

Health shocks and consumption smoothing: Evidence from Indonesia

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Abstract

Uninsured illness events can seriously compromise households' wellbeing. However, identifying the consequences of illness is a hard task since these events are clearly endogenous and it is not obvious what the best way to measure illness is. This paper provides further evidence on the consequences of illness episodes on earnings and consumption in Indonesia. We exploit a rich panel dataset that allows combining fixed effects and instrumental variables to address biases associated with the endogeneity of illness. Using deteriorations in physical functioning abilities to measure illness for a sample of prime-age individuals we find that earnings are significantly reduced. However, the effects on consumption are relatively small and not statistically significant. In addition, we explore informal mechanisms households may be using to smooth out the consequences of these episodes. In particular, we study whether households deplete liquid assets or receive transfers from non co-resident kin. Transfers are responsive to illness but there is no evidence of asset depletions. Overall, our findings suggest some ability to smooth the income effects of illness on average. Nonetheless, our analysis is subject to some important caveats that highlight the difficulties of identifying these effects and the need for more careful research on this relevant question.

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1. Introduction

All around the world, households face income risks of very different natures. Some of these risks involve entire communities and regions, such as droughts, natural disasters or fluctuations in commodity prices. Other risks are idiosyncratic, affecting specific individuals or households, such as illness, death or unemployment of family members. In contexts where insurance and access to credit are absent or limited, adverse income shocks may have devastating consequences. As a result, an important strand of the literature in development economics has analyzed to what extent agents manage these risks ex-ante and take action once hardship occurs. In particular, there has been special interest in understanding the ability of households to protect their consumption as an important dimension of welfare.²

One source of risk relatively underexplored in this literature is due to illness. There are basically two economic costs associated with illness. First, it limits the ability to work and therefore may reduce labor income. Second, a sick person demands extra care and medical expenditures; in some cases, these outlays can be substantial. Households without formal health or disability insurance may find alternative ways to cope with these events. For instance, they can rely on selling assets, borrowing or receiving transfers from relatives or friends. Nonetheless, sometimes these options are insufficient or unavailable and households may need to cut important expenditures or reduce investments in human capital. These responses may not only undermine households' short term but also long term welfare.³

This paper investigates the effects of illness episodes on earnings and consumption in Indonesia. This country provides an ideal context to study the consequences of illness in a low income economy with a limited social safety net. The country's health financing is mainly private, with individuals providing approximately 75 percent of all health costs, mostly out-of-pocket. Only one third of the population is covered by formal health insurance and even those who are insured face high out-of-pocket expenses for many health services (World Bank, 2005).

As we discuss in the next section, there are relatively few studies that explore the extent of consumption insurance against illness. One reason may be that identifying the consequences of illness is complicated. Answering this question requires addressing various identification concerns mainly related to the way illness is measured, the presence of omitted factors driving both earnings/consumption and health changes, and reverse causality.

² For reviews on the topic see Alderman and Paxson (1992), Townsend (1995), Morduch (1995, 1999) and Dercon (2005).

³ For example Jacoby and Skoufias (1997) find that in rural South India, children are often taken out of school in response to negative income shocks. Frankenberg et al. (2003) studying the immediate effects of the Indonesian crisis in 1998 find that households reduced health and education spending in response to the crisis.

One important contribution to this literature is Gertler and Gruber (2002) who also consider the Indonesian case. This is one of the first studies that specifically focus on understanding households' ability to insure their consumption against illness in a developing context. Different from previous work, the authors highlight the importance of adequately measuring a "health shock". They suggest that previous contributions may have been capturing small and potentially anticipated health events which may have led to conclude that there is consumption insurance. Using changes in the ability to perform activities of daily living to capture severe illness events, the authors find that labor supply and earnings are significantly compromised. They also find important decreases in consumption associated with these measures. Based on these findings the authors conclude that there are significant costs associated with severe illness episodes that are not insured by households and that it may be important to focus policies to insure catastrophic health events.

Gertler and Gruber's empirical strategy, however, presents some limitations that make hard to interpret their findings as causal. Their findings show a strong negative association between illness and consumption, but it is not clear to what extent the results are driven by reverse causality or omitted variables correlated with health and consumption changes. In this paper we consider an instrumental variable approach to address explicitly the endogeneity of illness. Our data (the Indonesian Family Life Survey) contain information about prices of different health services available in the communities. Thus, we can extend Gertler and Gruber's analysis by instrumenting illness with changes in health input prices. Our analysis also relies on reports about physical functioning abilities to measure illness. Nonetheless, we discuss some of the limitations of these variables that should be taken into account when interpreting results based on them.

In addition, most of the studies in this literature have mainly focused on understanding the extent of insurance. Thus, they do not provide many insights about the strategies households may be using to cope with illness. An additional contribution of our study is that we investigate some of these strategies. In particular, we explore whether households deplete liquid assets and receive cash transfers from relatives in response to the health episodes.

Our results for a sample of prime-age individuals show that the illness events, measured as deteriorations in physical functioning abilities, significantly reduce individual and household earnings. The effects on household earnings are smaller than at the individual level suggesting that other household members respond to illness by increasing their labor supply. Nonetheless, the overall reductions in earnings indicate that households' ability to generate income is compromised and illness can potentially impact consumption. However, we find that the effects on total nonmedical and food expenditures are very small and statistically insignificant.

Since the consequences of sickness may depend on the household's vulnerability to the shock, we examine the impacts stratifying the sample by education and household size. Low educated individuals are more likely to be engaged in activities with less flexibility to miss days of work without losing earnings. Moreover, they tend to have fewer alternative sources of income (e.g. assets, credit, etc.) to compensate the reductions in earnings and the increases in medical expenditures. In addition, individuals who live in households with fewer adult members may be more vulnerable to illness events because there are fewer people to deal with the consequences of illness. The results based on these subsamples show that the effects on earnings are concentrated in small households and that they are larger for less educated individuals. Yet, we do not observe significant changes in consumption for these groups.

We also find that that transfers are responsive to illness. However, we do not find evidence of depletions in liquid wealth. The effects on transfers, together with the increases in earnings of other members, highlight the importance of co-resident and non co-resident relatives in insuring these events.

Taken as a whole and given the assumptions and caveats of the analysis, these findings point to some ability of households to smooth out the consequences of illness on average. Our results contrast those in Gertler and Gruber suggesting that assumptions about the role of reverse causality and omitted variable bias can lead to very different conclusions and policy implications. Most importantly, our analysis highlights some of the difficulties in identifying the consequences of illness and possible avenues for future research.

In the next section we discuss the main contributions to the literature and some of its limitations. In Section 3, we present in detail our empirical strategy to identify the consequences of illness. Section 4 describes the data and section 5 reports the main results. Section 6 discusses the caveats of the analysis and concludes.

2. Background

There is a relatively small literature that explores the ability of households to insure against illness and the evidence is mixed. One of the first contributions in this literature is Cochrane (1991) who uses US data to test the theory of full insurance. Very broadly, this theory explores the extent of risk-sharing within groups such as families and communities. Cochrane's test is very simple and is based on the assumption that, under full insurance, consumption growth rates should be independent of idiosyncratic variables that are exogenous to households. Using days of work lost due to illness to capture an idiosyncratic health event, the author finds that consumption is unaffected by illness episodes that take less than 100 days. However, he finds evidence against consumption insurance for longer episodes.

Townsend (1994) conducts a similar test for a sample of households in southwestern India and indicates that consumption is not responsive to illness measured as the percentage of days sick in the last year. The purpose of these two studies is to broadly evaluate the full consumption insurance hypothesis. Therefore, they examine how different idiosyncratic events affect households' consumption growth; one of these events is illness. In this sense, these contributions do not provide many insights about the extent illness affects households' capacity to generate income or the possible strategies they may be using to cope with the shock.

Kochar (1995), while not explicitly examining the effects on consumption, provides more insights about why illness may be different from other shocks. She notes that farm households in central India may be more vulnerable to demographic shocks such as illness than to crop income shocks, because the use of labor market as insurance is more limited. The author finds that households experience a significant loss of wage income due to illness in the peak agricultural seasons, particularly illness of males. However, they are able to compensate for episodes of illness suffered during slack seasons.

Gertler and Gruber (2002) use data from the Indonesian Resource Mobilization Study (IRMS) and conduct a similar test to Cochrane (1991) and Townsend (1994). However, they extend the analysis by exploring the effects of illness on labor supply and earnings. One important departure from the previous contributions is that the authors pay more attention to the way health shocks are measured. Their data allow them to compare self-reports on morbidities and deteriorations in physical functioning abilities as measures of illness. Their findings show that more objective measures (i.e. physical functional limitations) are more reliable capturing a health shock. Using these measures, their findings support the rejection of full consumption insurance with households being able to insure about 40 percent of the income loss related with more severe illnesses. The authors indicate is that previous studies may have been capturing small and potentially expected health events which may explain the evidence in favor of consumption insurance. With a similar approach, Wagstaff (2007) finds evidence against food consumption smoothing in Vietnam using different measures of health shocks such as the death of a working household member, a long inpatient spell and drops in the body mass index of the household head.

Finally, Dercon and Krishnan (2000) use panel data from rural Ethiopia to test whether individuals can smooth nutritional levels over time. Since their outcome of interest is individuals' Body Mass Index (BMI), they are able to explore the ability of individual members to smooth consumption relative to other members in the same household. The authors do not reject the presence of risk-sharing of illness shocks within most households except within poor households living in the Southern part of the country.

Identifying the consequences of illness on households' income generating capacity and consumption is not trivial. In interpreting the evidence there mainly three issues to keep in mind.

A first issue is how to measure illness. Measuring health and changes in health is complicated. Health is a multidimensional concept and it is hard to describe with few survey variables. Most of the studies mentioned before have relied on self-reported measures to capture illness. A general concern with self-reports about health or illness is that they are based on respondents' behaviors and understanding of their health status which can make them very prone to measurement error. For instance, a widely used measure in this literature are days of disability (See for example Cochrane, 1991, Townsend, 1994, Dercon and Krishnan, 2000). A problem with this particular type of variables is that they are already incorporating a labor supply decision made by the individual. For instance, individuals that have a high opportunity cost of missing a day of work will report fewer days of disability and may seem less sick than others with a lower value of time. In addition, it is possible that illness is reported to justify missing days of work, though there are other reasons behind the absences. Therefore, findings based on this sort of variables can be very hard to interpret (Strauss and Thomas, 1998).

Gertler and Gruber (2002) argue that within self-reported measures, reports on limitations to perform activities of daily living can do a better job capturing severe health events since they are more objective and less subject to measurement error. In this paper, we also use deteriorations in physical functioning abilities to capture illness. However, these measures also present limitations that we will discuss in the next sections. One drawback, for example, is that they tend to be more relevant for older populations. We certainly find evidence of that in our analysis.⁴

In addition, it is important to keep in mind the distinction between health shocks and changes in health or illness. Researchers commonly use the term health shocks which we generally understand as sudden exogenous changes in health status. However, most of the time we only observe changes in health that could also reflect choices made by individuals. In our analysis, we will use the terms illness or health events since it is unclear to what extent changes in the ability to perform activities of daily living can be interpreted as health shocks.

A second issue in identifying the effect of illness has to do with the presence of unobserved events (for the researcher) driving both health and consumption/income changes. For instance, rainfall fluctuations can easily affect production conditions and consumption and also affect health through changes in the disease environment. Another example can be the overall growth of the community that

⁴ One of the measures of illness used by Wagstaff (2007) is large drops in Body Mass Index (BMI). A concern with BMI is that feedback effects from consumption to BMI may be very hard to disentangle. In fact, Dercon and Krishnan (2000) use BMI as outcome to measure consumption smoothing at the individual level.

can affect both consumption and health through changes in the local labor demand and health infrastructure. The main strategy used in this literature to address this problem has been to include community fixed effects to control for factors taking place at an aggregate level such as weather events or economic growth. However, this approach does not solve biases associated with unobserved idiosyncratic events. For instance, the unemployment or death of a household member can reduce consumption because income falls and can also deteriorate health maybe through depression. Importantly, as we mentioned before, the changes in health can be driven by investments choices made by individuals which may also be related to labor supply and consumption decisions.

Another central issue not convincingly addressed in the literature is the presence of feedback effects or reverse causality. For example, illness can reduce income and consumption and these reductions can feedback into health maybe through lower nutritional intakes. Alternatively, an unobserved income shock may reduce the amount of food consumption and other health investments which can consequently worsen health. Thus, an empirical strategy that does not address these sources of bias will inform about the association between illness and consumption or earnings but not about the causal consequences of these events.

Moreover, the studies in this literature have mainly focused on understanding the extent of insurance. However, they do not inform about other sources of income and support that households may be using to cope with illness.

There is a large literature highlighting the role of wealth in smoothing consumption (Deaton, 1992). Our data contain detailed information on households' wealth that we can use to study whether households sell accumulated assets to finance the costs of illness. Because liquid assets are the most likely candidates, we explore the role of depletions in liquid and semi-liquid assets (i.e. durables, financial wealth, and jewelry).

Furthermore, several studies suggest that transfers from friends and relatives can play a role in partially sharing risks. Lucas and Stark (1985) find that in Botswana transfers from individuals in urban areas to families in rural areas are responsive to drought. Those families who are at higher risk because they own drought-sensitive assets receive more remittances. Similarly, Caldwell et al. (1986) find that in South India the ability to obtain resources from relatives was a main factor to protect household consumption during droughts. Rosenzweig (1988) also observes that kin-based transfers play a role in smoothing consumption in India. Fafchamps and Lund (2003) using data from rural Philippines indicate that gifts and informal loans have a role in insuring consumption and that households receive help primarily through networks of friends and relatives. Based on this evidence, we study the role played by cash transfers from non co-resident parents, siblings, and children in insuring illness.

3. Empirical Strategy

The data used in this analysis consists of a panel of individuals interviewed in 1997 and 2000. Therefore, we estimate a model that relates the 3 year growth or change in a variable of interest and health changes (in our case an illness measure) controlling for baseline characteristics and other events observed in the period.

We explore several outcomes. First, we want to understand how illness affects the household ability to generate income. Thus, we study the impact of illness on individual and household earnings. The effects on individual earnings will capture the direct impact of the events on the person's labor supply and productivity. The changes in household earnings will inform about the overall effect of the event by incorporating the compensating labor supply responses of other household members. Once the impact in terms of earnings is assessed, we move to study the effects on consumption growth. We mainly focus on the effects on total nonmedical consumption and food consumption. Finally, we explore whether non-labor income increases in response to illness. In particular, we look at the effects on transfers from non co-resident relatives and the change in liquid assets.

Our model can be generally written in the following way,

$$\Delta Z_{ij} = \beta_1 \Delta \theta_{ij} + \Delta X_{ij} \beta_2 + X_{ij} \beta_3 + \delta_j + v_{ij} \quad (1)$$

where ΔZ_{ij} denotes the change in one of the outcomes of interest mentioned above (e.g. earnings, household per capita consumption, transfers) for individual i in community j and $\Delta \theta_{ij}$ denotes a health change. We control for baseline characteristics included in X_{ij} and time-varying factors included in ΔX_{ij} . In addition, we add a community fixed effects denoted by δ_j to control for aggregated changes in the communities. Finally, v_{ij} denotes unobserved factors. Our objective is to estimate β_1 which is the impact of illness on the different outcomes.⁵

Note that in equation (1) the model takes differences across periods for the same individual. Therefore, observed and unobserved time invariant factors that only affect outcome levels (e.g. consumption or earnings levels) should be differenced out as long as they enter in a linear and additive way. For example, differencing will control for the individual's health endowment and family background if we are willing to assume that these factors do not affect changes in the outcomes. Importantly, if the measures of health are reported with error, taking differences also removes the measurement error that is

⁵ Note that in our framework the unit of observation is the individual, however, some dependent variables vary at the household level. Thus, in the estimation the standard errors are clustered at the household level.

constant across time. For example, it would reduce concerns related to the fact that certain individuals tend to report themselves in worse/better health than others.

In addition, the community fixed effects δ_j are introduced to control for common changes at the community level that may be correlated with illness such as the economic growth of the community, changes in infrastructure or changes in the disease environment. Again, a non trivial assumption is that these community factors enter in the equation in a linear and additive fashion. The baseline characteristics also account for trends for different types of households or individuals.

This model or similar versions of it have been previously estimated in the literature (see for example Gertler and Gruber, 2002). Estimates based on this model will in principle address some biases due to omitted variables and measurement error, however, they will not inform about the causal effect of health events. A remaining problem is the potential correlation between $\Delta\theta_{ij}$ and v_{ij} . This correlation is likely to happen if there is reverse causality or if unobserved idiosyncratic factors are affecting simultaneously health and our outcomes. Our strategy to address these concerns is to complement the fixed effect estimation with an instrumental variable approach.

The IV strategy consists on finding a variable that is correlated with the health changes but is otherwise unrelated to our outcome of interest. In terms of Equation (1), we need to find a variable correlated with the endogenous variable $\Delta\theta_{ij}$ and orthogonal to the omitted factors included in v_{ij} .

One set of instruments proposed in the literature to identify the causal impact of health status on labor supply and earnings are prices of health inputs. Although the validity of these instruments should be assessed in each case, the broad intuition behind its support is straightforward. Prices of health inputs are likely to be correlated with health status and, if we are able to control for aspects of the local infrastructure and labor demand conditions, they should not have a direct impact on labor supply or earnings.⁶

In our case, we want to instrument health *changes*, therefore, we rely on *changes* in prices of health inputs as IVs. We use information from the communities' health centers to construct measures of changes in prices, such as registration fees, the price of an examination visit, and the price of a standard laboratory test. These prices are out-of-pocket expenses for individuals demanding health services. Importantly, the instruments are defined based on services *available* to the individuals in the communities but they are not the prices actually paid by them; otherwise, they would be invalid since they would reflect individual choices.

As a first condition, the instruments need to be correlated with the endogenous variable. In

⁶ See Strauss and Thomas (1998, 2007) for discussions of the possible use of prices of health inputs as instruments and Schultz and Tansel (1997) and Thomas and Strauss (1997) for applications.

Indonesia there is a fair amount of decentralization in the determination of health input prices which provides some variation in prices across time. Moreover, during the period we consider, Indonesia experienced a financial crisis with high levels of inflation and changes in relative prices which we think adds more variation in health prices than under normal circumstances. We find that the correlation between changes in prices defined at the community level with our measures of illness is significant; however, it is not high enough to provide reliable estimates (Staiger and Stock, 1997).

However, there is evidence that responses to health prices are likely to depend on characteristics such as age, gender and socio-economic status. Therefore, the interaction between some of these demographic characteristics and the price changes can allow the different price elasticities to emerge in predicting demand for health inputs and consequently health outcomes. For that reason, we multiply the IVs defined at the community level by the individual's age and an indicator for male. Importantly, this strategy allows controlling for aggregate changes in the community by including community fixed effects because the IVs now vary at the individual level.⁷

A second requirement for the validity of the instruments is that, conditional on the health changes, they do not affect our outcomes. A reasonable concern is that the evolution of prices is correlated with unobserved events in the community that have a direct effect on our outcomes, in particular, consumption or earnings growth.⁸ Examples are changes in infrastructure or local labor demand conditions. Failing to control for these community events would invalidate the use of health input prices as IVs. In our case, the price changes are multiplied by individual variables which allow retaining the community fixed effects in the estimation. Therefore, we can control for the average effect of these unobserved community events. However, by multiplying the changes in prices by individual variables the arguments supporting the exclusion restriction become less clear.

Fortunately, our data allow assessing the validity of the instruments in different ways. First, we are able to correlate changes in prices of health inputs *defined at the community level* with other events reported by community leaders that could affect income and consumption growth such as the occurrence of a natural disaster or improvements in infrastructure. Finding low associations does not imply that the exclusion restriction is valid but it is indicative that these price changes are not capturing other events in the community.

⁷ One concern with this strategy is that the direct effect of gender and age on our outcomes may be captured in these interactions. The main concern is the interaction with age, since individuals in different stages of their lifecycle have different rates of earnings and consumption growth. Thus, in the second stage we control for the main effect of these variables by adding controls for age, household composition by gender, age and employment status.

⁸ We assume that changes in health prices do not have a direct impact on nonmedical consumption through income and substitution effects. Our overidentification tests suggest that, in our context, this may not be an unreasonable assumption.

Next, we take advantage of the multiple instruments to perform a series of overidentification tests. A rejection of the test's null hypothesis implies that the instruments are not satisfying the required orthogonality conditions. One problem with this test is that it tends to have low power; in other words, the probability that will correctly lead to the rejection of a false null hypothesis is low. One way to assess whether the test is working in this context is to evaluate the instruments in a regression for the change in medical expenditures. For this outcome, the test should reject the instruments because changes in health prices should affect medical expenditures directly. If the overidentification tests cannot reject the instruments in our main regressions but reject their validity in the medical expenditures' regression it would indicate that the tests are able to distinguish the IVs in a case where they are conceptually invalid and would suggest that the tests are informative about the validity of the instruments.

4. Data

The Indonesian Family Life Survey (IFLS) is an ongoing longitudinal survey that collects data on individuals, households and the communities where they live. The survey covers 13 of Indonesia's 26 provinces and it is representative of about 83 percent of the country's population. The first wave (IFLS1) was conducted late 1993 and surveyed 7,224 households and 22,000 individuals in 321 enumeration areas.⁹ The second wave (IFLS2) was administered four years later in late 1997 and a third full sample wave (IFLS3) was conducted in late 2000.¹⁰

A distinctive feature of the survey design is that movers are tracked as long as their new location is one of the 13 provinces surveyed. In the IFLS2, 94.4% of the IFLS1 households were re-contacted. In the IFLS3 the re-contact rate was 95.3% of the IFLS1 households. These high re-interview rates contribute significantly to the quality of the analysis reducing the risk of bias due to nonrandom attrition.¹¹

We consider the panel of individuals surveyed in the IFLS2 and the IFLS3. The main analysis will be conducted for a sample of individuals 30 to 60 years old. We later stratify this sample by education and household size. Tables 1 and 2 report summary statistics for the entire sample. Appendix Table 1 presents summary statistics by education and household size.

⁹ These enumeration areas are the communities considered in the analysis.

¹⁰ See Frankenberg and Thomas (2000) and Strauss et al. (2004) for details on the IFLS2 and IFLS3 design and content.

¹¹ For a discussion of attrition in the IFLS see Thomas et al. (2001).

4.1 Measures of Illness

As discussed previously, measuring health and health changes is not trivial. It is well recognized that health is multidimensional and difficult to capture in surveys. Different measures have been used by researchers and there is an extensive literature studying their relevance, predictive power, and measurement error.¹²

For our analysis, we rely on changes in physical functioning abilities to measure illness. The IFLS questions respondents about their ability to perform different activities related to daily living. For each activity, individuals report whether they can do it easily, with difficulty, or they are unable to do it. ADLs can be divided into two groups according to their degree of difficulty: intermediate and basic. Intermediate ADLs refer to harder activities, such as carrying a heavy load for 20 meters, walking for 5 kilometers, bowing or kneeling, sweeping the floor or yard, and drawing a pail of water from a well. Basic ADLs refer to simpler activities, such as standing up from a sitting position, going to the bathroom without help, and dressing without help. The literature concludes that reports on abilities to perform activities of daily living (ADLs) are less prone to the type of measurement error present in other self-reported indicators such as assessments about general health status and morbidities.¹³ One reason is that the questions are more specific and objective. For example, responding if one is able to walk 5 km is less ambiguous than assessing overall health.

Although it would be interesting to explore deteriorations in both intermediate and basic ADLs, we focus on the intermediate ADLs. This is because a very small share of the sample 30 to 60 years old reports deteriorations in basic ADLs (about 2 percent). Most of the deteriorations in basic ADLs are reported by individuals older than 60. In contrast, approximately 25 percent of our sample reports deteriorations in intermediate activities and, although there is a clear age gradient, the changes are frequent even for younger individuals. This has a drawback in the sense that we may not be capturing the effect of more severe health events.

We note that the ADL deteriorations are mainly driven by changes in the ability to walk for 5 kilometers; approximately 18 percent of the sample reports deteriorations in this ADL. Therefore, we evaluate separately deteriorations in this activity and deteriorations in the other intermediate ADLs which are less prevalent (10 percent). We construct two indicator variables. The first one indicates whether the individual reports a deterioration in the ability to walk 5 km between 1997 and 2000. The second indicator takes value one if there was a deterioration in the ability to perform any of the other intermediate

¹² See for example Strauss et al (1993), Strauss and Thomas (1998, 2007), Sadana et al. (2002), and Thomas and Frankenberg (2000) for the IFLS case.

¹³ See for instance Strauss et al. (1993) and Dow et al. (1997).

activities. Importantly, these two variables are not mutually exclusive. This implies that some of those who experienced limitations in walking 5 km are also experiencing other limitations at the same time and vice versa. However, based on the prevalence of these deteriorations the second measure should capture more serious health events. It is important to note that there is still significant heterogeneity in our classification. For instance, these measures do not allow distinguishing the severity of the events or between transitory and permanent illness. In the concluding section we discuss in more detail some of the limitations of these measures.

4.2 Dependent Variables

Household consumption in the IFLS is based on respondents' recall of expenditures of approximately 26 food items and 20 non-food items. The reference period for the recall varies depending on the good. For food consumption, the respondent is asked to recall about food items purchased, self-produced or received from another source during the last week. For expenses like utilities, transportation and domestic services, the reference period is the last month. The reference period for health and education expenditures is the last year. In addition, respondents are asked about their housing rental costs (if they are renting) or an estimated rental equivalent (if they live rent free). We construct a measure of household consumption that includes all food, non food and rental expenses excluding medical expenditures. The amounts are cumulated, converted to a monthly equivalent, and expressed in thousands of Rupiahs (Rs000) at December 2000. For the estimation we use the change in log per capita nonmedical consumption and the change in log per capita food consumption.¹⁴

Medical expenditures come from the individuals' questionnaire on outpatient and inpatient use. The reference periods are the last month and last year, respectively. Outpatient expenditures add prescription, treatment, and transportations costs. Inpatient expenditures include prescription and hospitalization costs. All medical expenditures are converted to a monthly equivalent and expressed in thousands of Rupiahs (Rs000) at December 2000. Because there are many zero medical expenditures we use the change in the quartic root which is a very close approximation to the log transformation for positive values.

For individuals that reported work in the past year, the IFLS asks their total labor income. Earnings are converted to a monthly equivalent and expressed in thousands of Rupiahs (Rs000) at December 2000. We consider the log change in individual earnings and the log change in household

¹⁴ To deflate the expenditures, we use a province-specific price deflator following Thomas et al. (1999). Specifically, we take the price indices reported by the Indonesian Bureau of Statistics for 45 cities and create a province price deflator that consists of the simple average of the cities' price indices by province. Since the estimation includes community fixed effects, the results are not affected if we use nominal changes instead of real changes.

earnings per capita.¹⁵

In addition, we construct a measure of liquid wealth that adds the value of semi-liquid and liquid assets owned by the household. Specifically, we include the value of durables, savings, certificates of deposit, stocks, receivables, and jewelry. The amounts are expressed in thousands of Rupiahs (Rs000) at December 2000. In the estimation we condition on having positive values of liquid wealth and use the log change in per capita liquid wealth as dependent variable.¹⁶

We also build a measure of net cash transfers received from non co-resident family members (children, siblings or parents) during the past 12 months. This measure is also converted to a monthly equivalent and expressed in thousands of Rupiahs (Rs000) at December 2000. In the analysis we consider the change in the quartic root of per capita transfers. Summary statistics for all the variables are presented in Tables 1 and 2.

4.3 Health Prices and Community Information

As mentioned before, the IFLS community-facility instrument provides a wealth of information about the respondents' communities. This information is collected from interviews with the community leader and the head of the village women's group, as well as through visits to multiple schools and health care providers. Importantly, the sample of schools and health care facilities is intended to characterize the services *available* to people in the community. This is crucial for the identification strategy, because our instruments should be defined based on prices faced by the individuals but not on the prices actually paid by them; otherwise, they would be correlated with the unobservables and be invalid.

To construct the instrumental variables, we use information from government's health centers (Puskemas) and private facilities. The selected prices refer to very general services and should be relevant for the entire sample. In particular, we choose registration fees, the price of an examination visit, and the price of a standard laboratory test. We also consider two variables capturing changes in the availability and price of drugs reported by the head of the facility. The price of the service at a community is the median price of the facilities in that community. We compute the real change in the quartic root of median prices by community between 1997 and 2000. Importantly, the price change that we impute to

¹⁵ The earnings measure is taken from the household's roster and is likely to be reported with some error. Approximately 8 and 5 percent of the workers have missing earnings in 1997 and 2000, respectively. We do not take actions to correct missing responses in earnings and they are assumed to be zero. Households with zero earnings are excluded from the sample. However, the results are robust if we include those zero/missing responses by using a quartic root transformation.

¹⁶ Thus, the results for liquid wealth are based on a smaller sample, approximately 75 percent of the original sample. The reason for restricting the sample in this way is that individuals need to have some positive wealth in order to deplete it.

each individual is the one corresponding to the community where he was living in 1993. In this way, we reduce concerns related to selective migration based on the evolution of prices.¹⁷

Finally, to assess the validity of the instruments, we rely on information from community leaders about economic events in their communities. The purpose of using this information is to check whether changes in prices and are highly correlated with other economic events in the community. In particular, we consider changes in the share of households with electricity, improvements in infrastructure, and the occurrence of natural disasters, such as fires, floods, earthquakes, volcanic eruptions or droughts (Last row of Table 3 reports means for these variables).

5. Findings

5.1 Validity of the Instrumental Variables

Before presenting the main results, we assess the validity of the IVs. First, we evaluate whether the instruments are correlated enough with our illness measures. In the estimation, the instruments are the changes in health input prices mentioned above multiplied by age or an indicator for male. As a rule of thumb, a First-stage F statistic below 10 is cause of concern (Staiger and Stock, 1997). The results presented in the following sections are all based on IVs with First-stage F-statistics above 10.

Second, we assess the correlation between the changes in health input prices defined at the community level with other events in the community that could affect outcomes such as earnings or consumption growth. For this purpose, we run an OLS regression where the dependent variables indicate events that occurred in the community between waves and the explanatory variables are the changes in prices. The community events we consider are natural disasters, the construction of new roads, schools and houses, and the change in the share of households with electricity. Table 3 reports those results. Although some price changes are individually significant in some regressions, we cannot reject the null hypothesis that the changes in prices are jointly equal to zero. This result does not imply that the exclusion restriction is valid; however, it is indicative that these price changes are not capturing other important events in the communities.

Third, we further assess the validity of the exclusion restrictions by checking whether the instruments pass a series of overidentification tests. A rejection of the null hypothesis casts doubt on the validity of the instruments. We argue that the IVs should be excluded from our outcome of interest equations but should have a direct effect in an equation for the growth in medical expenditures. Table 4 presents the p-values of the Hansen test of overidentifying restrictions for the growth in earnings and

¹⁷ The results do not change if we use prices defined at the 1997 communities.

consumption equations for the entire sample and a sample of individuals that reported paid work in 1997. We find that the IVs cannot be rejected except when the dependent variable is the growth in medical expenditures. This indicates that, in our context, the overidentification tests are able to reject the null hypothesis of instruments exogeneity in a case where they are conceptually invalid. Thus, we can feel more confident about the ability of the test to inform about the validity of the exclusion restriction.

5.2 Effects on Earnings and Consumption Growth

Table 4 presents the effects on household earnings and consumption growth. In the first panel we report results for individuals working for pay in 1997 and in the second panel we consider the entire sample. We only report the estimated coefficient and standard error for the illness variables. The rows correspond to the different outcomes or dependent variables. Column 1 reports the estimated coefficient and standard error for illness when it is measured as deteriorations in the ability to walk for 5 km. Column 3 presents the estimated coefficient and standard error when illness is measured as deteriorations in other intermediate ADLs. All regressions include controls for age, whether the household is female headed, household size, the share of individuals employed, average education, indicators for wealth quintiles, changes in household size and composition, an indicator if the individual moved between waves, other negative economic events reported by the household head, and community fixed effects.¹⁸ Standard errors are clustered at the household level and the regressions are weighted using the IFLS longitudinal weights. Columns 2 and 4 present the p-value of the Hansen test of overidentifying restrictions testing whether the IVs can be excluded from the second stage.

As mentioned before, our main goal is to assess the extent households are able to protect their consumption when they experience an illness episode. However, a preliminary step is to identify a health event that is significant enough to potentially compromise consumption. The economic costs of illness are mainly related to the increased medical expenditures and the reductions in the ability to work and generate income. Our estimation strategy allows us to estimate the latter.¹⁹

Row A0 in Table 4 presents the effects of illness on the growth in individual earnings for the sample of individuals that reported paid work in 1997. We find significant reductions in earnings for both illness measures; the annual growth rate in earnings is about 19 percent lower for deteriorations in walking 5 km and 26 percent lower for those individuals experiencing deteriorations in other intermediate

¹⁸ In other specifications we included a larger set of controls such as baseline household composition by age and gender, marital status, employment categories, per capita expenditures in 1993, etc. Since the results are similar, we present the results from a more parsimonious specification.

¹⁹ Our IV strategy is not valid to estimate the effects on medical expenditures. As expected, the correlation between medical expenditures and illness is positive and significant.

ADLs. These results show that deteriorations in ADLs importantly reduce the individuals' earning capacity either through decreases in labor supply, wages or both.

In addition, other household members may need to adjust their labor supply in response. On one hand, they may increase their labor supply to at least partially compensate the reductions in earnings experienced by the member who got sick. On the other hand, they may work less to take care of that person. The impact on household earnings will provide a summary measure of the direct impact of illness and these compensating responses. Rows A1 and B1 present the effects on household earnings for those who reported paid work and the overall sample, respectively. The estimated coefficients are negative and significant for both samples, although they are larger for the sample that was working. Illness reduces the annual growth rate in per capita household earnings in about 8 to 12 percent for the overall sample and between 11 and 18 percent for those working for pay.

The results based on the sample working for pay allow us to compare the effects at the individual and household level. Note that the effects on earnings at the household level are smaller than at the individual level which indicates that other household members are increasing their earnings to compensate. Even so, the lower growth rates in household earnings suggest that the deteriorations in physical functioning reduce households' overall capacity to generate income and could consequently lower consumption.

Rows A2 and B2 in Table 4 report the effects on per capita nonmedical consumption growth. The estimated coefficients are small and statistically insignificant for both samples. In fact, the coefficients are positive indicating a slightly higher growth rate of total nonmedical consumption for both health measures and samples. Rows A3 and B3 show the effects on food consumption growth. Again, the estimated coefficients are very small and statistically insignificant. However, in this case the signs are negative, indicating a 0.1 percent lower annual growth rate in food expenditures for the overall sample. Despite their imprecision, these results point to relatively small consumption effects compared to the reductions in household income.

5.3 Effects by Education and Household Size

The small consumption responses presented before may be explained by the fact that we are considering a very heterogeneous sample. In other words, the analysis presented so far does not distinguish across different households with different degrees of vulnerability to illness. Thus, in this subsection we explore the effects dividing the sample by two features that we think can be informative about households' ability to insure against illness: education and household size. Table 5 shows these results. For convenience, we only report the estimated coefficient and standard error for deteriorations in

other intermediate ADLs. The effects for deteriorations in the ability to walk for 5 km are qualitatively similar.

We expect less educated individuals to be more vulnerable to sickness for several reasons. First, individuals with lower education are more likely to be engaged in self-employed activities and more physically demanding jobs. Since illness is measured by deteriorations in physical functioning, they may be more likely to experience higher decreases in earnings. A related reason is that the labor market options for less educated individuals may be more limited and it can be harder for them to increase their earnings when another household member falls sick. Finally, households where members are less educated tend to have fewer alternative sources of income to compensate the reductions in labor income and the increases in medical expenditures. They are less likely to obtain credit and to accumulate wealth which reduces their options once a member falls sick.

Panel A in Table 5 reports the results by household education attainment. Specifically, we compare individuals in households where the average education of adult members is less than 5 years with those in households where the average education level is 5 years or more. The median education for households with less than 5 years of schooling is 3 years. For more educated households, the median education is 7.5 years. Education attainment provides a good proxy of the household's permanent stock of human capital and overall socio economic status. In our sample, less educated households present significantly lower levels of wealth, consumption, and earnings.²⁰

We find significant lower growth rates in household earnings for both groups. However, the effects are larger for lower educated individuals (approximately 19 percent lower annual growth rate in per capita earnings). Yet, we find no significant effects on consumption. For the less educated sample the estimated coefficients have the expected negative sign but they are not significant. The estimated coefficient suggests a 2 percent lower annual growth rate in nonmedical consumption. The estimated effects for food consumption are smaller and not significant. For the higher educated sample the estimated coefficients have a positive sign pointing to increases in expenditures due to illness.

Another relevant comparison is between smaller and larger households. We divide the sample based on the number of adult members 15 to 80 years old. We compare individuals living in households with up to three adult members to those living in households with more than four members. The median number of adult members for small and large households is 2 and 4, respectively. In small households, illness episodes are expected to hit harder for two main reasons. First, the direct impact on household earnings is likely to be larger because there are fewer individuals generating income. Second, when an

²⁰ Note however, that within the higher educated sample there are still significant differences in education attainment.

adult gets sick there is basically one additional adult to respond. In contrast, we should not see important effects on large households where there are more individuals to cope with the shock. Panel B in Table 5 confirms these expectations; only small households experience significant reductions in overall earnings due to the ADL deteriorations. The estimated coefficients for consumption growth are more negative and larger than for the overall sample suggesting a 5 (2) percent lower annual growth rate in total (food) expenditures. However, the effects are still very imprecisely estimated.

Overall, these results indicate that even within these groups there may be substantial heterogeneity in the effects from illness. Taking into account the significant reductions in earnings for some of these groups, the consumption effects point to some ability to smooth the income reductions due to illness on average.²¹

5.4 Effects on Wealth and Transfers

In this subsection we explore whether households receive more cash transfers from non co-resident family members and whether they deplete liquid assets in response to illness. We mentioned before that there is an extensive literature highlighting the important role that these strategies may have in smoothing income shocks. Certainly, there are many other sources of non-labor income that households may rely on and this analysis will not inform about them. Nonetheless, these two strategies are two of the most mentioned responses to illness reported by households in IFLS.²²

Table 6 presents the effects on transfers and liquid wealth for the entire sample and subsamples. We find that households are more likely to receive cash transfers from non co-resident relatives in response to illness. In particular, the effects are concentrated on those who are experiencing the larger decreases in earnings (the smaller and less educated households). These findings, together with the evidence on increases in earnings from other household members, point to an important role of co-resident and non co-resident family members in insuring illness.

However, we do not find evidence of asset depletions in response to illness. In fact the estimated coefficients are positive and for the smaller households significant. There are many reasons why

²¹ Certainly, this does not imply that all households can insure consumption against illness. Unfortunately, our empirical strategy requires relatively large sample sizes to obtain high correlations between our illness measures and the instruments. Thus, we cannot stratify further our samples to explore some more vulnerable groups.

²² About 8 percent of the households interviewed in 2000 reported having experienced the sickness of a family member that necessitated hospitalization or continuous medical treatment between 1998 and 2000. To those households, the survey inquires about the steps taken in response to this difficulty. The responses can be any combination of options that include a list of 25 possible steps from reducing different expenditures, selling assets, borrowing money, praying, or doing nothing. Individuals can choose all the options that apply. We find that the most mentioned answers are receiving assistance from friends and family (30 percent), borrowing money (30 percent), using savings (18 percent) and selling possessions (18 percent).

household may not want to deplete their assets and savings in response to these episodes. One possible explanation is that the deteriorations in health signal harder times in the future which make households increase their savings as a precaution. An alternative explanation is that the illness events are not severe enough to put the household in a position that demands selling assets taking into account other available sources of income such as transfers or earnings from other household members.

6. Discussion

In this paper we explore the ability of households to insure consumption against illness. In contexts such as the Indonesian where formal safety nets are limited, health events can seriously compromise households' wellbeing. In this sense, it becomes important to understand the extent of insurance and the mechanisms to make it operational. However, identifying the effects of illness is complicated. In this paper we are able to exploit a very rich longitudinal dataset and combine fixed effects and instrumental variables to provide more reliable estimates on the ability of households to insure against illness than previous studies.

Our findings for a sample of prime-age individuals indicate that illness events, measured as deteriorations in physical functioning abilities, reduce individual and household earnings. However, the effects on consumption are relatively small and statistically insignificant. These results seem to hold not only on average but also when we stratify the sample by working status, education and household size. The imprecision in our estimates suggests that the consumption effects may be subject to substantial heterogeneity. In addition, we study whether households rely on cash transfers from relatives or deplete liquid assets in response to illness. We find that only transfers are responsive to illness but there is no evidence that households deplete assets to cope with these events.

Overall, our findings point to some ability to smooth illness on average. Our results suggest that households are very responsive. The effects on household earnings compared to the impact on individual earnings indicate that other household members are increasing their labor supply to compensate for these events. In addition, non co-resident relatives also respond by sending more (or receiving less) transfers to (from) the households in trouble. Our findings contrast Gertler and Gruber's which conclude that health events based on deteriorations in physical functioning significantly compromise consumption. This implies that assumptions about reverse causality and the sources of omitted variable bias can lead to very different conclusions.

Nonetheless, it is important to note some of the limitations of our analysis that should be taken into account when interpreting the results. As we mentioned before, one complicated task is to adequately

capture an illness shock. In this analysis we relied on deteriorations in physical functioning abilities. Specifically, we consider indicator variables that take value one for deteriorations in ADLs and zero otherwise. A first concern is that there may be substantial heterogeneity and classification error in our measures of illness.

Illness events can have very different implications depending on their length and severity. For example, transitory health deteriorations may imply very different responses than longer-term illness. In principle, an isolated transitory episode is more likely to be insured than more permanent or repeated episodes since the latter may imply permanent reductions in labor income, longer treatments and also depletions in alternative sources of income. A similar issue arises with the severity of the shock. For instance, the same report about limitations in the ability to walk for 5 km may reflect very different health conditions; it could be capturing a bone fracture or the development of a degenerative disease. The reductions in earnings seem to suggest that we are capturing relative severe or more permanent events on average. However, by not explicitly distinguishing illness episodes by these features we may be missing important information to understand households' insurance ability.

In addition, it is not clear within our framework how to distinguish between expected and unexpected events. It is possible that some individuals have private information and are able to anticipate these episodes to some extent. If households make provisions anticipating an illness episode, our estimates may overstate their capacity to smooth truly unpredictable health shocks. In this sense, understanding household's expectations about health is crucial to assess their capacity to smooth consumption. Longer panel data combined with information on expectations could potentially add important insights on this issue.

Moreover, in this analysis we do not estimate the consequences of health improvements. We assume that improvements in health are no different from no-changes in health. We made that assumption because the IVs become very weak when we separately consider improvements. However, this is a strong assumption and should be taken into account when reading our findings. Importantly, this highlights another central issue not carefully addressed in this literature which has to do with the non-linearity of these effects.

Furthermore, ADL measures were originally developed to study the health of older populations. It is still unclear how informative these measures can be to capture illness events for younger populations. Our data clearly show that ADLs are more prevalent for individuals older than 60. Even though, we consider intermediate ADLs which are also prevalent for younger samples, there is still a concern that most of the action comes from the older individuals. When we estimate the effects for an older sample (above 50 or 60) we find that there are significant and large reductions in expenditures. Moreover we find

much larger and significant effects on transfers and depletions in liquid wealth. Not surprisingly, these findings indicate that deteriorations in physical functioning may have very different implications for prime-age and older individuals. This makes sense since the latter are experiencing the consequences of aging and health deteriorations are likely to be more severe, more permanent and in many circumstances expected. This suggests that it may be important to pay attention to the age of the sample and what group is driving the effects. Pooling younger and older individuals may provide misleading conclusions about the ability to insure illness if the findings are confounded with aging. This raises another concern about Gertler and Gruber's findings where the larger reductions in consumption were associated to changes in basic ADLs which are mostly relevant for older individuals.

As a final point, this study as most studies in this literature have focused on estimating the effects of illness on expenditures. Changes in expenditures can be informative about the welfare costs of illness, particularly when changes are large. However, it is important to note that these changes involve adjustments in prices and quantities. Households could easily substitute away expensive items or less necessary items to favor consumption of critical items. Focusing on expenditures does not inform about these substitutions and may miss these important responses to illness.

Overall, these caveats highlight some of the difficulties that underlie the identification of the consequences of illness and the interpretation of many of the results in the literature. Further research addressing these limitations may prove valuable in answering this important question.

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Table 1
Summary Statistics
Baseline Characteristics - IFLS 1997

| | Mean | Std. Dev. | Median |
|---|-------------|------------------|---------------|
| Male | 0.47 | 0.50 | - |
| Age | 42.49 | 8.61 | 41.00 |
| Years of education | 5.26 | 4.21 | 6.00 |
| Household size | 4.97 | 1.97 | 5.00 |
| Number of adult members 15-80 years old | 3.26 | 1.40 | 3.00 |
| Female headed household | 0.06 | 0.24 | - |
| Share of adults employed | 0.61 | 0.25 | 0.50 |
| Average education adults 15-80 years old | 5.87 | 3.39 | 5.75 |
| Per capita nonmedical expenditures ^(*) | 275.71 | 1056.18 | 143.67 |
| Individual earnings ^(*) /employment | 245.60 | 388.08 | 126.29 |
| Per capita earnings ^(*) | 109.64 | 135.48 | 69.38 |
| Individual medical expenditures ^(*) | 11.97 | 44.41 | 0.00 |
| Per capita net cash transfers ^(*) | -6.59 | 70.55 | 0.00 |
| Liquid wealth ^(**) | 5297.25 | 18897.65 | 936.14 |
| Median registration fees at Puskesmas ^(**) | 1.19 | 0.71 | 1.04 |
| Median price labtest at Puskesmas ^(**) | 2.42 | 1.72 | 1.96 |
| Median price check-up at Puskesmas ^(**) | 0.35 | 0.65 | 0.00 |
| Median price check-up at private facilities ^(**) | 8.52 | 3.50 | 7.86 |

Notes.- Author's calculations from IFLS 2 using IFLS longitudinal weights. Individuals 30-60 years old in 1997. 7313 observations.

* In monthly Rs000 at December 2000.

**In Rs000 at December 2000

Table 2
Summary Statistics
Changes between 1997 and 2000

| | Mean | Std. Dev. |
|---|-------------|------------------|
| Deterioration in other Intermediate ADLs | 0.102 | 0.302 |
| Deterioration in ability to walk 5 km. | 0.179 | 0.383 |
| Moved between 1997 and 2000 | 0.040 | 0.196 |
| Change log household size | -0.042 | 0.339 |
| Change log per capita nonmedical expenditures | 0.115 | 1.056 |
| Change log per capita food expenditures | 0.137 | 1.079 |
| Change log earnings /employment in 97 | 0.007 | 0.836 |
| Change log per capita earnings | 0.066 | 0.834 |
| Change quartic root transfers | 0.020 | 1.162 |
| Change log per capita liquid wealth | 0.082 | 0.946 |
| Change quartic root medical expenditures | 0.002 | 1.323 |
| Change quatic root registration fees in Puskesmas | -0.014 | 0.199 |
| Change quatic root price check up in Puskesmas | 0.077 | 0.573 |
| Change quatic root price check up in private facilities | 0.039 | 0.130 |
| Change quatic root price labtest in Puskesmas | 0.139 | 0.325 |
| Change price in drugs at private facilities | -0.599 | 0.475 |
| Change availability in drugs at private facilities | 0.002 | 0.468 |

Notes.- Author's calculations from IFLS 2 and IFLS 3 using IFLS longitudinal weights. Individuals 30-60 years old in 1997. 7313 observations.

Table 3
Correlation between Community Events and Changes in Prices of Health Inputs

| | Natural Disaster (1) | New Roads (2) | New Schools (3) | New Houses (4) | Electrification (5) |
|--|-------------------------|--------------------|--------------------|--------------------|------------------------|
| Change quartic root registration fees at Puskesmas | 0.043 [0.077] | 0.045 [0.100] | 0.049 [0.034] | -0.091 [0.076] | -0.016 [0.045] |
| Change quartic root price check-up at Puskesmas | 0.044 [0.035] | -0.003 [0.039] | 0.024 [0.018] | -0.013 [0.030] | -0.019 [0.016] |
| Change quartic root price check-up at private facilities | -0.223 [0.150] | 0.168 [0.102] | -0.025 [0.074] | 0.058 [0.101] | 0.091 [0.049]+ |
| Change quartic root price laboratory test at Puskesmas | -0.037 [0.058] | 0.025 [0.076] | -0.032 [0.029] | -0.095 [0.043]* | 0.022 [0.026] |
| Change price in drugs at private facilities | -0.034 [0.042] | 0.025 [0.046] | -0.023 [0.018] | -0.067 [0.035]+ | 0.01 [0.018] |
| Change availability of drugs at Puskesmas | 0.014 [0.051] | 0.02 [0.059] | 0.003 [0.032] | 0.022 [0.043] | -0.009 [0.019] |
| Constant | 0.165 [0.034]** | 0.192 [0.036]** | 0.037 [0.015]* | 0.108 [0.026]** | 0.043 [0.014]** |
| Observations | 306 | 306 | 306 | 306 | 306 |
| R-squared | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 |
| Joint F test | 0.97 | 0.64 | 0.68 | 1.48 | 0.96 |
| P value F test | 0.45 | 0.7 | 0.66 | 0.19 | 0.45 |
| Mean dependent variable | 0.18 | 0.18 | 0.05 | 0.14 | 0.04 |

Notes. - Each column corresponds to a different OLS regression. Robust standard errors in brackets. Natural disaster indicates the occurrence of a fire, flood, earthquake, volcanic eruption or drought. New roads is an indicator variable for the construction or opening of new roads. New schools and houses are indicator variables for the construction of these buildings. Electrification means the change in the share of households with electricity. The variable change price in drugs takes value 1 if there was a change in prices for the better of the facility, 0 for no change and -1 for negative change. The variable change in availability of drugs is defined in a similar way. These variables are self-reported by the head of the health facility.

+ significant at 10%; * significant at 5%; ** significant at 1%;

Table 4
Effects on Earnings and Consumption Growth

| Dependent variable | Illness measure | | | |
|--|---------------------------------------|---------------------|--|---------------------|
| | Deterioration in ability to walk 5 km | | Deterioration in other Intermediate ADLs | |
| | Coeff [Se] | P-value Hansen test | Coeff [Se] | P-value Hansen test |
| | (1) | (2) | (3) | (4) |
| A. Conditional on working for pay in 1997 | | | | |
| A.0 Change in log earnings | -0.569* [0.339] | 0.934 | -0.780* [0.474] | 0.892 |
| A.1 Change log per capita earnings | -0.329* [0.195] | 0.308 | -0.554* [0.316] | 0.353 |
| A.2 Change log per capita nonmedical expenditures | 0.028 [0.229] | 0.248 | 0.006 [0.368] | 0.245 |
| A.3 Change log per capita food expenditures | 0.000 [0.191] | 0.414 | -0.029 [0.307] | 0.412 |
| F-test Ivs ⁽¹⁾ | 18.66 | | 12.83 | |
| P-value Hansen test for change in medical expenditures | 0.043 | | 0.039 | |
| Observations | 4794 | | 4794 | |
| B. All | | | | |
| B.1. Change log per capita earnings | -0.263** [0.123] | 0.701 | -0.385** [0.175] | 0.691 |
| B.2 Change log per capita nonmedical expenditures | 0.016 [0.144] | 0.508 | 0.012 [0.204] | 0.505 |
| B.3 Change log per capita food expenditures | -0.042 [0.143] | 0.606 | -0.036 [0.204] | 0.608 |
| F-test Ivs ⁽¹⁾ | 35.82 | | 28.87 | |
| P-value Hansen test for change in medical expenditures | 0.008 | | 0.007 | |
| Observations | 7313 | | 7313 | |

Notes. - Individuals 30-60 years old. Regressions include controls for household size in 1997, age in 1997, an indicator if the household is female headed, the share of members employed in 1997, average education of adult members, indicators for wealth quintiles, changes in household size and composition, an indicator if the individual moved between waves, other shocks reported by the household head and community fixed effects. Robust standard errors clustered at the household level in brackets. P-value Hansen test refers to the p-value of the Hansen test of overidentifying restrictions.

(1) F-test for the Null hypothesis that the instruments are jointly significant.

*** significant at 1%; ** significant at 5%; * significant at 10%;

Table 5
Effects on Household Earnings and Consumption Growth by Education and Household Size

| Sample | Illness: Deterioration in other Intermediate ADLs | | |
|--|---|--|--|
| | Change log per capita earnings (1) | Change log per capita nonmedical expenditures (2) | Change log per capita food expenditures (3) |
| <i>A. By education ⁽¹⁾</i> | | | |
| Lower education | -0.590* [0.303] | -0.06 [0.300] | -0.011 [0.222] |
| Higher education | -0.433** [0.221] | 0.105 [0.258] | 0.179 [0.256] |
| <i>B. By household size ⁽²⁾</i> | | | |
| Small households | -0.462* [0.265] | -0.157 [0.304] | -0.062 [0.226] |
| Large households | -0.061 [0.217] | 0.272 [0.262] | 0.085 [0.172] |

Notes. - Individuals 30-60 years old. Regressions include controls for household size in 1997, age in 1997, an indicator if the household is female headed, share of members employed in 1997, average education of adult members, indicators for wealth quintiles, changes in household size and composition, an indicator if the individual moved between waves, indicator for other shocks reported by the household head and community fixed effects. Robust standard errors clustered at the household level in brackets. All regressions have F-test above 10 and pass the tests of over-identifying restrictions.

(1) Lower education refers to the sample of individuals living in households where the average education of adult members is less than 5 years.

(2) Small households include individuals living in households where the total number of members 15 to 80 years old is less or equal to three.

Table 6
Effects on Transfers and Liquid Wealth

| Sample | Illness: Deterioration in other Intermediate ADLs | |
|--|---|---------------------------------|
| | Change quartic root transfers | Change log liquid wealth |
| | Coeff [Se] | Coeff [Se] |
| | (1) | (2) |
| <i>A. All</i> | 0.631 [0.412] | 0.106 [0.208] |
| <i>B. Working for pay</i> | 0.989* [0.576] | 0.486 [0.391] |
| <i>C. By education ⁽¹⁾</i> | | |
| Lower education | 1.041* [0.630] | 0.08 [0.326] |
| Higher education | 0.189 [0.570] | 0.112 [0.255] |
| <i>D. By household size ⁽²⁾</i> | | |
| Small households | 1.366** [0.633] | 0.624* [0.338] |
| Large households | -0.414 [0.535] | -0.329 [0.260] |

Notes. - Individuals 30-60 years old. Regressions include controls for household size in 1997, age in 1997, an indicator if the household is female headed, share of members employed in 1997, average education of adult members, indicators for wealth quintiles, changes in household size and composition, an indicator if the individual moved between waves, indicator for other shocks reported by the household head and community fixed effects. Robust standard errors clustered at the household level in brackets. All regressions have F-test above 10 and pass the tests of over-identifying restrictions.

(1) Lower education refers to the sample of individuals living in households where the average education of adult members is less than 5 years.

(2) Small households include individuals living in households where the total number of members 15 to 80 years old is less or equal to three.

Appendix Table 1**Summary Statistics by Education and Household Size****Baseline Characteristics - IFLS 1997**

| | Lower education | | Higher education | | Small households | | Large households | |
|---|-----------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|
| | Mean | Std. Dev. | Mean | Std. Dev. | Mean | Std. Dev. | Mean | Std. Dev. |
| Male | 0.44 | 0.50 | 0.49 | 0.50 | 0.49 | 0.50 | 0.45 | 0.50 |
| Age | 43.67 | 9.13 | 41.67 | 8.12 | 41.23 | 8.51 | 44.70 | 8.33 |
| Years of education | 2.06 | 2.22 | 7.48 | 3.81 | 5.21 | 4.19 | 5.34 | 4.24 |
| Household size | 4.66 | 1.97 | 5.18 | 1.94 | 4.10 | 1.44 | 6.48 | 1.84 |
| Number of adult members 15-80 years old | 2.95 | 1.19 | 3.47 | 1.49 | 2.38 | 0.55 | 4.80 | 1.06 |
| Female headed household | 0.07 | 0.25 | 0.05 | 0.22 | 0.07 | 0.26 | 0.04 | 0.19 |
| Share of adults employed | 0.65 | 0.26 | 0.59 | 0.25 | 0.67 | 0.25 | 0.51 | 0.22 |
| Average education adults 15-80 years old | 2.68 | 1.46 | 8.07 | 2.46 | 5.48 | 3.57 | 6.54 | 2.92 |
| Per capita nonmedical expenditures ^(*) | 237.58 | 618.46 | 302.15 | 1273.72 | 282.22 | 666.74 | 264.29 | 1514.00 |
| Individual earnings ^(*) /employment | 123.48 | 172.96 | 334.14 | 468.50 | 234.37 | 316.11 | 267.91 | 500.59 |
| Per capita earnings ^(*) | 62.22 | 62.27 | 142.53 | 160.49 | 108.92 | 134.69 | 110.91 | 136.87 |
| Individual medical expenditures ^(*) | 7.09 | 30.32 | 15.36 | 51.71 | 8.82 | 36.01 | 17.50 | 55.76 |
| Per capita net cash transfers ^(*) | -0.25 | 33.98 | -10.98 | 87.08 | -7.81 | 71.34 | -4.44 | 69.12 |
| Liquid wealth ^(**) | 1236.31 | 2748.26 | 8113.55 | 24087.86 | 4172.58 | 14236.89 | 7268.92 | 24938.32 |
| Observations | 2624 | | 4689 | | 4526 | | 2787 | |

Notes.- Author's calculations from IFLS 2 using IFLS longitudinal weights. Individuals 30-60 years old. Lower education refers to the sample of individuals living in households where the average education of adult members is less than 5 years. Small households include individuals living in households where the total number of members 15 to 80 years old is less or equal to three

* In monthly Rs000 at December 2000

**In Rs000 at December 2000