than that of *EsSalud*. The SIS package includes mostly preventive and curative care at MOH health facilities for a set of procedures that give priority to reproductive health and early childhood development. Recent adjustments included benefits for other adults and the elderly, especially for particularly vulnerable population groups. Partial subsidies are offered to the population that can pay a small premium.

Affiliation to the fully subsidized program is determined based on a specially designed proxy-means test that determines if the individual is poor or extremely poor. With respect to payments to health facilities, once a SIS affiliate is treated, the health facility files a reimbursement request for the specific procedures applied to the patient, based on a previously published price list that covers only variable costs.

Other insurance providers include private insurance firms, and EPS for army and police forces. These account for a very small fraction of the population.

The annual National Houshold Surdey (*Encuesta Nacional de Hogares* – ENAHO) provides an estimate of access to health insurance by the Peruvian population.

Table 1 presents the percentage of individuals who reported having access to health insurance in 2000, 2002 and 2006. For 2000, prior to the creation of the SIS, the data refer to affiliation to predecessor institutions – the mother-child health insurance (SMI) and the school-based health insurance (SEG).

Table 1
Access to Insurance and Health Services Utilization (%)

	2000	2002	2006
Affiliated to a health insurance plan	44.3	40.4	37.9
EsSalud	18.3	17.1	18.4
SEG-SMI / SIS*	24.6	20.0	16.4
Other private	5.4	4.7	4.2
Utilization of medical services (last 4 weeks)	20.5	19.7	15.2

Note: *For 2000, the figure refers to affiliation to the SIS predecessors, the school-based health insurance (SEG) and the mother-child health insurance (SMI).

Source: ENAHO 2000, 2002, 2006.

In 2000, 44% of individuals reported being covered by health insurance while in 2006 the figure was only 38%. The decline can be primarily explained by the affiliation to SEG-SMI in 2000 and the SIS in 2006. This is likely the result of the way SIS has organized its process to affiliate its targeted population which is based on individuals, especially women of reproductive age and children, showing up at MOH health centers with their ID card to be categorized according to their socio-economic status.[6]

These data confirm that *EsSalud* and SIS are the main insurance plans available for the Peruvian population.[7] In 2006, 18% of individuals reported being affiliated to *EsSalud* while 16% reported affiliation to SIS. All other insurance alternatives are used by only 4.2% of the Peruvian population. A very important difference between these two insurance plans is the distribution of their affiliates across income quintiles. **Table 2** shows that the publicly subsidized SIS is clearly more pro-poor. While 34% of people in the poorest quintile report affiliation to SIS, only 1% are affiliated to *EsSalud*. On the other hand, among the richest quintile, 43% report affiliation to *EsSalud* while only 2% report affiliation to SIS.

Table 2
Access to Health Insurance by Type and Income Quintile, 2006

Per Capita Income Quintile	Insured	EsSalud	SIS
I (poorest)	34.8	1.1	33.7
II	31.0	6.1	24.6
III	31.0	15.0	14.6
IV	37.5	27.4	7.0
V (richest)	55.3	42.6	2.1
Total	37.9	18.4	16.4

Source: Author's calculations based on ENAHO 2006.

6. This differs from the way SEG worked as any child attending a public school was automatically affiliated to the insurance program and mothers and children were aware of that situation.
7. Note that affiliation by source is not exclusive as an individual may have private health insurance in addition to *EsSalud* or SIS. However, the SIS affiliation process tries explicitly to avoid affiliating individuals already covered by *EsSalud*.

There are some factors that limit how these affiliation indicators reflect the proportion of the population protected from catastrophic OOP health expenditures. On the one hand, financial protection may be underestimated as it is possible that some individuals who report not having insurance may learn to be SIS beneficiaries when they go to an MOH health facility in search of medical attention. This situation may be important considering that subsidized affiliation requires individuals to show up at an MOH health facility and be classified as poor, which they likely do when they actually need healthcare. On the other hand, financial protection may be overestimated as many affiliates to SIS or *EsSalud* still have to pay OOP for some of the medicines, instruments or exams, etc. in order to secure quality healthcare.

Table 3 shows the importance of OOP payments for health by income quintile based on the share of per capita household income devoted to OOP health payments. The percentage is 4.4% for the total population but varies significantly by insurance status and across income levels. The ratio goes up to 5% for the uninsured while it goes down to 1.7% for those affiliated to SIS. This suggests that SIS affiliates tend to have lower OOP health expenditures. *EsSalud* affiliates, on the other hand, report as much OOP health expenditure as the uninsured, although the level and quality of healthcare received may be very different from those without insurance. Another important feature is that reported payments are very pro-rich in the case of *EsSalud* affiliates while they are somewhat pro-poor in the case of SIS affiliates. Again, these patterns may hide differences in the amount and quality of the healthcare received from the different insurance plans.

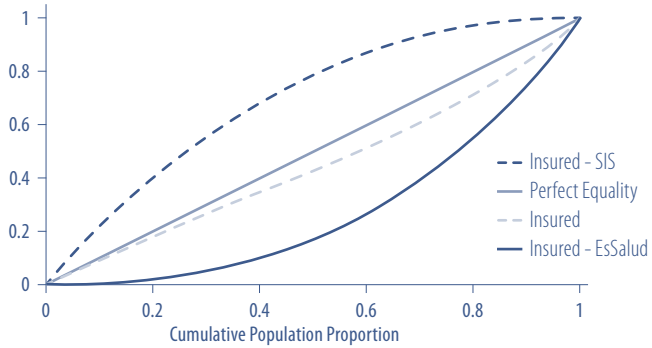
Table 3
OOP Health Expenditures by Type of Insurance (%)*

Income Quintile	Total	EsSalud	SIS	No Insurance
I (poorest)	4.8	8.7	1.1	6.6
II	4.2	5.5	1.7	5.1
III	4.4	4.3	2.5	4.8
IV	4.4	4.4	3.1	4.6
V (richest)	4.0	4.4	2.1	3.7
Total	4.4	4.5	1.7	5.0

Note: *Numbers reported refer to the percentage of per capita income assigned to OOP health expenditure by individuals.

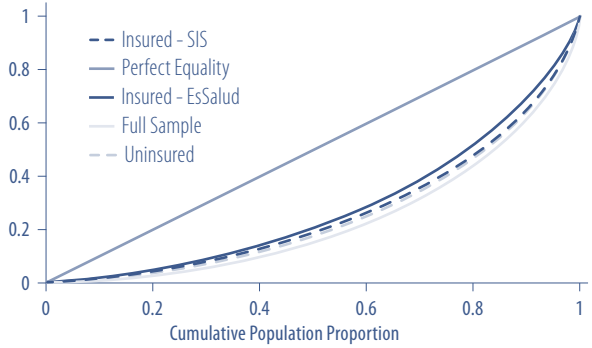
Source: Author's calculations based on ENAHO 2006.

Figure 2
Affiliation by Type of Insurance - Concentration Curves



Source: Authors' calculations based on ENAHO 2006.

Figure 3
OOP Health Expenditure by Type of Insurance – Concentration Curves



Source: Authors' calculations based on ENAHO 2006.

These differences across the income distribution between *EsSalud* and SIS affiliates can be further analyzed with concentration curves. **Figure 2** and **Figure 3** show the distribution of affiliation and OOP health expenditure by the two groups of affiliates analyzed thus far, confirming the patterns observed

in **Table 2** and **Table 3**. **Figure 2** shows that SIS affiliates are clearly concentrated in the poorest tail of the income distribution. About 65% of SIS affiliates are concentrated in the poorest 40% of the population while only 7% of *EsSalud* affiliates are found in this income group. In addition, **Figure 3** shows that OOP health expenditure among SIS affiliates is relatively pro-poor in comparison to that of *EsSalud* affiliates. The poorest 40% accumulate about 10% of the OOP health expenditure generated by SIS affiliates, while the figure is 20% for *EsSalud* affiliates.

IV. Catastrophic and Impoverishing Health Expenditures

The analysis of the distribution of OOP health expenditure may not adequately reflect the financial vulnerability of Peruvian households to a large health shock. Many who report non-zero OOP health spending pay minimal costs associated with minor health shocks that they can handle without much suffering and with the help of their savings or their social network, including relatives and friends. This study seeks to focus on those households that face serious health shocks that prompt them to spend a disruptive proportion of their disposable income in order to provide the ill or injured member with good, timely medical care. This is what is often referred to as catastrophic health expenditure. Although easy to define, this concept is not as easy to operationalize. An important literature discusses the relative advantages of alternative definitions, considering that the results tend to vary significantly with adjustments in the definition used to calculate the incidence of CHE.[8]

This section first reviews some of the most important definitions used in the literature. It then describes the database used to analyze the incidence of CHE in Peru. Finally, key results about the magnitude and nature of CHE among the Peruvian population are presented.

8. See Chapter 2: Household Health Spending, Equity and Poverty: A Literature and Methodology Review by Knaul FM, Arreola-Ornelas H, Pleic M, & Wong R in this Volume.

IV.i. Methodology

Operationalizing the definition of a CHE event demands defining disposable income, and for that one needs to define a level of subsistence expenditure, as well as the threshold for the proportion of OOP health spending to be considered catastrophic given the level of disposable income by a particular household. Wagstaff & van Doorslaer (2001) and Xu, et al. (2003), among others, discuss the definition carefully, based on the capacity-to-pay of each household.

A household's capacity-to-pay (***CTPi***) is defined as the difference between household income or expenditures (***Yi***) and the cost of a basket of non-health basic needs (***S***) adjusted for household size:

$$CTP_i = Y_i - S \qquad (1)$$

Let y_i^h denote household i's OOP health expenditures. Then, a household suffers a CHE if $y_i^h \geq x \cdot CTP$, where $x > 0$ is the pre-defined threshold level. In that sense, the incidence of CHE can be described with the following ratio:

$$\alpha = \frac{\#\{i \in I : y_i^h \geq x \cdot CTP_i\}}{\#\{i \in I_i\}} \qquad (2)$$

Wagstaff & van Doorslaer (2001) use the official local poverty line to define the level of subsistence expenditure. Xu, et al. (2003), on the other hand, define it endogenously as the average level of consumption of households between the 45th and 55th percentile. They also adjust consumption for economies of scale, arguing it is more consistent with their key objective: international comparisons of the incidence of CHE. Another important difference between these two previous methods is the way they handle the situation of the poor ($CTP_i \leq 0$). Thus any positive OOP health expense by the poor would be considered catastrophic, regardless of its size, which is reasonable considering that these families are already unable to afford basic consumption needs. However, Xu, et al. (2003) deal with health expenditures by the poor in a different way. They replace the subsistence level of consumption with the actual levels of food expenditures for those with food expenditures below the subsistence level. Thus, no household has a negative capacity-to-pay ($CTP_i \leq 0$), and some poor households with positive OOP health expenditure may not be considered as having incurred CHE.

The definition of large OOP health expenditures ends up being arbitrary. The general idea is that OOP spending beyond a given threshold seriously disrupts the welfare of the household.[9] One way to make sense of such operationalization is to make a connection to the idea that CHE may have impoverishing consequences. Thus, one first needs to define the poor, with S being a natural choice for a poverty line. Then a household is defined as poor if $CTP_i \leq 0$. It follows that y_i^h has an impoverishing effect if $\hat{CTP}_i = CTP_i - y_i^h = (Yi - y_i^h) - S \leq 0$.

In other words, if non-health expenditures are not sufficient to afford basic non-health needs. Clearly, the uninsured are more vulnerable to larger OOP health expenditures. Also, the lower the CTP_i, the higher the probability that a certain level of y_i^h will push a household into poverty. It follows that the incidence of impoverishing health expenditures (IHE) can be estimated through the following ratio:

$$ß = \frac{\#\{i \in I : y_i^h \geq CTP_i\}}{\#\{i \in I\}} \qquad (3)$$

These definitions help to clarify the nature of the relation between catastrophic health expenditures and impoverishment. They are equivalent for threshold $x = 1$. However, measures are normally not that strict (Baeza & Packard, 2006; Xu, et al., 2003; Wagstaff & van Doorslaer, 2001). The question is, then, what is an appropriate value for x? The lower the value of x, the larger is the incidence of CHE, but also the lower the probability that CHE leads to poverty. It follows that, for $x \epsilon (0,1)$, CHE is necessary but not sufficient for a household to be impoverished as a result of the health shock. That is, households that become poor due to large health expenditures definitely face CHE, but some households with CHE do not fall into poverty.

If $x > 1$, there would be a lower proportion of households with CHE than if $x \leq 1$, but CHE would then be a sufficient condition to be impoverished by health spending. Households without CHE can fall into poverty as a result of health expenditures only if $x > 1$, unless a different poverty line is defined somewhere to the right of S. The choice of that different poverty line can also be an artificial way to increase both the incidence of CHE and IHE. The issue is that it is hard to justify a way to sustain two different poverty lines. Whatever reason could justify setting the poverty line to the right of S, would also justify its use in the calculation of capacity-to-pay.

9. See O'Donnell, et al. (2008), chapter 18.

Keeping in mind the relationship between health impoverishment and CHE, one can agree on a meaningful value of x. Then following Wagstaff & van Doorslaer (2001) it is possible to analyze the regressiveness (progressiveness) of both measures (CHE and IHE) using already familiar indicators such as the headcount ratio (α *or* β) and the concentration index.

Previous studies that have analyzed inequalities in CHE across the income distribution seek to find an indicator that could describe such distribution with one scalar. The poor-to-rich ratio, for instance, compares the situation of the extremes, establishing the number of times the ratio of the poor was compared to that for the rich. The limitation of this indicator is that it is based only on the extreme, and therefore does not capture changes in the situation of the in-between groups. Van Doorslaer & Wagstaff (1997) provide a variety of methodological alternatives to better characterize the distribution of OOP health expenditures along the income distribution. One such indicator is the concentration index (C) which is a generalization of the Gini coefficient. Let "$L(y)$" denote the concentration curve which identifies, for each point in the income distribution, the proportion of OOP health expenditure incurred by the lower tail. Then, C can be defined as follows:

$$2C = 1 - 2\int_0^1 L(y)\,dy \qquad (4)$$

C takes a value of zero when $L(y)$ coincides with the diagonal line, and will take a positive (negative) value when $L(y)$ is located below (above) the diagonal. However, C will take a positive or negative value even when $L(y)$ crosses the diagonal. In the case of a positive (negative) value, the distribution of OOP health expenditures is considered to benefit the poorest (richest), as the poorest tend to spend less on health than their share of the total population. This inequality indicator is sensitive to all movements along the income distribution, although it tends to fail to transmit the level of injustice or urgency that is captured in the poor-rich ratio.

More recently, concerns have focused on the impoverishing consequences of catastrophic health expenditures, as averages tend to hide the catastrophic consequences of the lack of health insurance for those facing serious health events. The following section discusses this line of literature.

IV.ii. Incidence and Inequalities in CHE and IHE

This sub-section presents the estimates of the incidence of CHE and IHE among Peruvian households using the methods described above. According to **Table 4**, and based on ENAHO 2006, Peruvian households spend on average about 812 soles a year on OOP health spending, while average total household expenditures is 18,072 soles a year. An important and telling feature of the Peruvian health system is that inequality of the distribution of OOP health spending is higher than inequality of total household expenditure. The concentration index (**C**) for OOP health spending is 0.41 while the Gini coefficient for total expenditures is only 0.32. That is, OOP health expenditure is more concentrated among the rich than other household expenditures. However, as discussed before, it is not possible to say whether this is a positive distributional outcome as the lower expenditures by the poor may still be associated with lower levels of healthcare utilization, or lower quality care.

The incidence of CHE (headcount ratio – HR) is presented using Xu, et al. (2001 and 2003) (hereafter referred to as CHE1) and the one used by Wagstaff & van Doorslaer (2001) (hereafter referred to CHE2). **Table 4** presents the estimates of the headcount ratio (HR) for both definitions, using three different thresholds: 20%, 30% and 40%.

Clearly the method CHE2 implies a higher headcount ratio. The results are consistent across the thresholds. For instance, for the 20% threshold, according to the CHE2 method, up to 16% of Peruvian households incurred CHE in 2006. However, that proportion is only 10% when the CHE1 is used.

These differences are partly definitional as the methods vary in how subsistence level **S** is determined and in the treatment of OOP spending for the poor. CHE2 defines any positive OOP spending as catastrophic, while Xu adjusts the subsistence level **S** to the level of food expenditures actually incurred by the poor household. Thus, the CHE1 artificially increases the household's capacity-to-pay, reducing the incidence of CHE. **Table 4** also presents the estimates of a hybrid method for which **S** is determined as in the CHE1, but OOP spending by the poor is determined as proposed by the CHE2 method. The HR estimates with the hybrid method are very similar to the standard CHE1, so that one can conclude that the differences between the CHE1 and CHE2 correspond almost entirely to the choice of how to handle OOP spending by the poor.

Table 4
Average OOP Health Expenditure and CHE and IHE Incidence

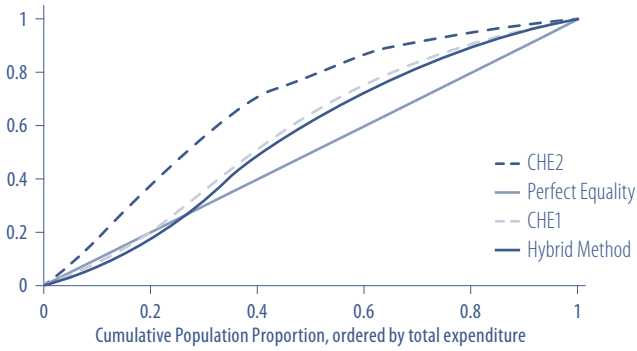
	Mean	CI
OOPHE (annual soles)	812	0.41
Total expenditures (annual soles)	18,073	0.32
CHE	**HR**	**CI**
CHE1 method		
20%	10.1	-0.20
30%	5.7	-0.32
40%	3.5	-0.42
CHE2 method		
20%	16.3	-0.45
30%	12.3	-0.61
40%	10.3	-0.71
Hybrid method		
20%	9.4	-0.14
30%	5.3	-0.28
40%	3.4	-0.40
IHE	0.8	-0.67

Source: Authors calculations based on ENAHO 2006.

The estimated concentration indices for each of the headcount ratios are negative suggesting that poorer households are more vulnerable to CHE events.[10] The CHE2 method implies not only a higher incidence of CHE but also that vulnerability is even more concentrated among the poorer households. The concentration curves show more clearly the greater vulnerability of the poorer. For the CHE2 method and the 30% threshold, the poorest 40% of Peruvian households incur 72% of CHE events. That proportion is only 50% when CHE1 is used. Overall, these results suggest that financial vulnerability to health expenditure in Peru is not only a result of large OOP payments for long-term, expensive treatments, which are less likely to be afforded by the poor; it is also a result of the poor being more likely to have to pay for the healthcare they need given that they are not fully insured.

10. See the explanation of expression (section IV) in sub-section IV.1 for a reminder of this implication.

Figure 4
Concentration Curves of CHE by Method (30% threshold)



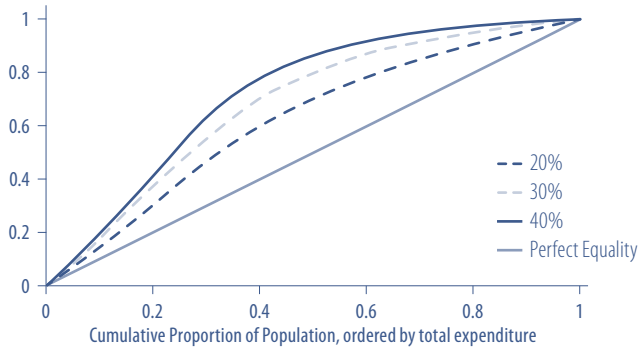
Source: Authors' calculations based on ENAHO 2006.

The final point associated with the distribution of the incidence of CHE among the Peruvian population refers to the sensitivity of the estimates presented to the threshold chosen. As shown in **Table 4**, a higher threshold implies a lower incidence. In the case of the CHE2 method, for instance, the proportion of households with CHE in 2006 is 16% when using the 20% threshold, but goes down to 10% when using the 40% threshold. However, the higher the threshold, the more pronounced is the vulnerability of the poor. Higher thresholds are associated with higher absolute values of the concentration indices. This is also evident in the concentration curves reported in **Figure 5** for the CHE2 method. When using the 20% threshold, about 62% of all CHE events are concentrated in the poorest 40% of the population, while that proportion goes up to 82% when using the 40% threshold.

In sum, although the concept of CHE as payments that severely disrupt the welfare of the population is very sensible, its operationalization requires some arbitrary definitions. Moreover, the specific estimates of financial vulnerability are significantly affected by some of the key methodological choices identified in the literature. However, the analysis helps in choosing an appropriate measure. The ENAHO survey estimates for the Peruvian population show that there are many poor households that are forced to pay OOP for their healthcare needs, which is particularly strenuous for these households considering that they do not have enough resources to buy the food they need. In this sense, it would

seem reasonable to consider any positive OOP payments by these households as catastrophic; hence Xu's method underestimates the financial vulnerability faced by these households.

Figure 5
Concentration Curves CHE (CHE2 method) for Different Thresholds



Source: Authors' calculations based on ENAHO 2006.

Second, **Figure 5** shows that although a higher threshold reduces the incidence of CHE among the Peruvian population, it also implies a higher concentration of these negative events among poorer households. Thus, this study argues that regardless of the choice of threshold, the financial vulnerability to health shocks is a serious problem that demands policy action.

In order to define specific policy recommendations, it is useful to examine the factors that increase the vulnerability of Peruvian households to these shocks. The following sub-section presents this analysis.

IV.iii. Socio-Economic Determinants of CHE

Socio-economic characteristics affect a household's propensity to face a CHE event in a given period, either by increasing the probability of a negative health shock or by improving their capacity to afford the cost of medical care. First, household size, composition and area of residence may affect the propensity by increasing or reducing the probability that a household member falls ill or

gets injured. A larger household with small children or elderly members residing in an urban area is more likely to face a negative health shock than a household with fewer members and no children or elderly. Household income, on the other hand, may not only affect the probability of an illness occurring but also the capacity of a household to afford medical care, either through OOP payments or through its effects on the likelihood of a household having family health insurance that covers the costs of medical care.

In this section, a multivariate econometric model is used to analyze the relative importance of these socio-economic factors as determinants of a household's financial vulnerability to health shocks, measured by the presence of a CHE event. **Table 5** reports the coefficients for the marginal effects for four models combining the two methods (CHE1 and CHE2) with and without access to health insurance as a determinant, at the 30% threshold. Although this analysis cannot prove causality, it is nevertheless useful to know the marginal predictive power of each variable in the presence of the others.

Household size, composition and income bracket are important determinants of CHE (**Table 5**). For the CHE2 method, being in the poorest quintile implies a reduction of about 12 percentage points in the probability of a household facing a CHE event, and the inclusion of the variable for access to health insurance does not seem to affect this pattern.[11] Having both small children (under 5 years of age) and elders (above 65 years of age) among the household members is associated with a higher likelihood of facing a CHE event (7 percentage points relative to households that have neither). The same is true for household size. Households with 5 or more members are 7 percentage points more likely to incur CHE than households with less than 3 members. Having access to insurance for all household members is associated with a lower likelihood of facing a CHE event, 5 percentage points less than those that have no member affiliated to an insurance program. Finally, although rural households appear to be more vulnerable to CHE events (**Appendix A**), the place of residence does not appear to be a significant determinant once household size, composition and income bracket are controlled for.

11. Notice that the simple difference in the incidence of CHE by quintile is much larger if one does not control for the other socio-economic determinants. According to Appendix A, a household in the second poorest quintile is 36 percentage points less likely to face a CHE event.

Table 5
Socio-economic Determinants of CHE – Probit model (CHE2 *versus* Xu at the 30% threshold)

	CHE2		CHE1	
	(1)	(2)	(3)	(4)
Residence area				
Urban (= 1 if urban)	0	0.001	0.004	0.005
	(0.03)	(0.21)	(1.32)	(1.36)
Income quintile				
Quintile II	-0.118	-0.119	-0.022	-0.022
	(35.97)***	(35.90)***	(6.30)***	(6.22)***
Quintile III	-0.132	-0.134	-0.047	-0.048
	(36.05)***	(36.14)***	(12.61)***	(12.69)***
Quintile IV	-0.129	-0.133	-0.049	-0.051
	(32.51)***	(33.36)***	(12.07)***	(12.75)***
Quintile V (richest)	-0.117	-0.123	-0.048	-0.053
	(26.39)***	(28.84)***	(10.37)***	(12.25)***
Household composition				
With children under 5	0.039	0.031	0.023	0.018
	(7.61)***	(6.34)***	(5.63)***	(4.58)***
With elders (above 65)	0.031	0.032	0.025	0.026
	(4.89)***	(5.06)***	(5.12)***	(5.18)***
Both	0.07	0.068	0.048	0.046
	(6.49)***	(6.26)***	(5.48)***	(5.26)***
Household size				
3 - 4 members	0.041	0.034	0.019	0.014
	(5.96)***	(5.01)***	(3.62)***	(2.76)***
5 or more members	0.066	0.057	0.022	0.016
	(9.39)***	(8.18)***	(4.26)***	(3.16)***
Insurance				
% hh members with insurance	-0.047		-0.032	
	(6.89)***		(6.07)***	
Observations	**20,577**	**20,577**	**20,577**	**20,577**
Pseudo R2	**0.27**	**0.27**	**0.06**	**0.06**

Notes: Marginal effects reported. Absolute value of t statistics in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Source: Authors' calculations based on ENAHO 2006.

The effect of omitting/including the health insurance variable is not significant in any of the models, in the sense that the coefficients of the other socioeconomic determinants remain almost unchanged. Second, the proposed model of determinants is substantially less appropriate when CHE1 is used as compared to CHE2. The pseudo R^2 is much lower (0.06 *versus* 0.27). More importantly, although both methods result in the same significant variables, the estimated marginal effects are much smaller for CHE1.

Finally, it is important to note that by no means can the marginal effects reported in **Table 5** be interpreted as reflecting a causal relationship, especially in the case of access to health insurance. An instrument such as the geographical distribution of health facilities could have been used to identify a more causal effect. However, this avenue was not pursued here given the limitations of such an approach to identify an instrument that satisfies the exclusion restriction. Also, a panel of households could have been used to control for household fixed effects and to better approximate a causal effect. This approach is being undertaken in a related study (Bitrán & Associates, 2009).

Instead, this study uses unique panel data on health shocks in order to analyze the ability of households to cope with large negative health shocks. The research aims to contribute to the literature by revealing some other mechanisms through which Peruvian households are vulnerable to health shocks. The results of this analysis are presented in the following section.

V. Health Shocks, Private Social Protection Mechanisms and the Welfare of Peruvian Households

In this section, the Gertler and Gruber (2002) method is used to explore the effects of health shocks on households' OOP health expenditures, earnings capacity, and non-medical household consumption. In particular, the aim is to assess the capacity of households to finance episodes of illness that require large OOP expenditures. This analysis will contribute to our knowledge of household strategies and the role of the public health system to cope with health shocks.

V.i. Data

This part of the research uses the 2002-2003 rotating panel of the ENAHO which includes a subsample of 3,066 households. The survey questionnaire is comparable over time, and conveys information on aggregate household consumption, as well as information on household members' education, health, employment and earnings.

The ENAHO includes information on individual and household earnings, aggregate non-medical household consumption, OOP health expenditures and the occurrence of health shocks. There are two alternative ways to identify health shocks using ENAHO. The first consists of using information from the individual health section of the survey that records whether the household members report having a chronic illness. The occurrence of a chronic illness is a major negative health event, surely affecting household medical expenditures and likely affecting income-earning potential. Exploiting the longitudinal dimension of the data, the indicator registers the occurrence of a health shock when a household member changes from reporting not having a chronic illness in the 2002 survey to reporting having one in the 2003 survey. Since all the analysis is at the household level, health shock indicators are computed for the household as a whole. A set of shock indicators is defined as binary (dummy) variables that reflect whether:

a) Any household member changed to having a chronic illness from 2002 to 2003,

b) Any 14-55 year old member gets ill,

c) The head of the household gets ill, or

d) The household head's partner gets ill.

The second way to define health shocks is based on information from the perception section of the ENAHO. In this section of the survey, the household head is the informant. This study uses one of the questions regarding adverse events that affected household well being or household welfare during the last year. In particular, two negative events that reflect adverse health conditions are analyzed:

a) The death of a household member, and

b) The occurrence of a severe illness for any income-earning household member.

Unfortunately, there is no further information on the details regarding either the cause of death or the nature of the illnesses.

V.ii. Identifying Health Shocks in the ENAHO

Overall, 26% of households in the 2002-2003 panel experienced a health shock for at least one of their members, irrespective of age (**Table 6**). Concentrating on working age household members between 14 and 55 years of age only, gives a figure of 16% of households that experienced a health shock. In 11% of the households, it was the household head, and in 18% the partner of the head who suffered the occurrence of a new chronic illness. Using health shocks reported by the household head, less than 1% of households experienced the death of a member and about 5% experienced a severe illness for at least one of their income-earning members.

Since the response to the occurrence of health shocks might depend on the structure of the household, it is useful to explore the occurrence of shocks using several partitions of the sample according to the household composition. First, the sample is classified into households without children (980 households), households with any child present related or unrelated to the household head (2,086 households), and households with children whose mother or father is the household head (1,520 households). Then the last two groups are split into households where the household head's partner is present (1,735 households with any child and 1,369 households with children of the head) and households where the head's partner is absent (351 households with any children and 151 households with children of the head). Using the definition of health shocks in terms of new chronic illnesses, the results show that shocks affect all types of households almost equally. In general, one third of each type of household report a new chronic illness.

V.iii. Health Shocks, Health Expenditures and Earnings Potential

Next, this study explores whether these health shocks generate a sizable cost of illness that might affect the household consumption profile. In particular, the effects of health shocks on household per capita OOP healthcare expenditures and per capita labor earnings are analyzed.

Regressions of OOP health expenditures and labor earnings are run using the following specification:

$$\Delta \text{Outcome}_{ij} = \alpha_j + \beta \Delta h_{ij} + \sum_k \lambda_k X_{ijk} + \eta_{ij} \quad (5)$$

where Δ ***Outcome***$_{ij}$ denotes the log change between 2002 and 2003 in per capita health expenditures and per capita labor earnings of household ***i*** from region ***j***; α_j denotes region specific fixed-effects; Δh_{ij} represents the health shocks, either the occurrence of a new chronic condition, or the occurrence of an adverse health event; $\mathbf{X}_{ijk}$ denotes a vector of household characteristics, such as gender, age, and education of the household head, dwelling characteristics, number of household members and the proportion of household members aged 0-5 years; and η_{ij} denotes a random error.

Table 7 reports the regression results for per capita OOP healthcare expenditures for each health shock indicator and for every household type described earlier. The results show that health shocks, defined by the change in the presence of a chronic illness, generate sizable increments in per capita healthcare expenditures for all types of households. For the whole sample, per capita OOP healthcare expenditures between 2002 and 2003 were 0.6 log points more for households affected by a new chronic illness. When the health shock indicator refers to the head of the household, healthcare expenditures also increases by 0.6 log points. By contrast, when health shocks are defined using adverse events reported by the household, there is no statistically significant effect of health shocks defined by the death of a member on the change in per capita OOP health expenditures or by a severe illness among income earners.

With respect to the effect of health shocks on labor earnings, the picture is less clear. Although one would expect to find negative effects of health shocks on labor earnings, **Table 8** shows that there is no general pattern in terms of the effect of health shocks on per capita labor earnings. Although several of the estimated regression coefficients for changes in chronic conditions are negative, none are statistically significant.

On the other hand, several coefficients are positive and statistically significant. For instance, for the full sample the household labor earnings are positively related to the occurrence of a health shock for any household member and for the household head. One possible explanation is that other household members become engaged in income generating activities, even if these activities are not necessarily formal or permanent employment.

To summarize, the results show that new chronic illnesses and an income earner falling severely ill generate large increases in household per capita OOP health expenditures. On the other hand, no clear pattern emerges from the relationship between health shocks and per capita labor earnings.

Table 6
Health Shocks by Type of Household

	Full sample of households	Households with only adults	With kids in the household		With children of the household head	
			Head and partner present	Only head present	Head and partner present	Only head present
	(N=3,066)	(N=980)	(N=1,735)	(N=351)	(N=1,369)	(N=151)
Change in chronic conditions						
Any household member becomes ill (%)	25.8	25.7	26.1	24.8	24.0	19.9
Any household member 14-55 becomes ill (%)	15.6	12.4	17.6	14.5	17.8	12.6
Household head becomes ill (%)	10.8	13.2	8.9	13.7	7.7	11.9
Partner of the household head becomes ill (%)	17.8	20.2	17.3		15.5	
Main income earner becomes ill (%)	9.8	12.8	8.1	9.1	7.4	7.9
Adverse events reported by the household head						
A death of any household member (%)	0.8	0.9	0.2	3.1	0.2	4.6
Any household member becomes severely ill (%)	5.3	6.1	4.9	4.8	5.0	4.0

Notes: The table reports the percentage of households that suffer deterioration on the health status of their members. This deterioration is defined as the occurrence of a new chronic disease using information from the health section from ENAHO 2002 and 2003. The table also reports the percentage of households that suffer the death of a household member or experienced events of severe illness among household members as reported by the household head in ENAHO 2003.

Source: Authors calculations using a 2002-2003 panel of households constructed from ENAHO 2002 and 2003.

Table 7
Impact of Health Shocks on per Capita OOP Health Expenditures

	Full sample of households	Households with only adults	With kids in the household		With children of the household head	
			Head andpartner present	Only head present	Head and partner present	Only head present
	(N=3,066)	(N=980)	(N=1,735)	(N=351)	(N=1,369)	(N=151)
Change in chronic conditions						
Any household member becomes ill	0.625	0.717	0.471	1.428	0.481	1.394
	(0.118)	(0.246)	(0.142)	(0.378)	(0.165)	(0.696)
Any household member 14-55 becomes ill	0.613	0.872	0.417	1.553	0.463	2.027
	(0.142)	(0.329)	(0.163)	(0.453)	(0.184)	(0.819)
Household head becomes ill	0.623	0.796	0.269	1.425	0.156	1.871
	(0.166)	(0.313)	(0.220)	(0.469)	(0.264)	(0.850)
Partner of the household head becomes ill	0.443	0.418	0.537		0.612	
	(0.183)	(0.382)	(0.201)		(0.237)	
Main income earner becomes ill	0.729	0.960	0.371	1.674	0.475	2.129
	(0.172)	(0.312)	(0.227)	(0.560)	(0.267)	(1.025)
Adverse events reported by the household head						
A death of any household member	-0.459	-1.130	-1.880	-0.167	-0.788	-0.281
	(0.595)	(1.084)	(1.491)	(0.972)	(1.831)	(1.376)
Any household member becomes severely ill	-0.416	-0.339	-0.455	-0.993	-0.228	0.311
	(0.228)	(0.432)	(0.287)	(0.758)	(0.322)	(1.423)

Note: Standard errors in parentheses. Coefficients estimated from separated first differenced regressions of the change in per capita medical expenditures on health shocks and additional covariates.

Source: Authors calculations using a 2002-2003 panel of households constructed from ENAHO 2002 and 2003.

Table 8

Impact of Health Shocks on per Capita Labor Earnings

	Full sample of households	Households with only adults	With kids in the household		With children of the household head	
			Head andpartner present	Only head present	Head and partner present	Only head present
	(N=3,066)	(N=980)	(N=1,735)	(N=351)	(N=1,369)	(N=151)
Change in chronic conditions						
Any household member becomes ill	0.142	0.159	0.134	0.426	0.028	-0.059
	(0.087)	(0.200)	(0.086)	(0.343)	(0.096)	(0.519)
Any household member 14-55 becomes ill	0.040	-0.025	-0.020	0.829	-0.106	-0.121
	(0.105)	(0.267)	(0.099)	(0.407)	(0.107)	(0.616)
Household head becomes ill	-0.045	-0.137	-0.012	0.327	-0.117	-0.364
	(0.122)	(0.254)	(0.133)	(0.423)	(0.153)	(0.635)
Partner of the household head becomes ill	0.045	0.200	-0.024		-0.033	
	(0.135)	(0.309)	(0.122)		(0.138)	
Main income earner becomes ill	0.297	0.154	0.288	0.915	0.276	0.573
	(0.127)	(0.254)	(0.137)	(0.503)	(0.155)	(0.763)
Adverse events reported by the household head						
A death of any household member	-0.133	-0.083	-1.735	0.157	-0.779	-0.120
	(0.437)	(0.877)	(0.902)	(0.864)	(1.063)	(1.008)
Any household member becomes severely ill	0.054	-0.158	0.341	-0.225	0.409	0.638
	(0.168)	(0.350)	(0.173)	(0.676)	(0.187)	(1.040)

Note: Standard errors in parentheses. Coefficients estimated from separated first differenced regressions of the change in per capita family labor earnings on health shocks and additional covariates.

Source: Authors calculations using a 2002-2003 panel of households constructed from ENAHO 2002 and 2003.

V.iv. Health Shocks, Consumption Smoothing and the Welfare of Peruvian Households

This subsection assesses whether Peruvian households are able to insure their consumption profile from health shocks. First, the analysis explores whether health shocks generate changes in non-health consumption, and later, whether these changes track household labor earnings net of health expenditures.

If households were able to insure their consumption profile against illness, one would expect that changes in health events do not affect household's per capita consumption net of health expenditures. First-difference regressions of non-health per capita consumption on region fixed-effects, household characteristics, and health shocks are used to test this. The following estimating equation is used:

$$\Delta \ln\left(\frac{C_{ij}}{n_{ij}}\right) = \alpha_j + \beta \Delta h_{ij} + \sum_k \lambda_k X_{ijk} + \xi_{ij} \qquad (6)$$

where $\Delta ln(C_{ij}/n_{ij})$ measures the log change in per capita non-health consumption expenditures of household i from region j; α_j are region specific fixed-effects; Δh_{ij} represents the health shocks; X_{ijk} denotes a vector of household characteristics; and ξ_{ij} denotes a random error. If households are able to smooth consumption, one would expect that health shocks do not affect non-health consumption. That is, under full consumption insurance one expects to find $\beta = 0$. **Table 9** reports the results of the regression analysis. Contrary to what was expected, the results show that in general, per capita non-health consumption expenditures increase with the occurrence of new chronic illnesses.

Table 9

Impact of Health Shocks on per Capita Non-health Expenditures

	Full sample of households	Households with only adults	With kids in the household		With children of the household head	
			Head andpartner present	Only head present	Head and partner present	Only head present
	(N=3,066)	(N=980)	(N=1,735)	(N=351)	(N=1,369)	(N=151)
Change in chronic conditions						
Any household member becomes ill	0.071	0.070	0.076	-0.006	0.098	-0.080
	(0.019)	(0.041)	(0.023)	(0.062)	(0.027)	(0.107)
Any household member 14-55 becomes ill	0.056	0.060	0.059	-0.033	0.080	-0.120
	(0.023)	(0.055)	(0.027)	(0.074)	(0.030)	(0.126)
Household head becomes ill	0.042	0.019	0.074	-0.055	0.077	-0.171
	(0.027)	(0.052)	(0.036)	(0.076)	(0.043)	(0.130)
Partner of the household head becomes ill	0.087	0.136	0.057		0.078	
	(0.030)	(0.063)	(0.033)		(0.039)	
Main income earner becomes ill	0.069	0.024	0.081	0.094	0.073	0.059
	(0.022)	(0.052)	(0.037)	(0.091)	(0.044)	(0.158)
Adverse events reported by the household head						
A death of any household member	-0.231	-0.354	-0.484	-0.123	-0.341	0.039
	(0.098)	(0.179)	(0.244)	(0.155)	(0.299)	(0.208)
Any household member becomes severely ill	-0.023	0.038	-0.050	-0.110	-0.063	0.107
	(0.038)	(0.072)	(0.047)	(0.122)	(0.053)	(0.214)

Note: Standard errors in parentheses. Coefficients estimated from separated first differenced regressions of the change in per capita non-medical expenditures on health shocks and additional covariates.

Source: Authors calculations using a 2002-2003 panel of households constructed from ENAHO 2002 and 2003.

V.v. The extent of consumption insurance

The last step in the study consists of testing the extent of consumption insurance. To this end, regressions of non-medical consumption on labor earnings are run in order to measure how much of the cost of illness is financed from non-health consumption. The specification of the estimating equations is similar to the previous equations, except that now per capita labor earnings are included instead of health shocks:

$$\Delta \ln\left(\frac{C_{ij}}{n_{ij}}\right) = \alpha_j + \beta \Delta Y_{ij} + \sum_k \lambda_k X_{ijk} + \xi_{ij} \qquad (7)$$

In this specification, ΔY_{ij} represents the change in log per capita labor earnings net of health expenditures of household i from region j. All the other variables in the equation are defined as before.

Following Gertler and Gruber (2002), the fixed-effect regression is estimated by 2SLS, using health shocks as the instrumental variables for labor earnings. The idea is to avoid two potential sources of bias. The first is that labor income and the error term in the consumption equation are correlated through the household production process (Morduch, 1995). The second is the potential bias related to measurement error in the growth of labor earnings that might be correlated with the error term.

The estimation results are reported in **Table 10** for the estimated coefficient associated to the change in per capita labor earnings net of healthcare expenditures. Each row of **Table 10** reports a coefficient from a separate 2SLS regression where the indicated health shock is the instrumental variable for net labor earnings.

As it turns out, despite the absence of a clear pattern, most of the point estimates are not statistically significant in the estimated 2SLS regressions. Taken at face value, these results would appear to suggest that Peruvian households are able to insure consumption completely against negative health shocks. However, it must be recalled that most of the first stage regressions, the regressions of labor earnings on health shocks, showed no robust relationship between these variables. There is evidence, however, that when the household head becomes ill, there is a positive relationship between earnings and consumption (but only statistically significant at the 10% level) for the full sample, suggesting no consumption smoothing.

Table 10
Consumption Smoothing Regressions

	Full sample of households	Households with only adults	With kids in the household		With children of the household head	
			Head andpartner present	Only head present	Head and partner present	Only head present
	(N=3,066)	(N=980)	(N=1,735)	(N=351)	(N=1,369)	(N=151)
Change in chronic conditions						
Any household member becomes ill	0.503	0.440	0.566	-0.014	3.457	1.380
	(0.325)	(0.602)	(0.370)	(0.147)	(11.633)	(12.038)
Any household member 14-55 becomes ill	1.380	-2.424	-2.924	-0.040	-0.759	0.999
	(3.576)	(26.323)	(14.695)	(0.093)	(0.875)	(5.006)
Household head becomes ill	-0.938	-0.138	-6.214	-0.170	-0.659	0.471
	(2.710)	(0.464)	(70.156)	(0.333)	(1.009)	(0.836)
Partner of the household head becomes ill	1.940	0.683	-2.402		-2.335	
	(5.788)	(1.090)	(12.598)		(9.940)	
Main income earner becomes ill	0.225	0.157	0.279	0.103	0.263	0.102
	(0.128)	(0.418)	(0.180)	(0.110)	(0.192)	(0.283)
Adverse events reported by the household head						
A death of any household member	1.734	4.264	0.279	-0.782	0.437	-0.325
	(5.667)	(45.036)	(0.180)	(4.490)	(0.637)	(3.503)
Any household member becomes severely ill	-0.421	-0.240	-0.147	0.491	-0.153	0.168
	(1.553)	(0.711)	(0.170)	(1.527)	(0.159)	(0.393)

Note: Standard errors in parentheses. Coefficients estimated from separated first differenced regressions of the change in per capita non-medical expenditures on family labor earnings. All regressions estimated by 2SLS, using health shocks as the instrumental variables for labor earnings. All regressions include additional covariates as described in the text.

Source: Authors calculations using a 2002-2003 panel of households constructed from ENAHO 2002 and 2003.

Since in Peru there is no fully functional social insurance system, and credit for consumption is restricted to relatively wealthy families, it is likely that households are financing health shocks out of savings, from borrowing, depletion of household assets, or by diverting resources from other consumption needs. These are necessary strategies in the absence of credit or when there is credit rationing.

VI. Conclusions

Catastrophic health expenditures are one of the major concerns of uninsured individuals when they get seriously sick or injured as such payments can severely disrupt the welfare of their household. Although conceptually clear, an operational definition requires some arbitrary decisions about household's disposable income and the threshold above which some payments can be called catastrophic. Despite these flaws, it is still possible to show the dramatic nature of the vulnerability of the uninsured poor in Peru.

In order to quantify catastrophic health expenditures, this study uses the methodologies proposed by Wagstaff & van Doorslaer (2001) and Xu, et al. (2003). Using data from ENAHO 2006, this analysis demonstrates that 10 to 16% of Peruvian households suffered catastrophic health expenditures, depending on the threshold used. The larger the threshold, the smaller is the incidence, but also the larger the concentration among the poor. The results also show that the likelihood of experiencing catastrophic health expenditures is larger among the poor and largest households, and among households with a larger share of children and elders.

Using longitudinal data from ENAHO 2002-2003, the results show that health shocks –defined as the occurrence of new chronic illnesses– always increase OOP health expenditures. In general, the increase in OOP health expenditures is not fully translated into reductions in non-health household expenditures. Except in the case when the main income earner is affected by a health shock, the results show that Peruvian households seem to be able to smooth total family labor income and non-health expenditures.

An immediate conclusion would be that Peruvian households use their cumulated assets or social networks to mitigate with the financial burden of health shocks. This strategy, however, is not sustainable over long periods and households may divert resources for longer-term investments such as education and nutrition in order to meet current expenditure needs. This strategy is

unsustainable and may perpetuate an inter-generational transmission of poverty. Another alternative explanation is that Peruvian households rely on informal safety nets, such as extended families or community organizations, to cope with the financial costs of health shocks.

Coverage rates of formal health insurance are relatively low in Peru, especially among the poorest population. In 2006, only 38% of the Peruvian population had access to formal health insurance. The two main formal health insurers are *EsSalud*, which provided coverage to 18% of the population; and the Integral Health Insurance (SIS), which provided coverage to 16% of the population. *EsSalud* provides health insurance for a fairly comprehensive health care plan, yet only to formal workers and their families. On the other hand, SIS is clearly not enough to protect the poorest Peruvian households from severe health shocks as it only covers treatments for reproductive health and early childhood development. It is still clear that protecting the uninsured from severe health shocks should be a high priority on the policy agenda.

References

Baeza C, Packard T. (2006). *Beyond survival: Protecting households from health shocks in Latin America*. Washington, DC: World Bank.

Becker, Gary. (1993). *A Treatise on the Family: Enlarged Edition*. Cambridge, MA: Harvard University Press.

Bitrán & Associados. (2008). Impact of Health Insurance on Access to Health Services, Health Services Use and Health Status in the Developing World: Case Study from Peru. Washington, DC: Global Health Financing Initiative, Brookings Institution.

Cutler D, Deaton A, Lleras-Muney A. (2006). The Determinants of Mortality. *Journal of Economic Perspectives*, 20(3): 97-120.

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

Morduch J. 1995). Income Smoothing and Consumption Smoothing. *Journal of Economic Perspectives*, 9(3): 103-114.

O'Donnell O, van Doorslaer E, Wagstaff A, Lindelow M. (2008). *Analyzing Health Equity Using Household Survey Data: A Guide to Techniques and Their Implementation*. Washington, DC: World Bank.

Seinfeld J, La Serna K. (2007). Avanzando hacia el aseguramiento universal: como lograr la protección en salud de personas de ingresos medios bajos y bajos? *Economía y Sociedad*, 64, CIES, July.

Valdivia M. (2006). "Institutional Change in the Health Sector and the Millennium Development Goals". GRADE Manuscript. Lima: GRADE.

van Doorslaer E, Wagstaff A. (1997). Equity in the Finance and Delivery of Health Care: A Review of ECuity Project Findings. Paper prepared for the Human Development Network and the Latin American and Caribbean Region Office of the World Bank. Washington, DC: World Bank.

Wagstaff A, Lindelow M; Jun G; Ling X; Juncheng Q. (2009). Extending Health Insurance to the Rural Population: An Impact Evaluation of China's New Cooperative Medical Scheme. *Journal of Health Economics*, 28(1):1-19.

Wagstaff A, van Doorslaer E. (2001). Paying for Health Care: Quantifying Fairness, Catastrophe, and Impoverishment, with Applications to Vietnam, 1993-1998. World Bank Policy Research Working Paper Series 2715, November.

World Health Organization (2000). *World Health Report 2000*. Geneva: World Health Organization.

Xu K, Evans DB, Kawabata K, Zeramdini R, Klavus J, Murray CJL. (2003). Household catastrophic health expenditure: a multicountry analysis. *The Lancet*, 362: 111-117.