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2008

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### How to cite

FLORES, Gabriela et al. Coping with health-care costs: implications for the measurement of catastrophic expenditures and poverty. In: Health economics, 2008, vol. 17, n° 12, p. 1393–1412. doi: 10.1002/hec.1338

This publication URL: <https://archive-ouverte.unige.ch/unige:41663>

Publication DOI: [10.1002/hec.1338](https://doi.org/10.1002/hec.1338)

## COPING WITH HEALTH-CARE COSTS: IMPLICATIONS FOR THE MEASUREMENT OF CATASTROPHIC EXPENDITURES AND POVERTY

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### SUMMARY

In the absence of formal health insurance, we argue that the strategies households adopt to finance health care have important implications for the measurement and interpretation of how health payments impact on consumption and poverty. Given data on source of finance, we propose to (a) approximate the relative impact of health payments on current consumption with a 'coping'-adjusted health expenditure ratio, (b) uncover poverty that is 'hidden' because total household expenditure is inflated by financial coping strategies and (c) identify poverty that is 'transient' because necessary consumption is temporarily sacrificed to pay for health care. Measures that ignore coping strategies not only overstate the risk to current consumption and exaggerate the scale of catastrophic payments but also overlook the long-run burden of health payments. Nationally representative data from India reveal that coping strategies finance as much as three-quarters of the cost of inpatient care. Payments for inpatient care exceed 10% of total household expenditure for around 30% of hospitalized households but less than 4% sacrifice more than 10% of current consumption to accommodate this spending.

Ignoring health payments leads to underestimate poverty by 7–8% points among hospitalized households; 80% of this adjustment is hidden poverty due to coping. Copyright © 2008 John Wiley & Sons, Ltd.

Received 25 June 2007; Revised 21 November 2007; Accepted 23 November 2007

KEY WORDS: coping strategies; out-of-pocket expenditures; catastrophic payments; poverty; India

### INTRODUCTION

Income and expenditure uncertainties play a key role in determining welfare in the developing world (Dercon, 2002, 2005). Given the lack of health and disability insurance, health shocks are a potentially important contributor to this uncertainty. In the absence of formal risk-pooling mechanisms, households must rely on informal insurance, including savings, to smooth consumption in the face of health shocks.

When panel data are available, the degree of consumption smoothing over health shocks can be estimated (Dercon and Krishnan, 2000; Gertler and Gruber, 2002; Lindelow and Wagstaff, 2005; Wagstaff, 2007; De Weerd and Dercon, 2006). With cross-section data, researchers have attempted to approximate the welfare effects of medical expenditures through the share of the household budget absorbed by such payments (Wagstaff and van Doorslaer, 2003; Xu *et al.*, 2003; van Doorslaer *et al.*, 2007). A large health-care budget share (e.g.  $\geq 10\%$ ) has been labelled 'catastrophic' with the

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justification that medical expenditures on this scale likely require sacrifice of consumption of other goods, possibly including basic needs (Russell, 1996; Wagstaff and van Doorslaer, 2003). However, this definition of catastrophic medical expenditures is insensitive to how these expenses are financed. It ignores variation in the capacity of households to draw on savings, assets, credit and transfers from friends and relatives to meet payments for health care and so protect consumption of other goods, at least in the short term. Evidence on how households in low-income countries finance health care is mostly from small-scale surveys (Sauerborn *et al.*, 1996; Wilkes *et al.*, 1998; Carter and Maluccio, 2003; Russell, 2004; van Damme, 2004). Notwithstanding their limited generalizability, these studies typically find that households finance a substantial share of health-care costs from coping strategies such as savings, credit, asset sales, etc.

Wagstaff and van Doorslaer (2003) have argued that poverty will be underestimated if measured, as is convention, on the basis of total household expenditure including that on health care. They propose the difference between poverty measures computed from consumption gross and net of out-of-pocket (OOP) medical expenditures as an approximation to the impoverishing effect of those expenditures. However, this approximation will be inaccurate in the case that households finance a substantial share of health payments from coping strategies. Then, expenditure gross of OOP payments is not equal to resources available for non-medical consumption on a long-term basis. The impoverishment effect proposed by Wagstaff and van Doorslaer (2003) not only will then overestimate the impact on transient poverty but also overlook hidden chronic poverty.

In this paper we analyze a large nationally representative cross-section survey of India that contains information on how payments for inpatient care are financed. Using these data, we develop measures of catastrophic payments and impoverishment that take account of financial coping strategies. Despite the static nature of the available information, it allows us to distinguish between, on the one hand, households that use coping strategies to reduce the negative impact of high medical expenses in the short term but are potentially vulnerable in the event of any future shock and, on the other, households that might be forced to reduce their current consumption and/or are dragged into poverty. This provides a new way of measuring risk and vulnerability in the absence of longitudinal data but with cross-section information about risk-coping strategies. We demonstrate how measures of catastrophic payments and impoverishment that ignore the means of financing can give a seriously misleading impression of the short-term consequences of high OOP medical expenditures.

The paper is organized as follows. In the second section we briefly review the literature on strategies of coping with OOP payments for health care in developing countries. Third section develops our measure of catastrophic payments adjusted for the source of financing and compares this with previous approaches. Fourth section considers the implications of OOP payments and their means of finance for the measurement of poverty. Fifth section gives background material on health-care payments in India and describes the data. The results are presented in the sixth section. The paper concludes with a summary of the findings and an interpretation of their implications.

## LITERATURE ON COPING WITH HEALTH PAYMENTS

Financial coping strategies refer to actions intended to protect current consumption from an economic shock, such as that induced by illness (Morduch, 1995). Drawing on precautionary savings, depletion of assets, borrowing and transfers from friends and relatives are examples of these strategies. Rather than test the extent to which households use these strategies to insure against health shocks through econometric analysis of longitudinal consumption data (Dercon and Krishnan, 2000; Gertler and Gruber, 2002; Lindelow and Wagstaff, 2005; De Weerd and Dercon, 2006; Wagstaff, 2007), one can ask households directly how they finance health expenditures. Such reported data mostly come from small-scale qualitative studies with restricted geographic coverage. The evidence may therefore be of

limited generalizability but it does suggest that households draw on different mechanisms to pay for health care and do not release only resources through sacrifice of current consumption of other goods. This is to be expected given the magnitude of some medical expenses relative to subsistence living standards in many low-income countries that leave little margin for the sacrifice of food and other basic needs. In a study of 566 rural households in Burkina Faso, Sauerborn *et al.* (1996) find that medical care is paid for from savings, selling livestock, borrowing and labor substitution. Wilkes *et al.* (1998) find that households in a small village in rural China are generally able to finance a single episode of severe illness without reducing their current consumption of other goods. Many can even deal with subsequent unanticipated expenditures. Reduced consumption and investment are identified as a transitory strategy only inducing short-term consequences. Social networks are important sources of financial support, and labor substitution is one of the main strategies to reduce the burden of income loss. Peters *et al.* (2001), using the same data as we do in this paper, show that poorer Indian households are more likely to finance inpatient care through borrowing and sales of assets and, according to Bonu *et al.* (2005), these strategies are also more common when hospitalized individuals are rural, male, head of the household, belong to a Scheduled Caste or Tribe and uneducated. While the small-scale qualitative studies suggest that coping strategies are used to shield household consumption from health shocks, the econometric panel data evidence indicates that informal mechanisms do not provide full insurance against this risk (Dercon and Krishnan, 2000; Gertler and Gruber, 2002; Lindelow and Wagstaff, 2005; De Weerd and Dercon, 2006; Wagstaff, 2007). Dercon (2002) emphasizes the asset risk and liquidity constraints that limit households' ability to smooth consumption. Small but frequent health shocks are found to be easier to deal with than large or persistent shocks, such as disability or chronic illness (Gertler and Gruber, 2002).

While financial coping mechanisms may protect consumption from health shocks, at least to some extent, in the short term, the long-term consequences could be substantial. Depleting productive assets, for example, could have a dramatic impact on future earnings. Indebtedness due to health expenditures has been reported as one of the major pathways into poverty and an important cause of remaining there (Rajeswari *et al.* 1999; Sen, 2003; Krishna, 2004, 2006; van Damme, 2004; Krishna *et al.*, 2005). van Damme (2004) reports that one year after the outbreak of a dengue epidemic in a poor, rural area of Cambodia, 67% of households that borrowed to pay for treatment continued to pay high interest rates. In India, interest rates charged by money lenders can be extraordinarily (Morduch, 1995) and rise with the degree of poverty and indebtedness of the household (Krishna, 2004, 2006; Krishna *et al.*, 2005; Banerjee and Dufflo, 2007).

#### HEALTH PAYMENTS AND THE RISK ON CURRENT CONSUMPTION

With cross-section data, the ratio of OOP payments for health care ( $\delta_i$ ) to total household expenditure ( $x_i$ ) has been used to approximate the relative impact of OOP payments on household welfare (Wagstaff and van Doorslaer, 2003; Xu *et al.*, 2003; Russell, 2004; van Doorslaer *et al.*, 2007). Although the approach is rather *ad hoc* with no firm conceptual basis, one justification offered is that a large OOP payments' budget share most likely implies a substantial sacrifice of current consumption. However, the validity of this justification obviously depends upon how OOP payments are financed. There might be a trade-off between protecting current versus long-term welfare. With data on the means of financing OOP payments, we are able to address this issue.

Let  $\theta_i$  be the self-reported amount of OOP health expenditures financed with coping strategies, with  $\theta_i \in [0, \delta_i]$ . In our Indian data set, households report the amount of OOP payment financed from: (i) income, (ii) savings, (iii) borrowing, (iv) sales of assets and (v) others.  $\theta_i$  is the sum of the amounts reported in all but the first category. We use  $\delta_i - \theta_i$  as an approximation to the absolute opportunity cost of OOP payments in terms of forgone current consumption. The accuracy of the approximation

rests upon the assumptions that in the absence of health-care needs there would be no saving from current income and coping strategies would not be used to support consumption of other goods. Conditional of these assumptions, we can directly test for full insurance of current consumption by examining whether medical expenditures are (reported to be) fully financed from coping strategies ( $\delta_i = \theta_i$ ). Of course, this approach relies on accurately reported data. In the empirical analysis below, we restrict attention to payments for inpatient care. Given the magnitude of such payments, it is likely that households can recollect how they were financed. Even with accurate reports, a restriction of this approach is that it identifies only the impact of health-care costs on consumption and not the total effect of a health shock, including that through loss of labor market earnings.

To obtain the relative impact of medical expenditures on current consumption, one must divide  $\delta_i - \theta_i$  by an estimate of what the consumption of other goods would have been if medical spending were zero. Assuming that in the absence of medical spending none of the coping strategies would be used to finance current period consumption of other goods, we approximate this consumption by  $x_i - \theta_i$ . Note that this is consistent with a Haig–Simons definition of income (Atkinson and Stiglitz, 1980): consumption that can be realized while leaving assets and liabilities constant. The relative disruption to current consumption is measured by the following ‘coping’-adjusted health expenditure ratio:

$$P_i = \frac{\delta_i - \theta_i}{x_i - \theta_i} \quad (1)$$

Ignoring financial coping strategies can result in a seriously biased estimate of the relative impact of OOP health payments on current consumption. Consider, for instance, a high spending rural household from our data defined as spending more than 20% of its annual per capita consumption (APCE) on health. The average APCE of such a household is Rs. 6866, with a mean per capita spending on inpatient care of Rs. 2760. To cover this cost, on average, these high spending households draw Rs. 823 from savings, borrow Rs. 1020, obtain Rs. 298 from the sale of assets, find Rs. 439 from other sources and finally pay Rs. 180 out of current income. Thus, only 7.8% of the cost of inpatient care is financed from current income. In the absence of health expenditures, such a household would not have spent Rs. 6866 on consumption of other goods but only Rs. 4286 ( $= 6866 - (823 + 1020 + 298 + 439)$ ), assuming that resources drawn from coping strategies to pay for inpatient care would have been held in reserve to meet future shocks. For such households, the short-term relative sacrifice of consumption necessitated by OOP health expenditures would be grossly overstated by their share of total household expenditure. However, the long-term financial consequences are likely to be considerable given that over a third of the hospitalization cost is financed from borrowing and more than a quarter through the depletion of savings.

The discrepancy between the above index of the relative impact of OOP health payments on current consumption,  $P_i$ , and the total expenditure share that has been used in the absence of information on the financing of these payments can be seen as follows:

$$\begin{aligned} P_i &= \frac{\delta_i - \theta_i}{x_i - \theta_i} \\ &= \frac{\delta_i}{x_i} * \frac{\delta_i - \theta_i}{\delta_i} * \frac{x_i}{x_i - \theta_i} \\ &= w_i * \Psi_i * \Phi_i \end{aligned}$$

where  $w_i$  is the unadjusted health expenditure ratio,  $\Psi_i$  is the proportion of health expenditures financed from current income and  $\Phi_i$  is the degree to which health payments inflate total expenditure through drawing on financing coping mechanisms. The unadjusted expenditure ratio gives the relative impact on current consumption if and only if  $\theta_i = 0$  and so  $P_i = w_i$ . In general,  $P_i \leq w_i$  and ignoring the source of

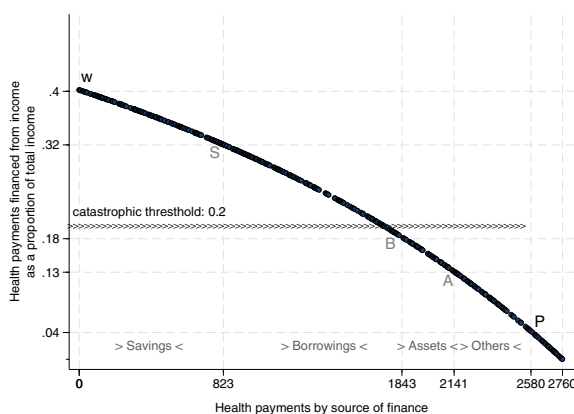


Figure 1. Coping-adjusted health expenditure ratio  $P$  against amount of health payments financed by coping strategies for a high spending rural household. Notes: High spending rural households are defined as those spending more than 20% of annual per capita expenditure on hospital care.  $w$  is the health payments as a proportion of annual consumption.  $P$  the health payments financed from income as a proportion of current income. Horizontal axis:  $S$  amount of OOP expenditure financed with savings, borrowings ( $B-S$ ), asset sales ( $A-B$ ) and Others ( $P-A$ ). Vertical axis:  $S$ ,  $B$  and  $A$  give the adjusted health expenditure ratio if each coping strategy is successively taken into account

funding leads to overestimation of the current consumption sacrifice induced by a health shock. Obviously the current economic strain of health-care payments depends on their size relative to total consumption ( $\delta_i$  relative to  $x_i$ ) and on the degree of reliance on financial coping mechanisms ( $\theta_i$  relative to  $\delta_i$ ). This can be seen in Figure 1 for our representative high spending rural household. As the proportion of medical expenditures financed from coping strategies increases from 0 (point  $w$ ) to the observed mean value of 0.93 ( $= 2580/2760$ , point  $C$ ), the relative impact on current consumption decreases by a factor of 10 from 40 to 4%. Most of the consumption protection is achieved through the use of savings (point  $S$ ) and borrowing (point  $B$ ).

$P_i$  measures the degree to which health payments disrupt current consumption. If this is sufficiently large, one might label the payments ‘catastrophic’ in the sense that they cause an extreme sacrifice of consumption that has a devastating effect on household welfare (Wagstaff and van Doorslaer, 2003; Xu *et al.*, 2003; Russell, 2004; van Doorslaer *et al.*, 2007). The threshold beyond which health payments become catastrophic is obviously subjective and the threshold chosen will inevitably be somewhat *ad hoc*. Accepting this, the catastrophic payments incurred by a household are given by  $O_i = \max(0, P_i - \tau)$ , where  $\tau$  is the threshold share.

In the previous literature, catastrophic payments have been approximated by  $O_i^* = \max(0, w_i - \tau)$  (Wagstaff and van Doorslaer, 2003; Xu *et al.*, 2003; van Doorslaer *et al.*, 2007).<sup>1</sup> Since  $P_i \leq w_i$ , we have  $O_i \leq O_i^*$ . In Figure 1, we can see how ignoring coping overestimates the risk of forgone consumption for our high-spending household. The unadjusted health payments budget share of our rural high-spending household is 0.4, twice the catastrophic threshold we have set at 0.2. However, the amount financed from income is so small that there is no catastrophic effect on current consumption. In fact, insurance provided by saving and borrowing alone is sufficient to reduce the short-term relative impact on consumption below the catastrophic threshold.

<sup>1</sup> Some of these authors have defined catastrophic payments on the basis of total health payments relative to capacity to pay, which is approximated by non-food expenditure to take account of the fact that a large proportion of the budget of poor households is dedicated to food.

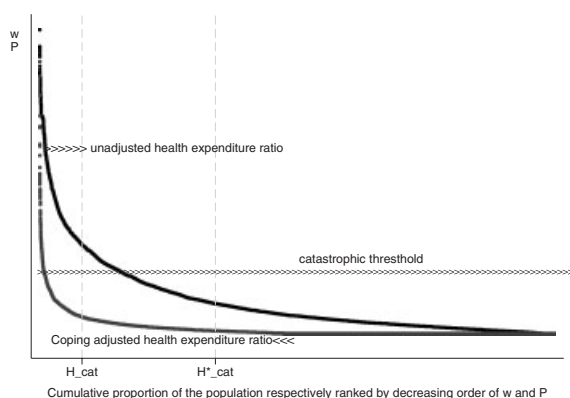


Figure 2. Cumulative distributions of coping-adjusted,  $P$ , and unadjusted,  $w$ , health expenditure ratios. Notes:  $H_{\text{cat}}$ ,  $H_{\text{cat}}^*$  adjusted and unadjusted incidence of catastrophic payments.  $w$  is the health payments as a proportion of annual consumption.  $P$  the health payments financed from income as a proportion of current income

The adjusted incidence of catastrophic payments,  $H_{\text{cat}}$ , is given by

$$H_{\text{cat}} = \frac{1}{N} \sum_i^N E_i \text{ with } E_i = 1 \text{ if } O_i > 0 \text{ and } 0 \text{ otherwise} \quad (2)$$

where  $N$  is the sample size. This prevalence is given by the inner curve in Figure 2, which shows  $P_i$  against the cumulative share of the sample ranked in descending order of this share. Reading off this parade at the threshold  $\tau$ , one obtains the fraction of the sample that experience a relative fall in current consumption sufficient to be considered catastrophic. The outer curve shows the unadjusted health budget share,  $w_i$ , against the cumulative proportion of the sample ordered by this ratio. Let  $H_{\text{cat}}^*$  be the unadjusted incidence of catastrophic payments defined on the basis of  $O_i^*$ , as in Wagstaff and van Doorslaer (2003). The difference between the catastrophic headcount ratios,  $H_{\text{cat}}^* - H_{\text{cat}} = H_{\text{cop}}$ , gives the proportion of households that avoid catastrophic expenditures in the short term because they finance health payments from coping mechanisms. This difference can also be decomposed by the source of funding.

The average intensity of catastrophic payments can also be calculated and the effect of coping strategies on this statistic identified in the aggregate and by source of funding.

### HEALTH PAYMENTS, TRANSIENT AND HIDDEN POVERTY

The previous section was concerned with the relative impact of health payments on current household consumption. One limitation of this relativist approach is that the threshold used to define catastrophic payments is inevitably somewhat arbitrary and there is no guarantee that spending less than this ratio is not a threat to the satisfaction of basic needs. For those at subsistence levels, even a small proportion of current consumption diverted to health care might push them into, or further into, poverty. This concern led Wagstaff and van Doorslaer (2003) to propose an absolute threshold approach based on the principle that households should not be pushed below the poverty line,  $z$ , or further impoverished because of health-care payments. They proposed a measure of impoverishment equal to the difference between poverty measures calculated from total household consumption gross and net of OOP health expenditures. However, if households are financing these expenditures with savings, assets sales, etc., rather than income, then total consumption gross of OOP payments does not indicate the resources that would be available on a long-term basis for non-medical consumption. This impoverishment measure

does not then correspond to the fall in poverty that would materialize if it were possible to remove OOP payments for health care. With data on coping strategies, we can identify the ‘hidden poor’: individuals not currently identified as poor because payments for health care financed by coping strategies temporarily raise their observed total expenditure above the poverty line. We can also identify individuals who experience ‘transient’ poverty because payments for health care temporarily push their consumption of other goods below the poverty line. The latter comes closer to poverty that could potentially be removed if OOP payments did not exist. Of course, it falls far short of identifying how poverty would change if a reform abolished OOP payments taking account of all behavioral responses and the financing of the reform.

We use the very well-known class of decomposable poverty measures developed by Foster *et al.* (1984):

$$\pi(\alpha, z, y) = \frac{1}{N} \sum_{i=1}^q \left( \frac{z - y_i}{z} \right)^\alpha \quad (3)$$

where  $z$  is a poverty line,  $y$  is an indicator of household welfare,  $q$  is the absolute number of poor, i.e.  $q = \sum_{i=1}^N 1\{y_i < z\}$  where  $1\{\}$  is the indicator function, and  $\alpha$  indicates the degree of poverty aversion. As  $\alpha$  increases, more importance is given to the poorest of the poor and the observed poverty is more severe. Measured poverty is a function of the living standard measure and the poverty line. It is difficult to adjust the poverty threshold to take account of health-care needs, because they are both heterogeneous and stochastic (van Doorslaer *et al.*, 2006). Accounting for health-care expenditures through the welfare indicator is more feasible. If total consumption expenditure,  $x$ , is used as a proxy for  $y$ , we have the *standard* poverty indicators:

$$\pi_0 = \pi(\alpha, z, x)$$

However,  $x$  includes health expenditures, which, if financed by coping, will raise the total. Household expenditure that is inflated by asset depletion or borrowing to pay for health care does not provide an accurate indication of sustainable long-term living standards. The preferred measure is then  $x - \theta$ , which is consistent with the Haig–Simons definition of income (Atkinson and Stiglitz, 1980), and, under the assumptions stated in the previous section, approximates the consumption that would be observed in the absence of a health shock. Measuring poverty on the basis of this welfare indicator gives

$$\pi_1 = \pi(\alpha, z, x - \theta)$$

If we assume that households do not derive utility directly from medical expenditures (Hubbard *et al.*, 1995), then  $x - \delta$  is the appropriate welfare indicator on which to assess poverty status giving

$$\pi_2 = \pi(\alpha, z, x - \delta)$$

Differences between these three measures of poverty allow us to identify various concepts:

1.  $\pi_2 - \pi_0$  gives the underestimation of poverty due to the failure to discount medical expenditures in assessing household living standards. This is the measure proposed by Wagstaff and van Doorslaer (2003).
2.  $\pi_1 - \pi_0$  gives the underestimation of poverty that arises because total expenditure is temporarily inflated by health payments financed from coping strategies, assuming that in the absence of medical spending none of the coping mechanisms would be used to finance current period consumption of other goods. This is what we refer to as ‘hidden poverty’. Households that are poor on the basis of their sustainable level of consumption are not recognized as poor by conventional measures because their use of savings, assets or borrowing to pay for large health-care costs temporarily raises their total spending above the poverty threshold.
3.  $\pi_2 - \pi_1$  is the underestimation of poverty due to the failure to recognize that households divert consumption from other basic needs to health care. This is ‘transient poverty’. Assuming that

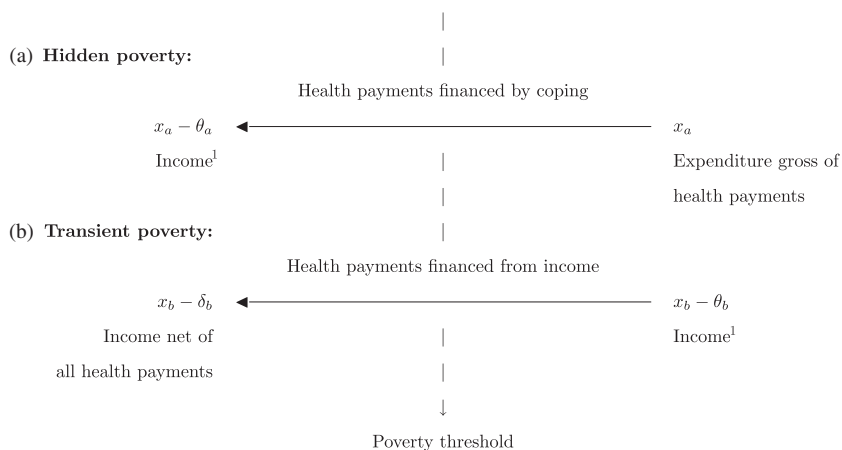


Figure 3. Hidden and transient poverty. Notes: <sup>1</sup>expenditure net of coping payments.  $x$  is the total household expenditure gross of all health payments.  $\theta$  the health payments financed by copings, e.g. saving, borrowing, etc.  $\delta$  the total health payments

health shocks are idiosyncratic and all health care financed from current income is non-discretionary, this is an approximation to the poverty that could be eliminated in the short term if households did not have to pay OOP for medical care.

$\pi(\alpha = 0, z, y)$  corresponds to the poverty headcount ratio,  $H$ . We have  $H_0 \leq H_1 \leq H_2$  since  $\theta \leq \delta \leq x$  with  $\theta \in [0, \delta]$  and  $x > 0$ . Figure 3 illustrates the distinction between hidden and transient poverty in the case of the Headcount. From a long-term perspective, household  $a$  is poor because its income lies below the poverty threshold and household  $b$  is not poor since its income lies above the threshold. By the conventional poverty headcount, assessed with respect to one-period total expenditure, neither household is recognized as poor. Household  $a$  is incorrectly labelled as non-poor because its total expenditure is temporarily pulled above the threshold by health payments that are financed from coping strategies. Its poverty is obscured by these payments. Elimination of these health payments would reveal this hidden poverty, but would not impact on the true poverty status of the household at the time of illness. In the long term, any reduction in health payments financed by coping strategies would raise the welfare of poor households by reducing the vulnerability left by the depletion of savings/assets and the accumulation of debt. Although household  $b$  is not poor from a long-term perspective, it is temporarily drawn into poverty by health payments that are financed from income and result in consumption of other goods being pushed below the poverty line. This transient poverty is caused by health expenditures and so could potentially be removed where it is possible to eliminate OOP payments for health care. Note that hidden poverty describes a situation in which a household that is long-term poor is erroneously, and only temporarily, considered to be above the poverty threshold because of health payments. In contrast, transient poverty refers to a long-term non-poor household being genuinely, but only temporarily, pushed below the poverty threshold by health payments, if health shocks are idiosyncratic.

#### THE SETTING AND DATA

In India, private health spending accounts for more than 80% of all health expenditure and public spending on health represents less than 1% of GDP (Peters *et al.*, 2001). In rural areas more than 90% households have no insurance at all and in urban areas over 75% are uninsured (National Sample

Survey Organisation, 1998a). Only 38% of primary health centers are adequately staffed and in rural areas the number of community health centers is little more than two-fifths of that deemed necessary (Srinivasan, 2005a). Deregulation resulted in drug prices almost doubling between 1980 and 1996 (Sen *et al.*, 2002). At retail market prices, a laborer would need to work more than two months in order to purchase medicines for anemia and over two years for a multi-drug-resistant tuberculosis treatment (Srinivasan, 2005b). Medical price inflation is not confined to drugs. Between 1987 and 1996, the average cost of hospitalization increased by 436 and 320% in rural and urban areas, respectively. The private sector has become the dominant provider of inpatient care, reflecting a narrowing of private–public price differentials and public sector shortages (Sen *et al.*, 2002). The proportion of people forgoing treatment for financial reasons almost doubled (National Sample Survey Organisation, 1998a) and in 1996, non-poor households were twice as likely to be hospitalized (Peters *et al.*, 2001). According to the latest figures from the National Sample Survey Organisation (2006), the financial strain caused by hospitalization seems to have worsened between 1996 and 2004; reliance on coping strategies, such as borrowing, to pay for hospital care has increased, at least in rural areas.

We use data from the health-care module of the 52nd Indian National Sample Survey (NSS) conducted in 1995–1962.<sup>2</sup> That survey gives the amount of health-care payments that is financed from each of income, savings, borrowing, sale of assets and other sources. No separate information is provided on transfers from friends and relatives. The source of finance is reported for payments made for both inpatient and outpatient care but we restrict attention to expenditures on inpatient care since, given their much greater magnitude, errors in reporting their means of finance are likely to be much smaller.<sup>3</sup> We multiply monthly per capita consumption expenditure by 12 to make it comparable with inpatient costs that are recorded for a one year reference period. The household is the unit of analysis. Expenditure on inpatient care includes all direct and indirect payments, including those for medicines.

The survey covered 71 284 and 49 625 rural and urban households, respectively (Table I). We restrict attention to non-insured households with any hospitalization in the last year that report the means of financing this hospital care. This gives sub-samples of 10 866 and 8630 rural and urban households, respectively (Table I). The excluded hospitalized households that do not report financing sources do not differ significantly with respect to the magnitude of OOP payments, annual consumption, or length of stay.<sup>4</sup> This is encouraging since reliance on coping strategies is correlated with these factors (see Table II below). However, those not reporting source of finance are more likely to live in urban areas, to have an older, better educated head and to receive treatment in a public hospital. All of these characteristics are correlated with a lower probability of relying only on coping strategies and/or a greater tendency to finance entirely from income (Table II). Hence, although we cannot be sure, the estimation sample may display a greater reliance on coping strategies than is true of the full hospitalized population. Hospitalized households are, on average, richer than the overall sample. Most probably, this reflects the fact that the poorest households simply cannot afford to pay for medical treatment and must forgo it. It is important to bear in mind that this most extreme welfare cost of the lack of health insurance is not reflected in the present analysis.

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<sup>2</sup> There is a more recent NSS survey on health-care carried out in 2004 that does contain some information on the means of financing health-care payments but it does not distinguish between funding from income and savings. For our purposes, this is a major drawback since the two sources of funding have very different short- and long-term consequences. Another limitation of 2004 survey is the very crude determination of household total expenditure, which was computed from relatively few consumption aggregates over a 30 day reference period unlike in our survey. Consumption is recorded for 25 components, grouped in 10 categories for two reference periods (30/365 days) depending upon the nature of the good (National Sample Survey Organisation, 1998b).

<sup>3</sup> Average expenditure per hospitalization is equivalent to over 10% of average annual per capita consumption and is over 20 times higher than the average cost of outpatient treatment reported for the past 15 days (National Sample Survey Organisation, 1998a).

<sup>4</sup> Results are available upon request.

Table I. Health payments and their financing

	Rural		Urban	
Number of households (full sample)	71 284		49 652	
Households with at least one member hospitalized <sup>a</sup>	11 947	(6.14%)	10 534	(8.42%)
Under reimbursement scheme	-123		-465	
With missing information on source of fundings	-959		-1439	
Hospitalized sample <sup>b</sup>	10 866	(5.7%)	8 630	(7%)
Average annual per capita expenditure (APCE) in Indian rupees at 1995/96 Prices, $\bar{x}$				
Full sample	Rs. 3080	[Rs. 3046, Rs. 3114]	Rs. 5185	[Rs. 5113, Rs. 5256]
Hospitalized sample	Rs. 3856	[Rs. 3701, Rs. 4011]	Rs. 5678	[Rs. 5549, Rs. 5808]
<i>Hospitalized sample</i>				
Mean OOP payments as a proportion of APCE, $\bar{w}$	10.62%	[10%, 11.3%]	9.01%	[8.6%, 9.4%]
Average share of OOP expenditures covered with current income	24.44%	[22.8%, 26.1%]	32.92%	[31.3%, 34.5%]
Mean OOP payments financed from income as a proportion of total income, $\bar{P}$	1.52%	[1.4%, 1.6%]	1.79%	[1.7%, 1.9%]
Proportion of households financing OOP exclusively from				
(a) Borrowing	13.56%	[12.2%, 15%]	9.22%	[8.2%, 10.3%]
(b) Savings	17.00%	[15.4%, 18.6%]	22.07%	[20.5%, 23.6%]
(c) Assets, another strategy or a combination of strategies <sup>c</sup>	21.61%	[19.7%, 23.5%]	13.14%	[12%, 14.3%]
	52.2%	[50%, 54.3%]	44.4%	[42.6%, 46.3%]
(d) Current income	17.08%	[15.5%, 18.7%]	25.61%	[24%, 27.2%]
(e) All sources <sup>d</sup>	28.56%	[26.7%, 30.4%]	25.69%	[24.2%, 27.2%]
	97.8%	[97%, 98.6%]	95.7%	[94.9%, 96.5%]
(f) Proportion of households without any expenditure	2.18%	[1.4%, 3.0%]	4.28%	[3.5%, 5.1%]

Sample weights applied. Confidence intervals at 95% level, cluster and stratification corrected []. Indian population share (). Authors' own calculation. Unit of analysis is the household. Data: Indian survey on morbidity and health care conducted in 1995–1996, NSS52 (National Sample Survey Organisation).

<sup>a</sup>Households reporting at least one hospitalization case during last 365 days.

<sup>b</sup>Households having at least one member hospitalized with information about source of funding, not covered by any employer or private health insurance.

<sup>c</sup>Households relying on any coping strategies either sold their assets or used another unspecified strategy. They might also have used all coping strategies at the same time (including borrowing and savings).

<sup>d</sup>Households relying on all sources depend not only on all coping strategies (including borrowing) but also on income.

## RESULTS

### Coping with hospitalization costs

The financial burden of inpatient care for the uninsured population is substantial, particularly in rural areas. For those hospitalized, on average, OOP payments account for 11 and 9% of total annual household expenditures (APCE) in rural and urban areas, respectively (Table I). The need to finance such large expenses through sources other than income is evident. Indeed, in rural areas only a quarter of these expenses are funded from current income on average (Table I). In urban areas the proportion is slightly higher but is still only one-third and, on average, only 1.8% of annual income is used to pay for hospitalization. Only one urban household out of four relies exclusively on income to pay for hospital care and the fraction is even lower in rural areas (Table I). Hence, while there is no full insurance of inpatient care costs, informal insurance mechanisms or coping strategies are used to finance the larger

Table II. Likelihood of financing inpatient care (probit estimates<sup>a</sup>)

	Entirely from						Partly from borrowing		
	Coping		Income						
	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.			
Constant	0.20		0.157	−0.20	0.18	−0.51	**	0.157	
Rural	0.22	**	0.045	−0.36	**	0.05	−0.41	**	0.048
Head of household									
Age	−0.003	*	0.002	0.003		0.002	−0.01	**	0.002
Female	0.07		0.064	−0.21		0.08	−0.16	**	0.068
Superior education	0.03		0.059	0.18	**	0.07	−0.63	**	0.068
Regular wage/salaried	−0.14	**	0.061	0.005		0.06	−0.11		0.068
Household socio-demographic variables									
Caste or tribe	−0.02		0.051	−0.04		0.06	0.25	**	0.054
Current income quintile (ref. is lowest 20 %)									
Q2	−0.11		0.067	0.13		0.08	−0.16	**	0.073
Q3	−0.10		0.070	0.17	*	0.09	−0.24	**	0.074
Q45	−0.31	**	0.067	0.53	**	0.08	−0.51	**	0.073
Household size (ref. is ≤ 4 members)									
]4, 6] members	−0.15		0.046	0.01		0.05	0.16	**	0.051
> 6 members	−0.16	**	0.053	0.03		0.06	0.17	**	0.058
Characteristics of household members hospitalized									
Relation to the head of the household (ref. is head of the household)									
Spouse of the head	−0.15	**	0.052	0.09		0.06	−0.13	**	0.057
Unmarried Child	−0.18	**	0.075	0.32	**	0.08	0.02	**	0.081
Married Child	−0.02		0.103	0.16		0.12	−0.24	**	0.108
Spouse of Married Child	0.05		0.106	0.11		0.11	−0.29	**	0.120
Grand Child	−0.11		0.132	0.49	**	0.14	−0.32	**	0.135
Other	−0.34	**	0.085	0.19	**	0.09	−0.20	**	0.089
Age group (ref. > 65 years)									
0–10 years	−0.02		0.098	−0.39	**	0.11	0.27	**	0.095
11–25 years	0.03		0.079	−0.41	**	0.09	0.24	**	0.079
26–45 years	−0.03		0.069	−0.22	**	0.08	0.31	**	0.070
46–65 years	−0.02		0.066	−0.15	**	0.08	0.16	**	0.072
Numbers of days hospitalized (ref. is ≤ 4 days <sup>b</sup> )									
5–30 days	0.10	**	0.045	−0.34	**	0.05	0.28	**	0.050
> 30 days	0.16	**	0.079	−0.49	**	0.09	0.38	**	0.084
Type of hospital (ref. is public)									
Private	0.11	**	0.043	−0.27	**	0.05	0.08	*	0.048
Per capita out-of-pocket expenditures (ref. <sup>c</sup> is ≤ Rs. 240/7.27\$)									
Rs. 241–664	0.24	**	0.051	−0.74	**	0.06	0.66	**	0.054
Rs. 665–1524	0.30	**	0.059	−1.14	**	0.06	0.92	**	0.063
> Rs. 1524	0.31	**	0.074	−1.34	**	0.10	1.08	**	0.080
<i>N</i>	19 240			19 240			19 240		
<i>F</i> (54, 11 487)	6.95			20.95			22.83		
Prob > <i>F</i>	0.00			0.00			0.00		
Pregibon's goodness of link test: $\text{Prob}(y = 1) = \delta_0 + \delta_1 X' \hat{\beta} + \delta_2 (X' \hat{\beta})^2 + v$									
$H_0: \delta_2 = 0$		$z = -0.6$			$z = -1.28$		$z = 0.02$		
$P >  z $		0.55			0.20		0.984		

Note: \* significant at 10%, \*\* significant at 5%. Standard errors are adjusted for clustering at the rural village/urban block and for stratification. Dependent variable is 1 if inpatient care is exclusively covered with any coping strategy, current income (column 2). In third column dependent variable is 1 if health payments are partly financed by borrowing. Data: Indian survey on morbidity and health care conducted in 1995–1996, NSS52.

<sup>a</sup>In addition, all models include state level fixed effects, not shown in the table.

<sup>b</sup>Four days correspond to the first quintile of hospitalization duration. Sixty-five percent of the members hospitalized spend between 5 and 30 days in a hospital. Only 10% are hospitalized for more than one month.

<sup>c</sup>Fifty percent of the households spend at most Rs. 240/per capita. Twenty-five percent spend between Rs. 241 and 664. Fifteen percent spend between Rs. 665 and 1524. Ten percent spend more than Rs. 1524.

part of these expenses, greatly reducing their short-term impact on household welfare. However, the long-term opportunity cost of coping might be substantial. While 44% of urban households rely exclusively on coping strategies to finance hospital care, only half of these do so by drawing on savings (Table I). The others rely exclusively on borrowing (9%) or on assets sales and/or a combination of all coping strategies (13%). In rural areas, the long-term consequences of paying for hospital care are likely to be even greater. While one in two households finances these costs entirely from coping, less than one-fifth do so from savings. One in seven relies entirely on borrowing and more than a fifth on asset sales, or a combination of coping strategies. Informal borrowing can indebt households for a long time at a tremendously high interest rate. Depleting productive assets threatens future earnings and leaves a household exposed in the event of future shock. There seems to be extensive reliance on informal insurance, but this is far from perfect. While individuals can spread risk over time, in general, risks may not be pooled across individuals.

We carried out a simple probit analysis to summarize the factors correlated with a higher likelihood of financing inpatient care completely through coping mechanisms (Table II). These factors include rural location, lower income, higher inpatient costs, longer length of stay, treatment in private hospital, head of household being hospitalized, higher education and smaller household size. Some households do not make use of coping mechanisms at all but finance inpatient care entirely from their current income. These correspond to 17 and 26% of households in rural and urban areas, respectively (Table I). As expected, factors correlated with a higher probability of financing through coping mechanisms are associated with a lower likelihood of relying entirely on current income. Interestingly, those with a regular wage are more likely to finance entirely from income and less likely to resort to coping strategies. Those living in smaller or poorer/middle income states, such as Meghalaya, Manipur, Nagaland, Assam, Bihar, Orissa, Uttar Pradesh, Gujarat and Rajasthan, are less likely to finance entirely from income.<sup>5</sup>

This descriptive analysis suggests that coping strategies are not a first, or even second, best response to meeting medical expenditure needs. If the cost is sufficiently moderate and/or if the household's income is sufficiently high, then payments appear to be made from current income. This may involve the sacrifice of current consumption but not of basic needs. When the costs are substantial relative to income, then alternative means of finance with longer-term consequences for household welfare are adopted. The long-term impact on welfare is unlikely to be the same for all coping strategies. Previous studies of Andhra Pradesh, Rajasthan and Gujarat (Krishna, 2004, 2006; Krishna *et al.*, 2005), for instance, reveal that borrowing is mainly from informal moneylenders at high rates of interest that, in general, increase with the severity of a household's poverty. For some particular groups, such as the Scheduled Castes and Tribes, borrowing can even lead to debt bondage (Krishna *et al.*, 2005). Credit on these terms is not an appealing financial instrument that will be readily used to smooth consumption. Table II shows that borrowing is more likely to be used by rural, poor and low-caste households to finance hospital costs. Borrowing is used, at least to some extent, when the costs are higher, the length of stay longer and care is in a private hospital.

The unadjusted health expenditure ratio increases strongly with total expenditure, ranging from 6–7% in the lowest quintile to 15–18% in the highest (Table III). Given that such a large share of inpatient costs are financed from coping strategies, this relationship must partly reflect the endogeneity of total household expenditure, which rises in response to inpatient care costs. This appears to be confirmed by the fact that the gradient in the ratio of health payments financed from current income to total income, while still present, is less pronounced than that in the unadjusted health expenditure ratio. Moreover across all income groups, the coping-adjusted health expenditure ratio remains below 3%. Savings and borrowing together finance around three-fifths of the cost of hospital care in both urban and rural areas,

<sup>5</sup> Results not shown in table but available upon request.

Table III. Out-of-pocket health payments of hospitalized individuals<sup>a</sup>

	Lowest 20%	Second lowest	Middle	Second highest	Highest 20%	Highest/lowest	Total
<i>As % of annual per capita consumption (APCE), unadjusted health expenditure ratio</i>							
By Quintile of annual per capita consumption							
Rural (mean)	6.69 (0.31)	7.89 (0.44)	9.46 (0.52)	10.91 (0.47)	18.18 (1.25)	2.72	10.62 (0.33)
Urban (mean)	5.59 (0.34)	6.71 (0.32)	8.02 (0.33)	9.52 (0.46)	15.23 (0.55)	2.72	9.01 (0.20)
<i>Financed from income as a % of annual per capita current income<sup>b</sup> (PCCI)</i>							
By Quintile of annual per capita current income							
Rural (mean)	1.20 (0.13)	1.16 (0.94)	1.27 (0.96)	1.48 (0.12)	2.49 (0.2)	2.08	1.52 (0.06)
Urban (mean)	1.17 (0.11)	1.72 (0.15)	1.62 (0.11)	2.05 (0.15)	2.40 (0.18)	2.04	1.79 (0.07)
<i>Proportion financed from</i>							
By Quintile of PCCI							
Rural (mean)							
Savings	23.15	29.88	29.79	28.24	33.59	1.45	29.6
Borrowing	40.11	35.25	34.20	32.94	22.76	0.57	33.8
Assets <sup>c</sup>	5.72	5.04	3.89	4.22	2.56	0.45	4.4
Others	8.18	5.80	6.10	7.10	8.42	1.03	7.3
Urban (mean)							
Savings	27.41	27.06	32.96	36.51	45.57	1.66	35.4
Borrowing	30.02	26.62	21.19	16.50	9.87	0.33	21.8
Assets <sup>c</sup>	2.79	2.57	2.18	1.42	1.01	0.36	2.1
Others	7.22	5.21	6.76	5.64	5.45	0.76	6.3

Sample weights applied. Authors' own calculation. () Standard errors are cluster and stratification corrected. Total expenditure/income quintile groups are calculated for rural and urban areas separately. *Data*: Indian survey on morbidity and health care conducted in 1995–1996, NSS52.

<sup>a</sup>Households having at least one member hospitalized during the last 365 days, with valid information about source of funding and not covered by any employer-sponsored or private health insurance. A total of 10 866 and 8630 households in rural and urban areas, respectively.

<sup>b</sup>Current income proxied by total expenditure net of inpatient expenses financed with coping.

<sup>c</sup>Sale of assets includes sale of animals, ornaments and other physical assets.

with savings contributing more in urban areas and borrowing more in rural areas (Table III, last column). Asset sales and other coping strategies are much less important. The mix of financing strategies differs markedly across the income distribution (Table III). The share of inpatient costs financed from savings rises with income, while the relative contributions of borrowing and assets depletion are falling with income.<sup>6</sup> The poorest fifth in rural areas cover 40% of their OOP expenditures with borrowing while the richest fifth finance a third of their payments with savings. It is expected that the better-off will have larger buffer stocks of savings that they can draw on in times of need, such as inpatient treatment. While drawing down savings will raise vulnerability to future shocks, it is likely that the accumulation of debt and the depletion of assets, which are strategies more common amongst the poor, will have an even greater long-term impact on household welfare. Banerjee and Duflo (2007) report that while indebtedness of the extremely poor varies considerably across the world, in general the poor do have access to informal credit markets. This study also corroborates our findings on the ability

<sup>6</sup>A WHO publication based on the 2003 World Health Survey for India (WHO, 2006) also shows a negative income gradient in the proportion of households financing any health expenditure from borrowing, asset depletion or transfers from friends and relative. On the other hand, the proportion of households relying on income, savings and health insurance increases with income.

Table IV. Incidence of catastrophic expenditures

Catastrophic threshold	India <sup>a</sup>			Hospitalized sample <sup>b</sup>		
	5%	10%	20%	5%	10%	20%
<b>Rural</b>						
Unadjusted catastrophic headcount ratio, $H_{cat}^*$ , %	3.54	2.20	1.08	54.97	34.15	16.79
Coping-adjusted catastrophic headcount ratio, $H_{cat}$ , %	0.52	0.21	0.04	8.06	3.28	0.69
Proportion currently avoiding catastrophic expenditures, $H_{cop}$ , %	3.02	1.99	1.04	46.92	30.87	16.09
<b>Urban</b>						
Unadjusted catastrophic headcount ratio, $H_{cat}^*$ , %	4.04	2.43	1.03	48.57	29.20	12.38
Coping-adjusted catastrophic headcount ratio, $H_{cat}$ , %	0.83	0.30	0.08	10.03	3.65	0.91
Proportion currently avoiding catastrophic expenditures, $H_{cop}$ , %	3.21	2.13	0.95	38.54	25.56	11.46

Sample weights applied. Authors' own calculation. *Notes:* All catastrophic headcount ratios are significant at 5% level (determined on the basis of cluster and stratification corrected standard errors).  $H_{cat}^*$  is the proportion of households spending more than  $\tau\%$  of their total consumption on inpatient care, regardless of the source of funding.  $H_{cat}$  is the proportion of households with health payments financed from income equal to more than  $\tau\%$  of their total income.  $H_{cop}$  identify the proportion of households reducing the risk of consumption disruption in the short-term below the catastrophic threshold,  $H_{cat}^* - H_{cat}$ . *Data:* Indian survey on morbidity and health care conducted in 1995–1996, NSS52.

<sup>a</sup>Sample size: 70 202 and 47 766, rural and urban households excluding those covered by any employer-sponsored/insurance scheme.

<sup>b</sup>Households having at least one member hospitalized during the last 365 days, not covered by any employer-sponsored/insurance scheme, i.e. 10 866 and 8630 households in rural and urban areas.

to cope with medical expenditures in India. The indigents in Udaipur, one of the poorest district in Rajasthan, can cover over 70\$ by borrowing or dissavings, while the average monthly consumption per capita is 43.12\$ in these hamlets.

### Catastrophic payments

Table IV presents estimates of the incidence of catastrophic payments with and without taking account of financial coping strategies. Rates are given for the whole sample, split by urban and rural, and among households with at least one member hospitalized. Figures are presented for thresholds of 5, 10 and 20% of total expenditure/income.<sup>7</sup> The incidence is obviously higher at a lower threshold but the choice of threshold does not affect the impact of allowing for coping strategies.

Taking no account of how OOP payments are financed, 2% of all households spent more than 10% of total expenditure on hospital inpatient care in both rural and urban areas. Among those with a hospitalization, the incidence of this definition of catastrophic payments is 34% in rural areas and 30% in urban areas. However, these figures are much lower if one takes account of the fact that households can rely on informal insurance mechanisms to finance health care and so prevent a catastrophic decline in their welfare, at least in the short-run. Less than 4% of households with a hospitalization direct more than 10% of their current income to pay for the cost. In rural areas, out of the 34% households that spend more than 10% of total expenditure on inpatient care, 31% can use informal insurance mechanisms to avoid a catastrophic impact on their current consumption. At a 20% threshold the proportion coping represents 96% of those who would have been exposed to catastrophic payments had

<sup>7</sup>For these data, 20% of total expenditure is equivalent to a little less than the figure of 50% of non-food expenditure that has been used by WHO (Xu *et al.*, 2003). The average food budget share was 69 and 61% in rural and urban areas, respectively; hence, 50% of non-food expenditure is 15.5 and 19.5% of total expenditure in each area.

Table V. Poverty headcount ratios unadjusted and adjusted for inpatient payments and their financing

	Rural		Urban	
	India <sup>a</sup>	hospitalized <sup>b</sup>	India <sup>a</sup>	hospitalized <sup>b</sup>
Standard poverty headcount ratio, $H_0$ , %	8.94 <sup>r/u</sup>	23.39	29.66	24.40
Poverty adjusted for OOP financed by coping, $H_1$ , %	39.39 <sup>r/u</sup>	30.35	30.13	30.13
Poverty adjusted for all OOP payments, $H_2$ , %	39.45 <sup>r/u</sup>	31.30	30.26	31.64
Change in poverty due to				
All OOP payments, $H_2-H_0$ , %	0.51	7.91	0.60	7.24
OOP payments financed from income, 'transient' poverty, $H_2-H_1$ , %	0.06 <sup>r/u</sup>	0.95 <sup>r/u</sup>	0.13 <sup>r/u</sup>	1.51 <sup>r/u</sup>
OOP payments financed by coping strategies, 'hidden' poverty, $H_1-H_0$ , %	0.45	6.97	0.48	5.73
Percentage change in measured poverty due to				
All OOP payments, $(H_2-H_0)/H_0$ , %	1.31	33.83	2.03	29.67
'Transient' poverty, $(H_2-H_1)/H_1$ , %	0.15	3.11	0.42	5.02
'Hidden' poverty, $(H_1-H_0)/H_0$ , %	1.15	29.79	1.61	23.48

Sample weights applied. Authors' own calculation. *Notes:* All poverty headcount ratios and differences are significantly different from zero at 5% level (determined from cluster and stratification corrected standard errors). <sup>r/u</sup> indicates significant differences between urban and rural ratios at 5% level. Official poverty lines for 1995/1996 are not available. Thus, poverty headcount ratios are calculated using figures for 1993/1994 (Deaton and Tarozzi, 2005). Expenditures (on consumption and inpatient care), as well as source of funding, are deflated using state-wise consumer index price for agricultural labors and industrial workers from the Labor Bureau, Government of India. *Data:* Indian survey on morbidity and health care conducted in 1995–1996, NSS52.

<sup>a</sup>Sample size: 70 202 and 47 766, rural and urban households excluding those covered by any employer-sponsored/insurance scheme.

<sup>b</sup>Households having at least one member hospitalized during the last 365 days, not covered by any employer-sponsored/insurance scheme, i.e. 10 866 and 8630 households in rural and urban areas.

they covered inpatient charges from their current income. In urban areas, consumption is protected from a catastrophic impact to a similar degree.

The difference between the unadjusted and coping-adjusted incidence of catastrophic payments is mainly accounted for by borrowing, particularly in rural areas where it reduces the incidence by half, and by savings<sup>8</sup> (not shown in the table but available upon request).

### Health payments adjusted poverty measures

The official poverty lines in India, which vary by State and rural/urban regions, are set at the *monthly per capita* expenditures estimated as required to consume 2400 calories per day in rural areas and 2100 in urban areas plus an allowance for basic non-food needs. Given that the consumption basket used to compute such lines has been the same for 30 years, some have argued that India has a 'starvation line', ensuring nowadays only an average of 1868 and 1912 calories in rural and urban areas, respectively (Guruswamy and Abraham, 2006). In any case, this is a threshold that takes little account of health-care needs. Figures for 1995/1996 are not available but they are for 1993/1994 (Deaton and Tarozzi, 2005), so we deflate all expenditure variables using state-specific consumer price indices.<sup>9</sup>

In 1995/1996, the standard poverty headcount ratio<sup>10</sup> ( $H_0$ ) is estimated as 38.9 and 29.7% among the rural and urban populations of India, respectively (Table V). Assessing poverty on the basis of household expenditure net of payments for inpatient care results in a rise in the headcount by 0.5 and

<sup>8</sup>We also analyzed state level variation in the incidence of catastrophic expenditures. We find that the states with the highest incidence are the ones with the highest proportion of households coping. These results are available upon request.

<sup>9</sup>State-specific consumer index price for rural laborers/industrial workers is used in rural/urban areas.

<sup>10</sup>Here we only present results for the poverty headcount although our methodology is applicable to the more general class of Foster *et al.* (1984) poverty indices.

Table VI. State-level factors correlated with OOP health payments adjustment to poverty headcount<sup>a</sup> (robust OLS regression)

Dependent variable	$H_2-H_0^b$		Robust standard errors
Households (%) with members treated in private hospitals	0.040	**	0.014
Population per hospital bed	1.3E-05	**	4.15E-06
Average share of OOP expenditures financed with coping strategies	0.221	**	0.034
Unadjusted initial rate of poverty $H_0$	0.207	**	0.026
Constant	-0.169	**	0.025
<i>R</i> -square	0.65		
Fisher zero slope test: $F(4, 25)$	29.1	<i>p</i> -value	0
Ramsey RESET test, $H_0$ : model has no omitted variables, $F(3, 22)$	0.33	<i>p</i> -value	0.81
Number of observations	30		

Notes: \*\*significant at 5%. Data: Indian survey on morbidity and health care conducted in 1995–1996, NSS52.

<sup>a</sup>The 15 major states considered are: Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Kerala, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West-Bengal. Data are urban/rural specific within each state.

<sup>b</sup>Dependent variable: differences between OOP adjusted and unadjusted poverty headcount ratios calculated in each Indian state for rural and urban areas separately.

0.6% points in rural and urban areas, respectively.<sup>11</sup> These increases might seem modest but they translate into substantial numbers in a country with a population of 1.1 billion. The greater part (88% in rural and 80% in urban) of this upward adjustment to the rate of poverty is due to discounting temporary increases in total expenditure caused by households using coping strategies to pay for hospital care.

According to the standard poverty measure, an estimated 24% of individuals from households in which someone is hospitalized are poor (Table V). This rate rises to approximately 30% if allowance is made for the inflation of household total expenditures due to drawing down saving, borrowing, depleting assets, etc. to pay for inpatient care. In other words, 6–7% of individuals in households with a hospitalized member are not recognized as poor by the standard methodology simply because their household's total expenditure has been temporarily raised to pay for hospital care. This is the poverty that is hidden because households manage to use informal insurance mechanisms to overcome payment difficulties. In rural areas, borrowing is the main coping strategy, financing almost 34% of OOP expenditures (Table III). Thus, poverty is mainly underestimated due to indebtedness. In urban areas, saving is the main source of funding, but borrowing still accounts for 22% of health expenditures.

The proportion of individuals in hospitalized households whose current income (i.e. total expenditure less health payments financed by coping) is above the poverty line but whose current consumption (i.e. total expenditure less total health payments) lies below the poverty threshold is around 1% in rural areas and 1.5% in urban areas. This is the transient poverty created by the financing of health payments from current income. Comparing the magnitudes of the hidden and transient poverty, it is apparent that the main consequence of health payments for the measurement of poverty is not the oversight of temporary diversions of consumption from basic needs to health care but the inflation of total household expenditures by the exercise of coping strategies adopted to pay for health care.

To illustrate how the use of financial coping strategies to pay for hospital care affects the measurement of poverty, we analyze state level variation in the poverty adjustment ( $H_2 - H_0$ ) in relation to the degree of reliance on coping strategies and other state level characteristics (Table VI). This

<sup>11</sup>In relative terms, the increases correspond to a 1.3 and 2% increase in poverty in rural and urban areas, respectively. Using the same data as we do but not state-specific poverty lines, Peters *et al.* (2001) estimate that taking account of direct hospital charges increases the poverty rate by 2.2%. van Doorslaer *et al.* (2006) use a different survey and poverty line (1.08\$) and estimate a 12% increase in the year 2000 Indian poverty rate after discounting all payments for health care (not only those for inpatient care).

is done for the 15 major states for which data are available, disaggregated by urban and rural locations. Poverty changes are the greatest in the states where households rely most on coping strategies and which have the highest initial poverty rates. The poverty adjustment is also greater in states with a greater presence of private sector care, presumably reflecting the higher costs of care. More surprising is the finding that the underestimation of poverty is greater in states with fewer beds relative to population. One might have expected that lower supply would result in less hospitalization and consequently a smaller impact of hospital costs on household resources.

## CONCLUSION

In the context of low-income populations with limited formal health insurance coverage, this paper argues that the strategies households adopt to finance health care have important implications for both the measurement and the interpretation of how health payments impact on household consumption, welfare and poverty. Given the availability of cross-section data containing information on the means of financing health payments, we propose that the relative impact of those payments on consumption of other goods is best approximated by payments financed from income as a proportion of that income. Measures based on the ratio of health payments to total household expenditure, which have been used previously, overestimate the risk to current consumption induced by health payments and so exaggerate the scale of catastrophic payments. Failure to take account of the extent to which health care is financed from running down savings, borrowing and depleting assets leads to the oversight of the long-run opportunity cost of health payments. We show how information on the source of finance can be used to uncover poverty that is hidden by conventional measures because total household expenditure is inflated by payments for health care that are financed from coping strategies. We propose that the impact of health payments on transient poverty be approximated through assessing poverty on the basis of current income both gross and net of health payments financed from income alone.

We use the 1995/1996 NSS of India to illustrate how taking account of the financing of payments of inpatient care affects measures of the impact of health payments on household consumption, welfare and poverty. Coping strategies—savings, borrowing, asset sales and transfers finance three-quarters of the cost of inpatient care in rural areas and two-thirds of the cost in urban areas. Hospital costs are fully financed from these sources by 52% of rural households and 44% of urban ones. While this suggests a high degree of informal insurance of health-care costs, it does not appear that such coping mechanisms are the preferred means of financing health care, chosen in order to smooth consumption of other goods. If the cost of care is sufficiently low relative to the household's income, then payments will be made from current income. This may involve the sacrifice of current consumption but not of basic needs. It is poorer households that resort to borrowing and the sale of assets, suggesting that long-term sacrifices are accepted only when the economic constraint is so severe that it is not possible to accommodate health payments through the sacrifice of current consumption. Thus, we observe a hierarchy of coping strategies in which health care is financed first from current income or savings, recourse is made to borrowing and asset sales if income and savings are insufficient and, finally, if collateral is lacking, health care is forgone.

The short-term catastrophic impact of hospital costs on household welfare is seriously overestimated if coping strategies are not taken into account. For example, payments for inpatient care exceed 10% of total household expenditure for 29% of rural hospitalized households and 34% of urban households. However, assuming that health payments financed from coping strategies are not at the expense of current consumption, less than 4% of households in both rural and urban areas sacrifice more than 10% of their current consumption to accommodate spending on hospital care. This is not to say that payments for health care financed from coping strategies do not entail substantial long-term

sacrifice. Rather, it is important to distinguish the short-term from the long-term consequences of health-care costs and data on how they are financed makes this more feasible. Of course, longitudinal data would allow one to identify the long-term impact of various coping strategies on consumption and poverty. Taking account of hospitalization costs raises the estimated rate of poverty by 7–8% points among hospitalized households. The greater part of this adjustment is not due to overlooking a temporary diversion of consumption from basic needs to health care but because total expenditure is inflated by coping strategies adopted to pay for health care; hence, total expenditure is not an accurate indicator of either current or long-term living standards. Households, to a large extent, manage to cope in the short-term. However, in doing so, they potentially get into deeper and deeper long-term financial difficulties through the accumulation of debt and exhaustion of savings and assets. The greater welfare impact of uninsured health payments may not be the short-term interruption to consumption but the long-term penury of households saddled with a burden of debt, which must be serviced at extremely high interest rates, and with insufficient remaining buffer stocks of wealth to endure future economic shocks. While the extensive use of coping strategies indicates an ability to smooth consumption, it falls far short of first-best insurance that pools risks of catastrophic medical costs. Relieving the long-term economic vulnerability generated by OOP health payments could be one of the main benefits from formal health insurance mechanisms.

Our analysis has some important limitations that may lead to an understatement of the burden of health-care payments in India. First, as noted above, health-care costs have escalated since 1995/1996, the year of analysis. Further, in order to minimize reporting error, we restrict attention to payments for inpatient care and so do not capture the financial burden induced by OOP expenditures on outpatient care and drugs that are not associated with inpatient treatment. Although per episode, payments for outpatient care and drugs are much smaller than those for inpatient care, they account for the largest share of aggregate health expenditures (WHO, 2006) and, unlike inpatient costs, are reported to be mainly financed from income and savings (National Sample Survey Organisation, 2006). Therefore, by restricting our attention to payments for inpatient care, we might be overlooking an important source of risk of current consumption disruption and impoverishment in the short term. Moreover, we examine the welfare effects of incurred medical expenditures and so restrict attention to individuals that use health services. In doing so, we overlook the problem of forgone treatment, which, as acknowledged above, may be the most extreme and least preferred coping strategy (Sauerborn *et al.*, 1996) or the only one available to the most vulnerable households, i.e. those without access to informal credit markets and networks. While we have argued that ignoring sources of funding will overestimate the short-term consumption consequences of health expenditures, we realize that our approach deal neither with the short-term consequences for health nor with the potential longer term consequences if an untreated ailment results in higher medical expenditures later. We have also ignored the labor supply effect of a health shock. Some studies suggest that the economic consequences of income loss are greater than those from medical expenditures (Jacoby and Skoufias, 1997; Rose, 1999; Gertler and Gruber, 2002; Beegle *et al.*, 2006).

Notwithstanding these caveats, it is our contention that taking account of how health payments are financed can enrich our understanding of their short- and long-term consequences for household consumption and living standards. Panel data, which allow identification of the impact of health shocks on changes in consumption, are obviously preferable. However, they are expensive to collect. Adding questions on the means of financing health payments to cross-section surveys is a relatively low-cost alternative with a good pay-off in the information provided. Moreover, the impact of coping mechanisms is likely to be context and country specific (Towsend, 1995; Suramya and Veena, 2006; Giles and Yoo, 2007). It would be interesting to apply the proposed analysis to data from other countries in order to compare differences in the strategies used to finance health care and their welfare consequences across groups and populations.

## ACKNOWLEDGEMENTS

This research has benefited from a grant of the Swiss University Conference, in the scope of the IRIS project 'Health and Society', involving the Universities of Geneva and Lausanne, and the Swiss Federal Institute of Technology Lausanne.

## REFERENCES

- Atkinson AB, Stiglitz JE. 1980. *Lectures on Public Economics*. McGraw-Hill: New York.
- Banerjee A, Dufló E. 2007. The economic lives of the poor. *Journal of Economic Perspectives* **21**(1): 141–167.
- Beegle K, Dehejia RH, Gatti R. 2006. Child labor and agricultural shocks. *Journal of Development Economics* **81**: 81–96.
- Bonu S, Rani M, Peters D, Jha P, Nguyen SN. 2005. Does use of tobacco or alcohol contribute to impoverishment from hospitalization costs in India. *Health Policy and Planning* **20**: 41–49.
- Carter MR, Maluccio JA. 2003. Social capital and coping with economic shocks: an analysis of stunting of South African children. *World Development* **31**(7): 1147–1163.
- De Weerd J, Dercon S. 2006. Risk-sharing networks and insurance against illness. *Journal of Development Economics* **81**(2): 337–356.
- Deaton A, Tarozzi A. 2005. Price and poverty in India. In *Data and Dogma: The Great Indian Poverty Debate*, Chapter 16, Deaton A, Kozel V (eds). Macmillan: New Delhi, India.
- Dercon S. 2002. Income risk, coping strategies and safety nets. *World Bank Research Observer* **17**(2): 141–166.
- Dercon S. 2005. *Insurance Against Poverty*. Oxford University Press: Oxford.
- Dercon S, Krishnan P. 2000. In sickness and in health: risk sharing within households in rural Ethiopia. *Journal of Political Economy* **108**(4): 688–727.
- Foster J, Greer J, Thorbecke E. 1984. A class of decomposable poverty measures. *Econometrica* **52**(3): 761–766.
- Gertler P, Gruber J. 2002. Insuring consumption against illness. *American Economic Review* **1**: 51–76.
- Giles J, Yoo K. 2007. Precautionary behavior, migrant networks and household consumption decisions: an empirical analysis using household panel data from rural China. *The Review of Economics and Statistics* **89**(3): 534–551.
- Guruswamy M, Abraham RJ. 2006. The poverty line is a starvation line. *Hunger has Fallen of the Map*. Info Change Agenda. (Available from: <http://www.infochangeindia.org/agenda6.jsp>, 16 May 2007.)
- Hubbard G, Skinner J, Zeldes S. 1995. Precautionary saving and social insurance. *The Journal of Political Economy* **103**(2): 360–399.
- Jacoby HG, Skoufias E. 1997. Risk, financial markets, and human capital in a developing country. *Review of Economic Studies* **64**(3): 311–335.
- Krishna A. 2004. Escaping poverty and becoming poor: who gains, who loses, and why? *World Development* **32**(1): 121–136.
- Krishna A. 2006. Pathways out of and into poverty in 36 villages of Andhra Pradesh, India. *World Development* **34**(2): 271–288.
- Krishna A, Kapila M, Porwal M, Singh V. 2005. Why growth is not enough: household poverty dynamics in northeast Gujarat, India. *The Journal of Development Studies* **41**(7): 1163–1192.
- Lindelov M, Wagstaff A. 2005. Health shocks in China: are the poor and uninsured less protected? *World Bank Policy Research Working Paper*, 3740.
- Morduch J. 1995. Income smoothing and consumption smoothing. *Journal of Economic Perspectives* **9**(3): 103–114.
- National Sample Survey Organisation N. 1998a. Morbidity and treatment of ailments, *NSS Fifty-second Round, Report*, Department of Statistics, Government of India, New Delhi.
- National Sample Survey Organisation N. 1998b. Morbidity and treatment of ailments, *NSS Fifty-second Round, Report*, Department of Statistics, Government of India, New Delhi.
- National Sample Survey Organisation N. 2006. Morbidity and treatment of ailments, *NSS Sixty Round, Report*, Department of Statistics, Government of India, New Delhi.
- Peters D, Yazbeck A, Sharmaand R, Ramana G, Pritchett L, Wagstaff A. 2001. *Better Health Systems for India's Poor*. The World Bank: Washington.
- Rajeswari R, Balasubramanian R, Muniyandi M, Geetharamani S, Thresa X, Venkatesan P. 1999. Socio-economic impact of tuberculosis on patients and family in India. *The International Journal of Tuberculosis and Lung Disease* **3**(10): 869–877.

- Rose E. 1999. Consumption smoothing and excess female mortality in rural India. *The Review of Economics and Statistics* **81**(1): 41–49.
- Russell S. 1996. Ability to pay for health care: concepts and evidence. *Health Policy and Planning* **11**: 219–237.
- Russell S. 2004. The economic burden of illness for households in developing countries: a review of studies focusing on malaria, tuberculosis and human immunodeficiency virus/acquired immunodeficiency syndrome. *American Journal of Tropical Medicine and Hygiene* **71**: 147–155.
- Sauerborn R, Adams A, Hien M. 1996. Household strategies to cope with the economic cost of illness. *Social Science and Medicine* **43**: 291–301.
- Sen B. 2003. Drivers of escape and descent: changing household fortunes in rural Bangladesh. *World Development* **31**(3): 513–534.
- Sen G, Iyer A, Georges A. 2002. Structural reform and health equity: a comparison of NSS surveys of 1986–87 and 1995–96. *Economic and Political Weekly* **37**(14): 1342–1352.
- Srinivasan S. 2005a. Public health infrastructure: what we need and what we have. *Access Denied*, Info Change Agenda. (Available from: <http://www.infochangeindia.org/agenda2.jsp>, 16 May 2007.)
- Srinivasan S. 2005b. Work for two years and maybe you can afford to get treated for TB. *Access Denied*, Info Change Agenda. (Available from: <http://www.infochangeindia.org/agenda2.jsp>, 16 May 2007.)
- Suramya SJ, Veena SG. 2006. Rising prices and coping strategies of urban families in India. *International Journal of Consumer Studies* **30**(1): 55–63.
- Townsend R. 1995. Consumption insurance: an evaluation of risk-bearing systems in low-income economies. *Journal of Economic Perspectives* **9**(3): 83–102.
- van Damme W. 2004. Out-of-pocket health expenditure and debt in poor households: evidence from Cambodia. *Tropical Medicine and International Health* **9**(2): 273–280.
- van Doorslaer E, O'Donnell O, Rannan-Eliya R, Somanathan A, Adhikar SR, Akkazieva B, Harbianto D, Garg C, Hanvoravongchai P, Herrin A, Huq M, Ibragimova S, Karan A, Lee TJ, Leung G, Lu JFR, Ng CW, Pande B, Racelis R, Tao S, Tin K, Trisnantoro L, Vasavid C, Yang BM, Zhao Y. 2007. Catastrophic payments for health care in Asia. *Health Economics* **16**(11): 1159–1184.
- van Doorslaer E, O'Donnell O, Rannan-Eliya R, Somanathan A, Raj-Adhikar S, Garg C, Harbianto D, Herrin A, Nazmul M, Ibragimova S, Ng C, Raj-Pande B, Racelis R, Tao S, Tin K, Tisayaticom K, Trisnantoro L, Vasavid C, Zhao Y. 2006. Effect of payments for health care on poverty estimates in 11 countries in Asia: an analysis of household survey data. *The Lancet* **368**: 1357–1364.
- Wagstaff A. 2007. The economic consequences of health shocks: evidence from Vietnam 1993–98. *Journal of Health Economics* **26**: 82–100.
- Wagstaff A, van Doorslaer E. 2003. Catastrophe and impoverishment in paying for health care: with applications to Vietnam 1993–98. *Health Economics* **12**: 921–934.
- WHO 2006. Health system performance assessment, *WHS India 2003*. (Available from: <http://www.who.int/healthinfo/survey/whsresults/en/index.html>, 7 March 2007.)
- Wilkes A, Hao Y, Bloom G, Xingyuan G. 1998. Coping with the costs of severe illness in rural China. (Available from: [www.ids.ac.uk/ids/bookshop/wp/Wp58.pdf](http://www.ids.ac.uk/ids/bookshop/wp/Wp58.pdf), 20 October 2006.)
- Xu L, Evans D, Kawabata K, Zeramdini R, Klavus J, Murray C. 2003. Households catastrophic health expenditure: a multi-country analysis. *The Lancet* **326**: 111–117.