Society for Economics Research in India
Working Paper Series

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Abhishek Dureja
(Indira Gandhi Institute of Development Research, Mumbai)
Digvijay S. Negi
(Indira Gandhi Institute of Development Research, Mumbai)

Working Paper No. 3
http://seri-india.org/research

February 2020

Coping with the Consequences of Short-Term Illness Shocks: The Role of Intra-Household Labour Substitution

Abhishek Dureja* Digvijay S. Negi†

February 10, 2020

Abstract

In developing countries where medical infrastructure and service delivery system, and the market for health insurance are underdeveloped, one important mechanism to cope with the consequences of health shocks is the intra-household substitution of labour. Most of the available studies have evaluated intra-household labour substitution in response to a health shock using low frequency data. This paper, using a panel of high frequency monthly data from the rural households in the semi-arid tropics of India, investigates the impacts of short-term illness shocks on individual's labour supply and wage earnings. It also evaluates compensating intra-household labour supply responses to short-term illness shocks of other non-ill members of the household. We find that an illness shock reduces an individual's monthly wage earnings by 4.3% via the decline in the individual's days of employment in the labour market. Further, an illness shock to the household-head causes a compensating increase in the spouse's labour supply in wage labour market and livestock activities. Similarly, an illness shock to the spouse induces the household-head to devote more time to domestic and livestock activities.

Keywords: Illness shocks, Labour supply, Intra-household allocation, India
JEL Classification: **I15, J22, J43, O12**

*Doctoral Student, Indira Gandhi Institute of Development Research, Mumbai, 400065, India. Email: abhishekd@igidr.ac.in

†Assistant Professor, Indira Gandhi Institute of Development Research, Mumbai, 400065, India. Email: digvijay@igidr.ac.in

1 Introduction

It is well known that for risk averse agents, economic shocks are welfare reducing, but for rural households in developing countries, economic shocks can have severe economic consequences (Binswanger and Rosenzweig, 1993; Wagstaff, 2007; Kochar, 1995). While much has been documented on the welfare consequences of agricultural income shocks and the households' coping responses to such shocks — illness shocks have received much less attention. To cope with illness shocks, households adopt several measures, such as reduction in consumption expenditure and investment in high-return activities, dis-savings, borrowings, and liquidation of productive assets especially in the developing countries where the health infrastructure and medical service delivery systems, and the market for health insurance are underdeveloped (Gertler and Gruber, 2002; Islam and Maitra, 2012; Mohanan, 2013; Sparrow et al., 2014; Mitra et al., 2016).

Illness shocks, besides affecting household welfare by increasing economic burden via medical expenses, also reduce income through forgone labour market opportunities and reduced labour productivity (Gertler and Gruber, 2002; Lindelow and Wagstaff, 2005; Wagstaff, 2007). Illness shocks can also induce labour supply responses from other non-ill household members by changing their opportunity cost of time (Skoufias, 1993). The evidence, however, on the use of labour supply adjustments and the role of intra-household labour substitution, as an ex-post coping mechanism, for health shock induced income loss is mixed (Lindelow and Wagstaff, 2005; Mohanan, 2013; Genoni, 2012; Liu, 2016; Lim, 2017; Heath et al., 2019). A possible reason is that most studies use a low-frequency data wherein they evaluate the use of intra-household labour substitution, years after the onset of health shocks (Heath et al., 2019). Whereas, intra-household labour substitution due to short-term illness shocks, if any, is expected to be contemporaneous to the incidence of such shocks.

This paper contributes to this literature by looking at the impact of illness

shocks on the labour supply and wage earnings of individuals in rural agricultural households from semi-arid tropics in India, using high frequency monthly labour market data. It also evaluates compensating intra-household labour supply responses to short-term illness shocks among the household members. For this purpose we extract data from the VDSA-Village Dynamics in South Asia maintained by the International Crop Research Institute for Semi-Arid Tropics (ICRISAT) India. The VDSA panel survey collects monthly data on the individual-level employment outcomes i.e. market employment as well as non-market outcomes of all the individuals in the household above the age of 6 years. The market outcomes include the number of days an individual worked in the wage labour activities in a month and the corresponding monthly wage earnings. The non-market outcomes include the number of days spent in working on own-farm, domestic and livestock activities. The dataset also provides information on the number of days each individual was serious ill in the given month. The VDSA data has a spatial coverage of 30 villages spread over eight states, viz., Andhra Pradesh, Bihar, Gujarat, Jharkhand, Karnataka, Maharashtra, Madhya Pradesh, and Orissa (Figure 1). We use the most recent data from the year 2010-11 till 2014-15.

We find gender based division of labour within these rural households where the household-head, predominantly male, is engaged in out-of-home employment activities. Whereas the spouse, predominantly female, devotes more time in domestic activities. Most of individuals in the labour market are employed in informal income generating activities, that neither offers medical nor income insurance against illness shocks. Our findings show that these illness shocks have labour market consequences, for both the sick and the non-sick individuals in the household. An incidence of illness shock reduces an individual's monthly wage earnings, on average, by 4.3%, and we establish that this happens via the decline in the individual's days of work in the labour market. There is also a reduction in the number of days the individual works in own-farm, domestic and livestock activities. Further, we find evidence of the added worker effect (Lundberg, 1985; Coile, 2004). An illness shock to the household-head causes a compensating increase in the spousal labour supply and vice-versa. Specifically, a

shock to the household-head makes the spouse allocate more time to wage employment and livestock activities. Likewise, a shock to the spouse makes the household-head devote more time to domestic and livestock activities. This heterogeneous labour supply response can be explained by the division of labour within the household. Additionally, we find that the household-head's labour supply is sensitive to the illness of the children but mainly of the female child.

This paper makes the following contributions to the literature. One, we establish that even short-term illness shocks to individual members of the household lead to significant decline in wage earnings. Two, we demonstrate the role of intra-household labour substitution as a coping mechanism to smooth out the negative labour supply consequences of short-term illness shocks. Three, we demonstrate that the compensating labour substitution takes place not only in the labour market, but also in the non-market household (or home production) activities such as domestic chores and taking care of livestock. Four, the paper supports the evidence on age-gender based division of labour amongst rural households (Mueller, 1984; Jacoby, 1991) and that this division of labour weakens in the event of an illness shocks. Five, the results also indicate the importance of livestock amongst rural agricultural households (Rosenzweig and Wolpin, 1993).

The paper is organised as follows. Section 2 presents the review of the literature. Section 3 describes the data and presents the summary statistics. Section 4 lays out our empirical specification. Section 5 presents the results and Section 6 concludes.

2 Literature

Multiple studies have used the risk sharing hypothesis to test for the impact of idiosyncratic health shocks[1] on household consumption (Deaton et al., 1992). While

[1]The term health shocks is used generically but studies have used different measures of changes in health such as self assessed health status, changes in physical functioning abilities, sickness, hospitali-

some studies found that households consumption is not responsive to health shocks (Townsend, 1994; Islam and Maitra, 2012; Genoni, 2012; Mohanan, 2013; Liu, 2016; Mitra et al., 2016), others didn't find this to be the case (Gertler and Gruber, 2002; Wagstaff, 2007; Gertler et al., 2009; Sparrow et al., 2014).

Health shocks also affect the households through forgone labour market opportunities. In the context of developed countries, there is evidence that health shocks lead to a decline in the probability of participation in the labour market, increased risk of becoming unemployed or disabled, lower hours of work, and lower individual as well as household earnings (Riphahn, 1999; Au et al., 2005; García Gómez and López Nicolás, 2006; García-Gómez et al., 2013; Cai et al., 2014).

In the context of developing countries, evidence on the impact of health shocks on labour supply is relatively scarce. Studies generally use changes in the functional abilities captured by the Activities of Daily Living (ADLs) index [2] (Gertler and Gruber, 2002; Genoni, 2012; Lim, 2017), or hospitalisation (Wagstaff, 2007; Mitra et al., 2016)), or number of days lost due to illness or injury (Mitra et al., 2016), and number of days of serious illness (Liu, 2016) as a measure of shock. Gertler and Gruber (2002), in the context of Indonesia, found a significant decline in both the labour participation rate as well as the weekly hours of work of the household-head due to a reduction in the functioning abilities. Similarly, Lim (2017) in the context of Indonesian households, found a decline in the weekly hours of work for both the husband and the wife with a decline in their intermediate functional abilities. Lindelow and Wagstaff (2005), in the context of China, used changes in self assessed health status of the household-head as a measure of health shock and found a reduction in the household-head's weekly

sation etc.

[2] The studies focussing on the changes in physical functional abilities use the Activities of Daily Living (ADLs) index as a measure of health status. The ADL index was developed to objectively assess the changes in the functioning abilities of old and chronically ill individuals, and to understand the disability dynamics associated with ageing (Katz et al., 1963, 1970). ADLs are self-assessed ratings assigned by an individual on his ability to carry out daily need activities. For example, individuals are asked to assess their ability to bathe, go to the toilet etc. on their own, on a scale of 1-3 where 1 refers to complete inability to do so, 2 refers to doing the task with some difficulty, and 3 refers to complete ease in doing the activity.

hours of work due to a decline in the health status.

Health shocks impose serious financial burden on the households in the form of high medical expenditures which reduces the household's disposable income (e.g., Wagstaff (2007)). Moreover, studies have also found evidence of a decline in the total household income or per-capita household income during health shocks to a household member (Lindelow and Wagstaff, 2005; Wagstaff, 2007; Genoni, 2012; Mitra et al., 2016; Heath et al., 2019). However, very few studies have attempted to assess the impact of an individual's health shocks on individual's self earnings (Genoni, 2012; Liu, 2016). Using data on earnings of individuals from Indonesia, Genoni (2012) found that individual earnings declined significantly with a decline in the intermediate functional abilities[3]. Liu (2016), for Chinese households, constructed a measure of illness shocks using the household-head and spouse's ill days, and found a significant decline in the joint earnings of the household-head and the spouse associated with an illness shock.

Households in the rural areas of developing countries engage in home production which may include domestic chores, own-farm work, livestock and non-farm activities, and are characterised by high degree of specialisation or division of labour based on age and gender of the family members (Jacoby, 1991). This division of labour is a joint outcome of economic variables and social and cultural norms (Mueller, 1984; Eswaran et al., 2013). Despite this age-gender division of labour, there is some degree of labour substitutability amongst the household members (Mueller, 1984). In such a setting, an illness shock to an individual member changes the opportunity cost of time of all the other household members and also affects their labour outcomes (Skoufias, 1993).

[3]Despite of having the advantage of being more objective than other measures of health shock, changes in functional abilities, as measured by Activities of Daily Living (ADLs), are more likely to represent changes in health statuses that are permanent and severe in nature as opposed to transitory shocks that do not permanently impact the individual's productivity. Moreover, these measures are more suitable to capture changes in the health statuses of older populations or disability, and not short-term illness per se. In a relatively younger population, the use of ADL changes as a measure of illness shock may not completely capture short-term illness or morbidity, which are the focus of this paper.

While there are significant earning losses associated with idiosyncratic health shocks at the individual level, intra-household labour substitution can attenuate their impact at the household level aggregates. Indeed, both Genoni (2012) and Liu (2016) have found evidence on idiosyncratic health shocks having lower impact on total household earnings than the loss in individual earnings. In the context of rural economies in developing countries, relatively fewer studies have evaluated the use of intra-household labour substitution as a means of coping with illness shocks. Kochar (1995), in the context of rural households in Central India, has observed that well functioning labour markets play a critical role in insuring households loss of income during idiosyncratic shocks. From a qualitative survey conducted in Burkina Faso, Sauerborn et al. (1996) have reported intra-household labour substitution as the most prevalent coping strategy against illness. Whereas Mohanan (2013), while analysing the impact of bus-accidents on individuals residing in rural India, found no evidence of labour substitution. Lindelow and Wagstaff (2005) did not find evidence of compensating increase in the labour supply of other household members with a decline in the self assessed health status of the household-head in China. While Sparrow et al. (2014) found compensating labour supply changes for urban households, but not for the rural households, in Indonesia. Lim (2017) found a compensating increase in the weekly hours of work of the wife, given a chronic illness of more than one year to the husband.

Health status of an individual is dynamic in nature and varies overtime due to changes in health investments and realisation of shocks (Strauss and Thomas, 1998, 2007). Due to this, the labour supply over an individual's lifetime may also vary. In general, as an individual ages, physical functional abilities are expected to decrease (Pinsky et al., 1987; Kaplan et al., 1993) and in response we expect the labour supply to decline overtime. Hence, comparing changes in labour supply over long time horizons by using changes in functional abilities as a measure of shock may not capture labour supply responses to short-term illness shocks as ADLs are designed to capture severe chronic illness, ageing or disability (Katz et al., 1970). Therefore, changes in ADLs may rather lead to a permanent change in the intra-household labour supply composition.

On the other hand, added worker effect of a transitory illness shock would mean a temporary change in the labour status of other household members (Lundberg, 1985). Moreover, the labour supply responses of transitory or short-term health shocks would be contemporaneous to the incidence of the shock. Most studies have used low-frequency data and have evaluated the use of intra-household labour substitution months' or years' after the onset of health shocks, and this may be one of the reasons why these studies have found mixed evidence on the negative impacts of health shocks on labour supply (Heath et al., 2019). Heath et al. (2019), using a high-frequency weekly data from urban Ghana, found that men are more likely to work, and significantly increase their days and hours of work in response to the unexpected illness to another adult member of the household.

3 Data and Descriptive Statistics

3.1 Data

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), in order to understand the farming systems and identify the constraints faced by the households in the farming communities, initiated the Village Dynamics in South Asia (VDSA) project in India. Under the VDSA project, ICRISAT has been collecting high frequency monthly panel data on the household economy of the semi-arid tropic regions of the country. The VDSA dataset has two modules viz., the EAST and the SAT dataset. The EAST dataset includes information pertaining to three states: Bihar, Jharkhand and Orissa, whereas the SAT dataset includes five states: Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, and Maharashtra[4]. From each of the 7 states, except Madhya Pradesh[5], 2 districts were chosen, and within each district, 2 villages were purposively sampled. Out of the total 30 villages in our sample, 40 households from each

[4]In the survey year 2014-15, a part of Andhra Pradesh was split into another independent state Telangana. In our final dataset, we recode Telangana as Andhra Pradesh.

[5]Only 1 district (2 villages) were surveyed in Madhya Pradesh.

of the 24 villages, except villages in Mahbubnagar, Akola and Solapur districts, were surveyed every month and the outcomes for the previous month were recorded. The sampled households represent 6 agro-ecologies out of the total of 20 agro-ecologies in India. These 6 agro-ecologies are prone to high weather risks. The sampling details are given in Table 1. Figure 1 shows the geographical location of the surveyed villages. We extract the latest rounds of the data from the second generation of these surveys. The time period we consider is from the year 2010-11 till 2014-15.

The survey collects detailed information on household demographics; household-level information on land, livestock, farm implements, physical and food endowments, financial transactions, consumption, farming and non-farming activities. It also records individual level monthly employment outcomes of the household members. The biggest advantage of this dataset is that it allows us to track the changes in the market employment and non-market labour supply contemporaneously with illness episodes of each member of the household above the age of 6 years.

We utilise this data from the employment module for this paper. We restricts our sample to the individuals in the age group of 15-65 years. In the employment module, the individuals are first asked to report the number of days they worked in the wage labour market in the given month and their corresponding monthly wage earnings. They are also asked about the days spent in home production i.e., the number of days they worked in their own-farm, days spent in domestic chores, days spent in taking care of livestock, and days spent in any other activities in a given month. Further, within the same module, individuals are asked to report the number of days they were seriously ill[6]. In our final dataset, after removing households with missing data, we are left with a total of 1310, 1247, 1294, 1246 and 1241 households across 30 villages from 8 states for each year respectively.

[6]An individual can report working for two activities within a single day. For example, an individual may work in the farm in the day time and then spend time in domestic chores or taking care of livestock afterwards. Hence one single day of the month may be counted twice as a working day. Further the individual may be serious ill on a given day but may still work on that day. In such a case, the sum of work days across all activities and illness, for an individual, may exceed 31.

3.2 Descriptive Statistics

Out of the total individual-month observations, 32% of the individuals in our dataset are farm-labourers. Out of the remaining 68% of the individuals, only 24 % of them are salaried and the rest are employed in informal sector activities for their livelihood. Most of the individuals working in the informal sector are either unskilled labourers or self-employed or low-skilled workers. More than 92% of the households are headed by a male member. Out of the total individual-month observations, approximately 8% show an illness shock. Conditional on the incidence of an illness shock, the mean number days an individual reports being ill is 3.17 days. From Figure 2a, we observe that these illness shocks are seasonal and heterogeneous in nature i.e., they are more prevalent in the monsoon (or rainy) months, and amongst the females.

Figure 3 presents the differences in the labour market outcomes of ill and non-ill individuals. Individuals facing an illness shock in a given month, on average, work 2 days less (Table 2) in the labour market than the individuals not facing a shock. Owing to lower days of wage labour, their monthly wage earnings are also lower by Rupees 756. These differences in the days of work and wage earnings are statistically significant. This provides the preliminary motivation for this paper. Individuals facing the shock, on average, also report significantly lower number of workdays in their own-farm work, domestic chores, and livestock activities (Figure 4). Overall, this reflects that the households residing in these villages do face short-term illness shocks, and despite being short-term, they do lead to a decline in market and non-market labour supply and wage earnings.

Figure 3 and Figure 4 also highlight an interesting feature regarding the allocation of labour within a rural household. While the male members appear to work pre-dominantly in wage labour and own-farm activities, the females predominantly take care of domestic activities. But both the males as well as females devote equal time in taking care of the livestock. This represents a typical agricultural household

with age-gender based division of labour, where both the males and females specialise in activities based on the opportunity cost of their time and social norms (Mueller, 1984; Jacoby, 1991).

In Figure 5, we observe that younger male members spend more days in wage employment and less days in farm work as compared to older male members. However, older male and female members spend significantly more days in livestock activities. It appears that in the older age, taking part in household production process may be more productive than outside work. This may also reflect a decline in productivity overtime as a consequence of dynamic nature of health.

4 Empirical Specification

For estimating the impact of illness shocks on individual's own-labour outcomes, we use the following specification:

$$y_{ihvmt} = \alpha_i + \mu_t + \nu_{i,t} + \theta_{v,m} + \beta_1 H_{ihvmt} + \epsilon_{ihvmt} \tag{1}$$

where, y_{ihvmt} represents the outcomes for individual i in household h of village v observed in month m of year t. The outcome variables are the self-reported monthly wage earnings, number of days worked for a wage, number of days worked in own-farm, number of days spent in domestic work, number of days spent in livestock activities and any other work days. H_{ihvmt} is the measure of illness shock. Illness shock is constructed as an indicator variable that takes a value 1 if the individual reports non-zero illness days during that month. The coefficient β_1 reflects the impact of the illness shock. We also consider the number of illness days in the given month as an alternative measure of illness shock. We prefer using the former as measure of illness shock as this may reduce bias in our estimate due to misreporting of illness days.

α_i and μ_t represent the individual- and the year-fixed effects respectively. μ_t controls for the aggregate macroeconomic changes or shocks (like price changes etc.) taking place over time. α_i controls for time invariant individual-specific unobservables like individual specific health preferences and/or health endowments, that may be correlated with the illness shock and the outcome variables. For example, illness risk (or the incidence of illness) depends upon the individual's state of health, which is unobserved, and this state of health can also affect the labour supply behaviour of the individual. The use of individual-fixed effects would also remove time invariant systematic and random measurement error (Mitra et al., 2016). Individual-fixed effects also controls for selection into different labour activities viz. the labour market as well as home production activities as long as the selection process is time invariant (Heckman and MaCurdy, 1980). Moreover, any changes in these unobservables over time would be controlled for by individual-time fixed effects denoted by $\nu_{i,t}$. Note that, $\nu_{i,t}$ can also control for the feedback effect of income on health as long as income induced health investment is not immediate (within a year).

Both labour supply and illness show a seasonal pattern (Figure 2a and 2b). Moreover, we expect this seasonality to be different across villages as they are geographically spread out (Figure 1) and their agricultural seasons, labour demand cycles, rainfall patterns and disease environments are different. The village-month fixed effects, $\theta_{v,m}$ in equation (1), controls for seasonality at the village level. Conditional on all the fixed effects in equation (1), we believe that the variation in illness shocks is as good as random, and β_1 reflects the causal impact of an illness shock on individual's own-labour outcomes. In essence, we are comparing the outcome of an individual, within a year, between the months he reports illness and the months he does not, after netting out the village level seasonality.

In order to evaluate the impact of illness shock on the intra-household labour

substitution we suitably modify equation 1 as follows:

$$z_{ihvmt} = \alpha_h + \mu_t + \nu_{h,t} + \theta_{v,m} + \beta_1 H_{ihvmt} + \beta_2 H_{-ihvmt} + \epsilon_{ihvmt} \tag{2}$$

We reshape the data so that the information on workdays and illness of each household member is placed corresponding to that of household-head's information for the same month-year. Note that, in equation 2, individual fixed-effects are equivalent to household fixed-effects. z_{ihvmt} represents the number of days worked by the household-head (or spouse) in various activities, given the head's (or spouse's) own-illness shock, H_{ihvmt}, and the illness shocks of other individuals in the household viz. the spouse (or head), son and daughter, H_{-ihvmt}. β_1 , as earlier, represents the sensitivity of the head's (or the spouse's) own-labour supply to own-illness shock. Whereas β_2 represents the sensitivity of the head's (or the spouse's) labour supply to illness shocks of other family members. In other words, β_2, is the compensating labour supply response of the household-head (or the spouse) to the shock of other family members. A $\beta_2 > 0$ implies intra-household labour substitution or the added worker effect due to an illness shock.

The coefficient, β_1, in both the equations (1) and (2) reflect the impact of an illness shocks on own-labour outcomes, but these two estimates are not directly comparable. This is because, in equation (2), we consider only the head's or the spouse's outcomes, whereas in (1), we consider the outcomes of all the household members. Second, we also control for the shocks of the other household members in equation (2).

5 Results

We first consider the impact of an individual's illness shock on the individual's own-labour outcomes. We then present the results of intra-household labour supply responses from the head and the spouse due to an illness shock in the family.

5.1 Individual Effects

The coefficients in the first row of Table 3 and Table 4 show the impact of an incidence of illness shock on an individual's own-labour market outcomes, namely the number of days worked in wage labour market in a given month and the corresponding monthly wage earnings. Each column represents regression results from a different fixed effects specification. As we progress from the specification (1) to specification (5), we add higher order fixed effects. The last column represents results from our preferred empirical specification (1), which is the most robust specification of them all. All further analysis in this paper is carried out using this specification[7].

All the specifications in Table 3 indicate a negative impact of the incidence of illness shock on the number of days an individual works in the wage labour market. We observe that as we move from specification (1) to specification (5), the impact of illness shock declines in magnitude but remains negative and statistically significant. Overall the incidence of an illness shock, in a month, reduces the individual's participation in the wage labour market by 1.12 days, which is equivalent to 5.98% of the average number of wage labour days in a month. The decline in the number of days an individual works in the wage labour market leads to a decline in monthly wage earnings of the individual. We find that an incidence of an illness shock, in a given month, leads to a decline in the monthly wage earnings, on average, by Rupees 167 (Table 5). This corresponds to a loss of 4.27% of the average monthly wage earnings of the individual.

[7]Given that the number of villages across these eight states is only 30, we have clustered the standard errors at the household level. Our results are robust if we cluster the standard errors at the village level and are presented in the appendix, Table A1 and Table A2

Similarly, we evaluate the impact of the illness shock by using the number of seriously ill days in the respective month as a measure of illness shock. Table 5 and Table 6 presents the estimates of the impact of illness shock by using the alternative measure of shock. We find that an incremental day of illness, on average, leads to a decline in the labour work by 0.46 days or 2.48% of the average number of wage labour days in a month. Moreover, an incremental day of illness leads to a decline in the monthly wage earnings by Rupees 67 or 1.70% of the average monthly wage earnings of the individual (Table 6).

The results show that transitory illness shocks do lead to forgone wage earnings and decline in productive market employment. This has important policy implications for the rural households who are already vulnerable to idiosyncratic agricultural income shocks. Kochar (1995) highlights that rural households may be more vulnerable to idiosyncratic demographic shocks like illness than idiosyncratic agricultural income shocks. The reason is that during an agricultural income shock, the household members can re-allocate labour between their farm activities and wage labour activities so as to cushion the loss of farm income. Whereas illness shocks, block such a channel of insurance as no compensating increases in own-wage labour supply can be made during illness episodes.

We further evaluate the impact of illness shocks on the individuals' days spent on home production. Table 7 presents the estimates of the impact of an incidence of illness shock on an individual's labour days in home production viz. the days of work in own-farm, domestic chores, livestock and other activities[8]. An illness shock leads to a significant decline in the number of days an individual works or participates in own-farm, domestic and livestock activities. Specifically, an incidence of an illness shock during a month, leads to a decline in an individual's days of work in own-farm by 3.30%; domestic chores by 5.70%; livestock activities by 3.64%; and an increase in other activities by 2.38%. Though we do not have information on what other types of activ-

[8]The results with the number of illness days as a measure of shock are qualitatively similar and are presented in appendix A3.

ities individuals carried out, but a major part of this additional time could be spent at home taking rest, visiting the doctor etc. during the illness. We believe that, on average, the increased time spent in activities during illness would be unproductive or at least less-productive as compared to wage labour, own-farm, domestic or livestock activities. Overall, illness shocks lead to poor labour outcomes for the ill individual in the form of forgone days of work in both market and non-market (or home production) activities apart from lower wage earnings.

5.2 Heterogeneous Impacts Based on Gender

It is evident from Figure 5 that individuals in our sample specialise in activities based on their gender. It is possible that the impact of illness shock may also vary with the gender of the individual. Ex-ante, we should expect the illness shock to impact an individual's labour supply more in his/her primary area of work. To evaluate this, we add an interaction term of illness and a female dummy in equation (1) and the results are presented in Table 8.

We find that males suffer a significantly higher loss in wage income and forgo higher wage labour and farm work days, given an incidence of illness shock. Males suffer a loss in wage income that is almost three times that for the females. Similarly the loss in farm labour for males is six-times than that for the females. Females, on the other hand, forgo significantly higher days of domestic work, almost twelve times the loss suffered by males. This is expected as males spend more time in wage labour and farm activities, whereas females devote more time to domestic activities. For livestock activities, even though both males and females equally share the livestock work, females report lower loss of work days as compared to males. The loss in workdays reported by females in livestock work is almost half as compared to males.

The EAST India module of the VDSA dataset additionally provides information on the average number of daily hours worked by the individual in wage labour

market and home production activities. We find no evidence of decline in the hours of work of the individuals except that, given an illness shock, the females reduce hours of work in domestic activities. Results are presented in the Table A4 in the appendix.

5.3 Intra-Household Labour Substitution

An illness shock that impacts the labour outcomes of the ill individual will also impact the labour outcomes of the other non-ill family members by changing their opportunity cost of time (Skoufias, 1993). The negative consequences of the illness shock on the labour outcomes of the ill individual may induce compensating increases or re-allocations in the labour supply of the other non-ill family members. In this section, we evaluate if other family members make such re-allocations or compensating changes in their labour supply.

The first row of Table 9, where the dependent variables are the outcomes of the household head, presents the contemporaneous effect of head's illness shock on his own-labour supply. The coefficients in the first row correspond to β_1 in equation (2). The results for the household-head are qualitatively similar to the previous results for the entire sample (Table 3). We find that a shock to the household-head leads to a significant decline in the household-head's own-wage earnings and a decline in the number of days the household-head works across wage labour and all home production activities viz., own-farm, domestic and livestock activities. The estimated coefficient in the second row of Table 9 corresponds to β_2 in equation (2). A positive β_2 in Table 9 would mean that after controlling for the head's own-illness shock, an illness shock to the spouse induces the head to work more. This would be the added worker effect due to the illness shock.

We find that an incidence of illness shock to the spouse makes the household-head work more in domestic chores as well as in livestock activities by 2.24% (or 0.124 days) and 1.79% (or 0.114 days) respectively. There is a corresponding decline in the

number of days the household-head works in wage labour and own-farm activities but it is not statistically significant. There is no evidence of any change in the labour earnings of the household-head also. This implies that the illness shock to the spouse brings about a compensating increase in the household-head's labour supply in the domestic and livestock activities. This represents an added worker effect in domestic and livestock activities due to illness shock. This compensating increase can be explained by the fact that the spouse of the household head devotes more time in domestic and livestock activities. We also observe a significant increase in the household-head's labour supply in other activities.

Moving on to Table 10, where the dependent variables are now the outcomes of the spouse of the household-head, we find that an illness shock reduces the wage earnings as well as the labour supply across all the activities for the spouse. We also find evidence of the added worker effect here (Table 10). An illness shock to the household head, significantly increases the labour supply of the spouse in the wage labour market and livestock activities. It is because the household-head, predominantly male, specialises in out-of-home income generating activities, and hence a shock to the head would be an income shock. Indeed, we find a significant decline in the total household wage earnings when there is an illness shock to the household-head (Table A5). Hence, in order to smooth out the loss in income due to the household-head's illness, the spouse increases her wage labour supply by 2.84% (or 0.169 days) in the same month. This leads to an increase in the average monthly earnings of the spouse by 5.42% (or Rupees 42). But this increase in wage earnings of the spouse is insufficient to completely offset the decline in the head's earnings. Moreover, the spouse also increases her livestock labour supply by 2.46% (or 0.144 days). An illness shock to the spouse does not lead to a compensating labour supply increase in the own-farm or wage labour activities by the head.

We extend the same analysis by including the illness shock and labour supply of the children in the household. We then evaluate the labour supply responses of

the household-head, the head's spouse, and their children, given a shock to any one of them. We distinguish between the illness shock to the male and the female child. The results for the labour supply responses of the household-head and the head's spouse are presented in Table 11 and Table 12 respectively. The results are qualitatively similar to our earlier results. Both the head and the spouse increase their labour supply during an illness shock to the other. Additionally, we find that during a shock to the female child, the head reallocates his time away from livestock activities to domestic activities, whereas we do not observe any compensating increases or reallocation in the labour supply of the spouse. The results for the labour supply responses of the male and female child are given in Appendix Table A6 and Table A7 respectively. We find a reduction in the wage labour supply of both the male and the female child associated with an incidence of illness shock to the head's spouse. This leads to a significant decline in the wage earnings of the female child. The labour supply of the children is insensitive to the illness shock of the household head.

The results indicate the presence of the added worker effect in our sample of households. More importantly, this compensating labour substitution takes place not only to the extent of insuring loss in income but also in offsetting the loss of work days in home production activities, domestic chores and taking care of livestock. Our results also show that the gender based specialisation of labour in these households weakens in the event of an illness shock. Finally, the results also highlight the importance of livestock in the rural households as both the household-head and the head's spouse spend equal time in taking care of the livestock, and also substitute for the loss in livestock labour days of the other, during an illness shocks.

6 Conclusion

Rural households in developing economies are engaged in a number of farm and non-farm income generating activities. Given economic, social and cultural considerations,

these activities are characterised by the age-gender division of labour. In our case, we observe that the male members of the households allocate more time to out-of-home activities, whereas the female members are more engaged in domestic chores. Nonetheless, there are some activities such as animal husbandry where both the males and females devote almost equal time. Our findings show that short-term illness shocks have economic consequences in terms of a reduction in wage employment and earnings of the individuals. Moreover, the impact of an illness shock is heterogeneous across male and female members of the household. These shocks also affect labour supply of non-ill members of the household. Household-head allocates more labour to domestic and livestock activities following an illness shock to the spouse. Likewise, the spouse participate more in labour market and allocates more time to tending the livestock.

These findings have important implications for health policy in developing countries where majority of the population is employed in the informal sector, that neither offers income insurance nor medical insurance against idiosyncratic illness shocks. As a step towards Universal Health Coverage (UHC), many developing countries, including India, are trying to provide state-financed health insurance to its most vulnerable population. Our findings indicate that the presence of well-functioning labour markets may provide better protection against illness shocks of the main earning members of the household. Health insurance may offer partial insurance through provision of medical expenses, but the households may still suffer loss in earnings due to illness. In the absence of well functioning labour markets, a combination of income insurance and medical insurance would reduce economic vulnerability of households due to illness shocks.

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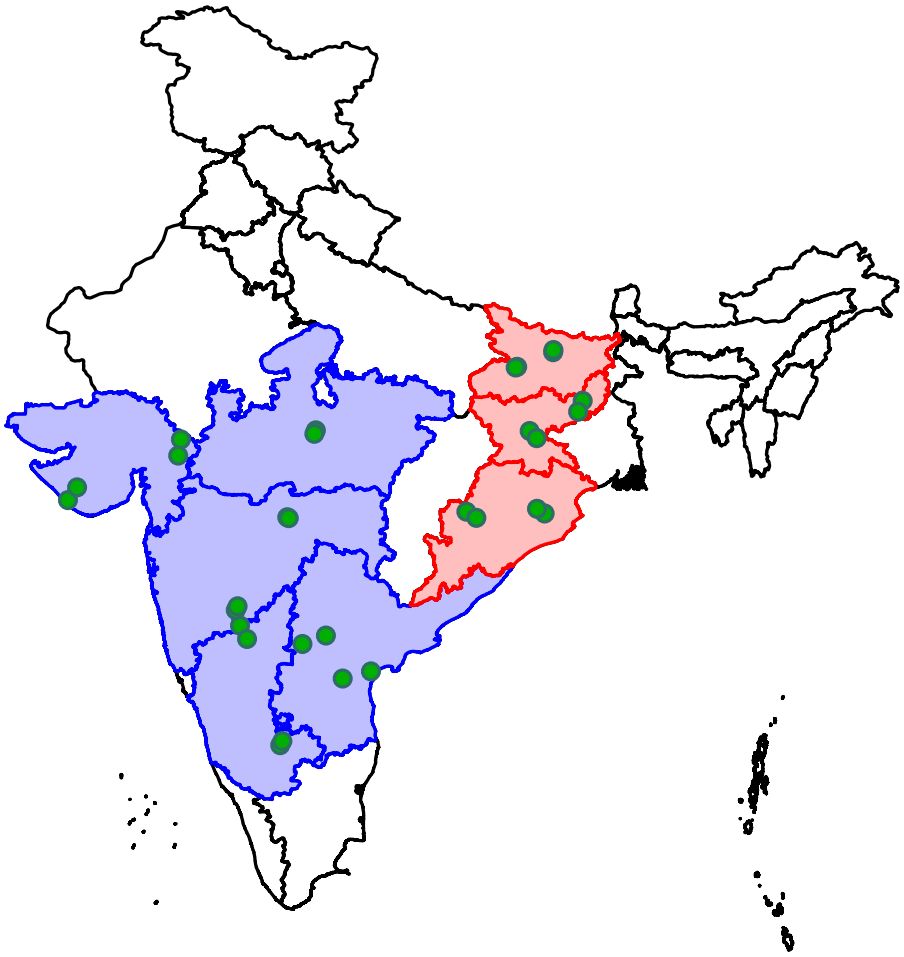
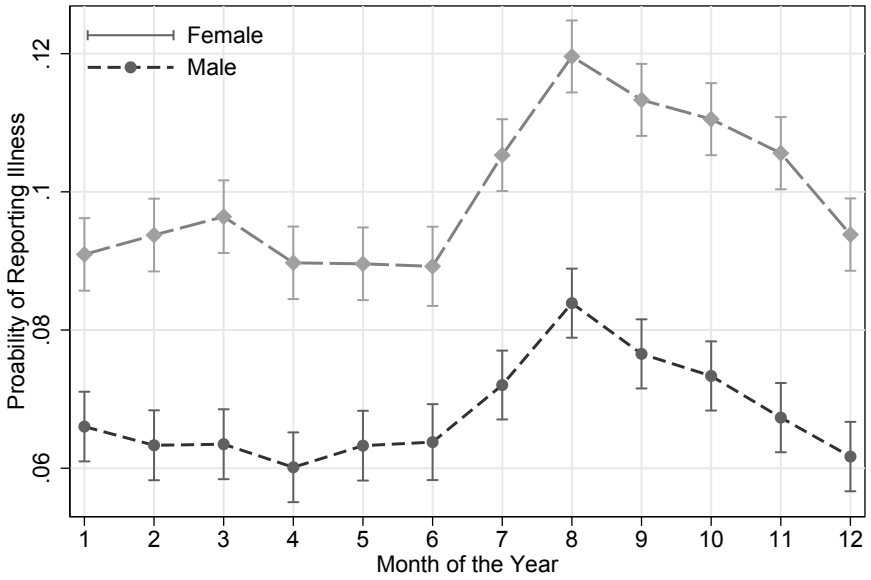
Figures

Figure 1: ICRISAT Villages



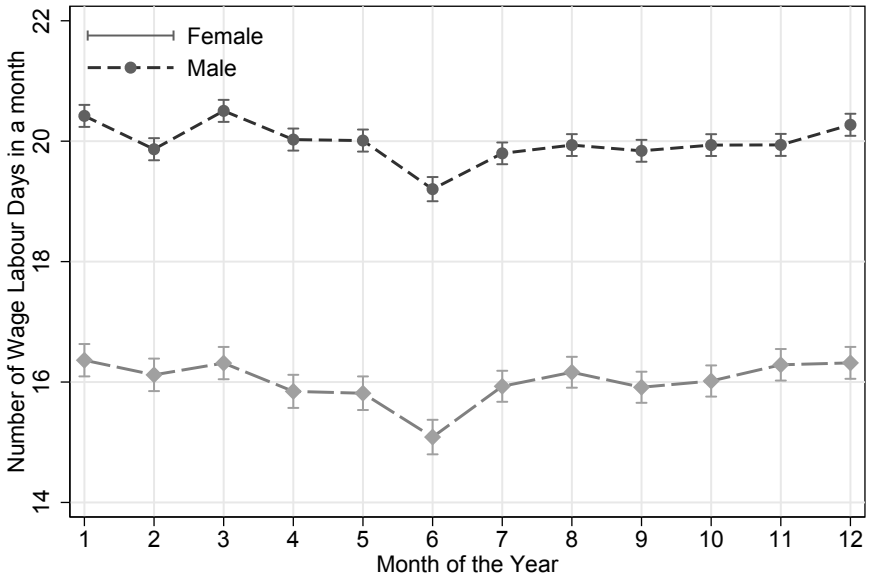
Note: The figures shows the geographic dispersion of the 30 ICRISAT villages across 8 states. 4 villages from each state were surveyed, except Madhya Pradesh, where only 2 villages were surveyed. The states highlighted in blue are from the SAT module, whereas the states highlighted in red are from the EAST module.

Figure 2a: Seasonality in Illness Shocks



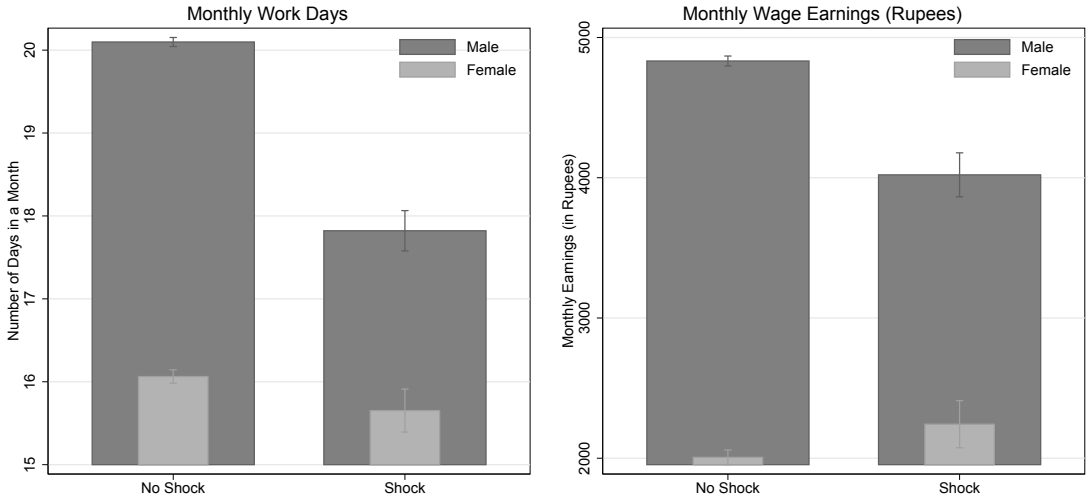
Note: The figure shows the seasonality in the illness shocks. Illness shocks are more prevalent in monsoon (or rainy) months, and amongst females.

Figure 2b: Seasonality in Wage Work



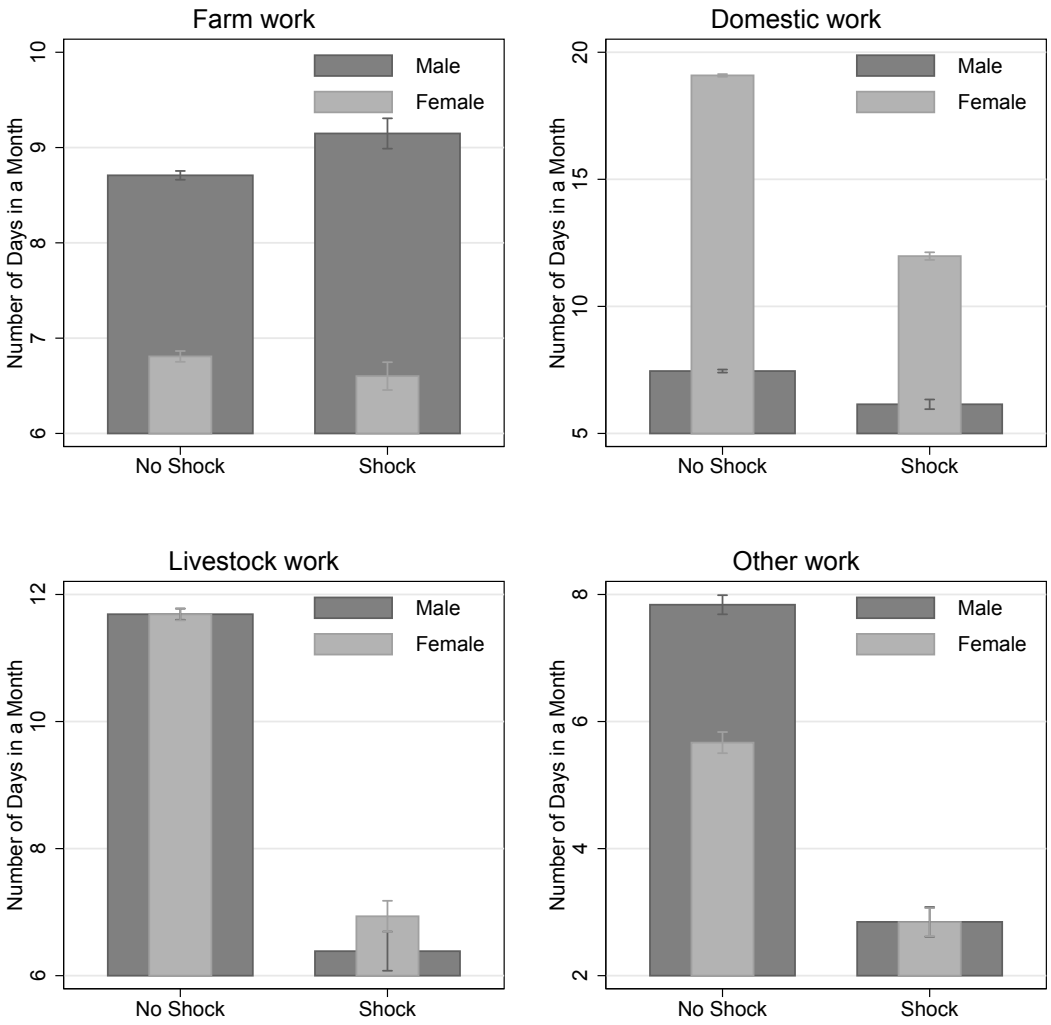
Note: The figure shows the seasonality in the wage labour days.

Figure 3: Illness Shocks, Labour Supply and Wage Earnings



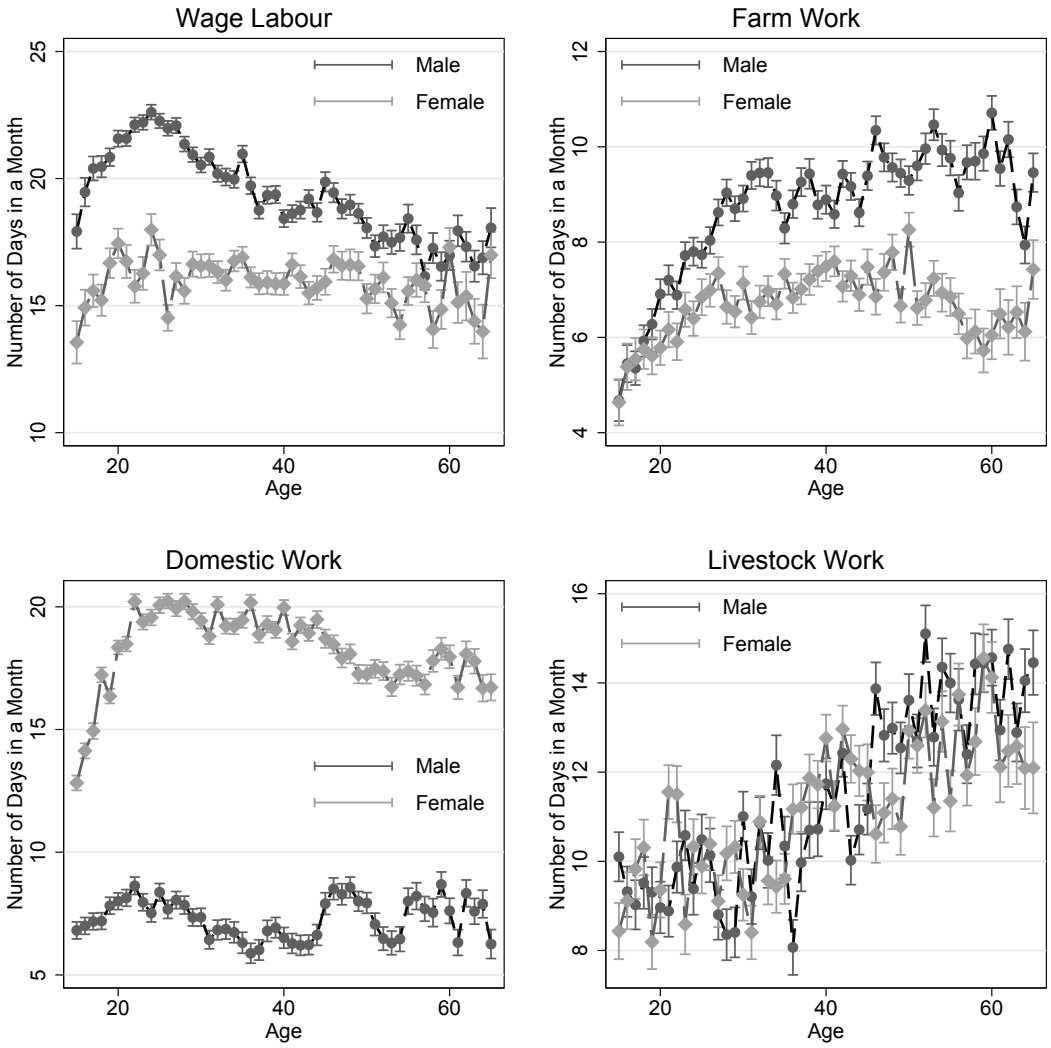
Note: The figure highlights the differences in labour supply and monthly wage earnings of individuals in the age group of 15-65 yrs who face an illness shock as compared to those who do not face such shock.

Figure 4: Illness Shocks and Non-Market Labour Supply



Note: The figure highlights the differences in non-market labour supply of individuals in the age group of 15-65 yrs who face an illness shock as compared to those who do not face such the shock.

Figure 5: Age-Gender Division of Labour



Note: The figure highlights the age and gender based division of labour within the household for individuals within the age of 15-65 years.

Tables

Table 1: Sampling Information

Region	State	District	Villages	No. of households
SAT India	Andhra Pradesh	Mahbubnagar	Aurepalle, Dokur	70, 50
		Prakasam	JC Agraharam, Pamidipadu	40, 40
SAT India	Maharashtra	Akola	Kanzara, Kinkhed	62, 52
		Solapur	Kalman, Shirapur	61, 89
SAT India	Karnataka	Bijapur	Kapanimbargi, Markabbinahalli	40, 40
		Tumkur	Belladamadugu, Tharati	40, 40
SAT India	Gujarat	Junagadh	Karamdichingariya, Makhiyala	40, 40
		Panchmahal	Babrol, Chatha	40, 40
SAT India	Madhya Pradesh	Raisen	Papda, Rampura Kalan	40, 40
EAST India	Bihar	Patna	Arap, Bhagakole	40, 40
		Darbhanga	Inai, Susari	40, 40
EAST India	Orissa	Dhenkanal	Sogar, Chandrasekharpur	40, 40
		Bolangir	Anlatunga, Villaikani	40, 40
EAST India	Jharkhand	Ranchi	Dubaliya, Hesapiri	40, 40
		Dumka	Dumariya, Durgapur	40, 40

Note: The table presents the details regarding the surveyed households within each module.
Source: VDSA-ICRISAT

Table 2: Descriptive Statistics

Variable	No Illness shock	Illness Shock	Mean Difference	t-statistic
Wage earnings in a month (in Rupees)	3948.79	3192.83	-755.96	12.14
	(5254.55)	(4255.81)		
Wage labour days in a month	18.84	16.81	-2.03	21.17
	(8.02)	(6.91)		
Own farm work days in a month	7.95	7.77	-.19	3.2
	(5.95)	(5.47)		
Domestic work days in a month	14.24	9.75	-4.49	59.65
	(10.47)	(6.27)		
Livestock work days in a month	11.69	6.72	-4.97	48.23
	(10.73)	(5.51)		
Others work days in a month	6.86	2.84	-4.02	39.89
	(7.8)	(2.55)		

Note: The table shows the differences in the mean monthly outcomes of the ill and non-ill individuals in the age group of 15-65 years.

Table 3: Impact of Illness Shock on Wage Labour Work Days

VARIABLES	(1) Days	(2) Days	(3) Days	(4) Days	(5) Days
Illness (1 if serious illness days > 0)	-1.998***	-1.485***	-1.189***	-1.153***	-1.121***
	(0.128)	(0.109)	(0.089)	(0.082)	(0.083)
Constant	18.836***	18.807***	18.791***	18.808***	18.806***
	(0.008)	(0.007)	(0.005)	(0.005)	(0.005)
Observations	120,830	120,770	120,715	120,347	120,347
R-squared	0.364	0.583	0.673	0.730	0.737
Individual FE	No	Yes	Yes	Yes	Yes
Household FE	Yes	No	No	No	No
Month FE	Yes	Yes	Yes	Yes	No
Year FE	Yes	Yes	Yes	Yes	Yes
Individual x Year FE	No	No	No	Yes	Yes
Household x Year FE	No	No	Yes	No	No
Village x Month FE	No	No	No	No	Yes
Adjusted R-squared	0.357	0.570	0.643	0.683	0.691
F stat	243.7	184.6	180.6	195.9	182.4
Mean of dependent variable	18.71	18.72	18.72	18.74	18.74

Note: Each column represents the results from a different fixed effects regression specification. The fixed effects associated with each specification are indicated in the respective column. The dependent variable is the number of days an individual worked in the wage labour market in a given month. The illness shock is an indicator variable that is 1 if the individual reports an illness in the corresponding month. The standard errors are clustered at the household level and are given in parenthesis. The results with village level clustered standard errors are given in Appendix A1. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 4: Impact of Illness Shock on Wage Earnings

VARIABLES	(1) Earnings	(2) Earnings	(3) Earnings	(4) Earnings	(5) Earnings
Illness (1 if serious illness days > 0)	-576.754***	-274.307***	-205.439***	-198.029***	-167.274***
	(79.038)	(52.486)	(35.128)	(34.491)	(34.221)
Constant	3,938.047***	3,923.408***	3,919.861***	3,926.852***	3,924.976***
	(4.822)	(3.204)	(2.145)	(2.104)	(2.088)
Observations	121,679	121,532	121,465	121,046	121,046
R-squared	0.551	0.781	0.841	0.872	0.874
Individual FE	No	Yes	Yes	Yes	Yes
Household FE	Yes	No	No	No	No
Month FE	Yes	Yes	Yes	Yes	No
Year FE	Yes	Yes	Yes	Yes	Yes
Individual x Year FE	No	No	No	Yes	Yes
Household x Year FE	No	No	Yes	No	No
Village x Month FE	No	No	No	No	Yes
Adjusted R-squared	0.546	0.774	0.826	0.850	0.852
F stat	53.25	27.31	34.20	32.97	23.89
Mean of dependent variable	3903	3907	3907	3915	3915

Note: Each column represents the results from a different fixed effects regression specification. The fixed effects associated with each specification are indicated in the respective column. The dependent variable is the wage earnings of an individual in a given month. The illness shock is an indicator variable that is 1 if the individual reports an illness in the corresponding month. The standard errors are clustered at the household level and are given in parenthesis. The results with village level clustered standard errors are in the Appendix A1. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 5: Impact of Number of Ill Days on Wage Labour Days

VARIABLES	(1) Days	(2) Days	(3) Days	(4) Days	(5) Days
Serious Illness Days	-0.549***	-0.488***	-0.468***	-0.467***	-0.464***
	(0.024)	(0.026)	(0.024)	(0.024)	(0.023)
Constant	18.802***	18.794***	18.794***	18.812***	18.812***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	120,830	120,770	120,715	120,347	120,347
R-squared	0.365	0.584	0.675	0.732	0.739
Individual FE	No	Yes	Yes	Yes	Yes
Household FE	Yes	No	No	No	No
Month FE	Yes	Yes	Yes	Yes	No
Year FE	Yes	Yes	Yes	Yes	Yes
Individual x Year FE	No	No	No	Yes	Yes
Household x Year FE	No	No	Yes	No	No
Village x Month FE	No	No	No	No	Yes
Adjusted R-squared	0.358	0.572	0.644	0.685	0.692
F stat	506.9	354.7	372.8	392.4	392.8
Mean of dependent variable	18.71	18.72	18.72	18.74	18.74

Note: Each column represents the results from a different fixed effects regression specification. The fixed effects associated with each specification are indicated in the respective column. The dependent variable is the number of days an individual worked in the wage labour market in a given month. The illness shock is the number of seriously ill days in the corresponding month. The standard errors are clustered at the household level and are given in parenthesis. The results with village level clustered standard errors are in the Appendix A2. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 6: Impact of Number of Ill days on Wage Earnings

VARIABLES	(1) Earnings	(2) Earnings	(3) Earnings	(4) Earnings	(5) Earnings
Serious Illness Days	-89.141***	-78.576***	-78.102***	-71.301***	-66.672***
	(12.889)	(14.668)	(10.734)	(7.588)	(7.360)
Constant	3,917.182***	3,919.290***	3,919.872***	3,926.200***	3,925.458***
	(2.071)	(2.357)	(1.725)	(1.216)	(1.180)
Observations	121,679	121,532	121,465	121,046	121,046
R-squared	0.551	0.781	0.841	0.873	0.875
Individual FE	No	Yes	Yes	Yes	Yes
Household FE	Yes	No	No	No	No
Month FE	Yes	Yes	Yes	Yes	No
Year FE	Yes	Yes	Yes	Yes	Yes
Individual x Year FE	No	No	No	Yes	Yes
Household x Year FE	No	No	Yes	No	No
Village x Month FE	No	No	No	No	Yes
Adjusted R-squared	0.546	0.774	0.826	0.850	0.852
F stat	47.83	28.70	52.94	88.29	82.05
Mean of dependent variable	3903	3907	3907	3915	3915

Note: Each column represents the results from a different fixed effects regression specification. The fixed effects associated with each specification are indicated in the respective column. The dependent variable is the wage earnings of an individual in a given month. The illness shock is the number of seriously ill days in the corresponding month reported by the individual. The standard errors are clustered at the household level and are given in parenthesis. The results with village level clustered standard errors are in the Appendix A2. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 7: Impact of Illness Shock on Labour Supply in Home Production

VARIABLES	(1) Own-Farm	(2) Domestic	(3) Livestock	(4) Others
Illness (1 if serious illness days > 0)	-0.262***	-0.787***	-0.408***	0.132**
	(0.055)	(0.058)	(0.068)	(0.056)
Constant	7.975***	13.884***	11.241***	5.498***
	(0.006)	(0.006)	(0.007)	(0.019)
Observations	111,908	205,512	110,299	18,695
R-squared	0.735	0.936	0.926	0.895
Adjusted R-squared	0.680	0.925	0.913	0.857
F stat	22.47	187.1	35.62	5.489
Mean of dependent variable	7.949	13.81	11.20	5.542

Note: Each column represents the results from our preferred regression specification. Each specification includes individual, year, individual-year and village-month fixed effects. The dependent variables are the individual's monthly days of work in own-farm, domestic, livestock and other activities respectively. The illness shock is an indicator variable that is 1 if the individual reports an illness in the corresponding month. The standard errors are clustered at the household level. The results with the number of illness days as a measure of shock are qualitatively similar and are presented in appendix A3. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 8: Heterogeneous Impact of Illness Shock

VARIABLES	(1) Earnings	(2) Wage Labour	(3) Own-Farm	(4) Domestic	(5) Livestock	(6) Others
Illness (1 if serious illness days > 0)	-226.433***	-1.237***	-0.442***	-0.108**	-0.546***	0.076
	(49.359)	(0.108)	(0.080)	(0.054)	(0.088)	(0.071)
Illness x Female	145.184***	0.284*	0.370***	-1.143***	0.236**	0.108
	(56.080)	(0.163)	(0.106)	(0.085)	(0.101)	(0.080)
Constant	3,924.464***	18.805***	7.973***	13.887***	11.240***	5.498***
	(1.993)	(0.005)	(0.006)	(0.005)	(0.007)	(0.019)
Observations	121,046	120,347	111,908	205,512	110,299	18,695
R-squared	0.875	0.737	0.736	0.936	0.926	0.895
Adjusted R-squared	0.852	0.691	0.680	0.926	0.913	0.857
F stat	12.06	92.20	15.44	130.5	21.44	3.717

Note: Each column represents the results from our preferred regression specification for the mentioned dependent variable. Each specification includes individual, year, individual-year and village-month fixed effects. The dependent variables are the wage earnings of an individual, and the number of days an individual worked in wage labour and home production activities, in a given month. The illness shock is an indicator variable that is 1 if the individual reports an illness in the corresponding month. The standard errors are clustered at the household level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 9: Impact on Household Head's Labour Supply

VARIABLES	(1) Earnings	(2) Wage Labour	(3) Own-Farm	(4) Domestic	(5) Livestock	(6) Others
Illness reported by Head	-173.999***	-1.034***	-0.264***	-0.378***	-0.448***	0.098***
	(44.616)	(0.108)	(0.069)	(0.074)	(0.073)	(0.025)
Illness reported by Head's Spouse	98.681	-0.048	-0.022	0.124**	0.114*	0.040**
	(93.696)	(0.105)	(0.064)	(0.051)	(0.061)	(0.020)
Constant	2,752.478***	11.247***	5.501***	5.552***	6.409***	0.426***
	(8.736)	(0.013)	(0.009)	(0.007)	(0.008)	(0.003)
Observations	65,426	65,426	65,426	65,426	65,426	65,426
R-squared	0.815	0.833	0.774	0.857	0.873	0.683
Adjusted R-squared	0.786	0.807	0.739	0.835	0.854	0.634
F stat	7.658	46.01	7.280	15.37	19.96	9.010
Mean of dependent variable	2748	11.16	5.479	5.534	6.384	0.437

Note: The table presents the sensitivity of the labour supply of the household-head due to an incidence of illness shock to the head's spouse, after controlling for head's own illness shock. Each specification includes household, year, household-year and village-month fixed effects. The illness shock is an indicator variable that is 1 if the individual reports an illness in the corresponding month. The standard errors are clustered at the household level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 10: Impact on Spouse's Labour Supply

VARIABLES	(1) Earnings	(2) Wage Labour	(3) Own-Farm	(4) Domestic	(5) Livestock	(6) Others
Illness reported by Head	42.006**	0.169**	-0.060	0.046	0.144**	0.040
	(19.441)	(0.085)	(0.058)	(0.069)	(0.066)	(0.029)
Illness reported by Head's Spouse	-51.945**	-0.732***	-0.113**	-1.146***	-0.374***	0.095***
	(21.012)	(0.088)	(0.053)	(0.091)	(0.075)	(0.027)
Constant	776.947***	6.021***	3.135***	18.400***	5.893***	0.275***
	(3.131)	(0.011)	(0.007)	(0.011)	(0.009)	(0.004)
Observations	64,205	64,205	64,205	64,205	64,205	64,205
R-squared	0.896	0.813	0.692	0.883	0.873	0.582
Adjusted R-squared	0.880	0.784	0.645	0.865	0.854	0.518
F stat	11.44	35.76	2.619	80.45	14.57	6.318
Mean of dependent variable	774.4	5.956	3.119	18.28	5.864	0.288

Note: The table shows the sensitivity of the labour supply of the spouse of the household-head due to an incidence of illness shock to the household-head, after controlling for spouse's own illness shock. Each specification includes household, year, household-year and village-month fixed effects. The illness shock is an indicator variable that is 1 if the individual reports an illness in the corresponding month. The standard errors are clustered at the household level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 11: Impact on Household Head's Labour Supply

VARIABLES	(1) Earnings	(2) Wage Labour	(3) Own-Farm	(4) Domestic	(5) Livestock	(6) Others
Illness reported by Head	-181.350***	-1.039***	-0.262***	-0.382***	-0.443***	0.092***
	(46.699)	(0.109)	(0.069)	(0.074)	(0.073)	(0.025)
Illness reported by Head's Spouse	88.982	-0.055	-0.019	0.115**	0.123**	0.033*
	(87.769)	(0.104)	(0.063)	(0.051)	(0.060)	(0.020)
Illness reported by Head's Son	107.836	0.071	-0.043	0.020	-0.035	0.111**
	(150.191)	(0.159)	(0.115)	(0.091)	(0.072)	(0.046)
Illness reported by Head's Daughter	201.071*	0.176	-0.035	0.287***	-0.262**	0.081*
	(113.582)	(0.249)	(0.171)	(0.096)	(0.130)	(0.048)
Constant	2,744.572***	11.241***	5.504***	5.546***	6.416***	0.420***
	(13.534)	(0.015)	(0.011)	(0.008)	(0.009)	(0.003)
Observations	65,426	65,426	65,426	65,426	65,426	65,426
R-squared	0.815	0.833	0.774	0.857	0.873	0.683
Adjusted R-squared	0.786	0.807	0.739	0.835	0.854	0.634
F stat	5.866	23.03	3.656	9.385	11.46	6.724
Mean of dependent variable	2748	11.16	5.479	5.534	6.384	0.437

Note: The table presents the sensitivity of the labour supply of the household-head due to an incidence of illness shock to the head's spouse, head's son and head's daughter, after controlling for head's own illness shock. Each specification includes household, year, household-year and village-month fixed effects. The illness shock is an indicator variable that is 1 if the individual reports an illness in the corresponding month. The standard errors are clustered at the household level. The standard errors are clustered at the household level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 12: Impact on Spouse's Labour Supply

VARIABLES	(1) Earnings	(2) Wage Labour	(3) Own-Farm	(4) Domestic	(5) Livestock	(6) Others
Illness reported by Head	39.642**	0.165*	-0.064	0.056	0.146**	0.031
	(19.161)	(0.086)	(0.058)	(0.068)	(0.066)	(0.028)
Illness reported by Head's Spouse	-54.876***	-0.734***	-0.116**	-1.136***	-0.373***	0.088***
	(19.785)	(0.087)	(0.052)	(0.091)	(0.075)	(0.026)
Illness reported by Head's Son	22.738	0.152	0.139	-0.139	-0.076	0.166***
	(26.525)	(0.120)	(0.091)	(0.115)	(0.098)	(0.045)
Illness reported by Head's Daughter	83.313	-0.159	-0.105	-0.177	0.090	0.037
	(83.511)	(0.213)	(0.146)	(0.173)	(0.116)	(0.064)
Constant	774.486***	6.019***	3.132***	18.409***	5.894***	0.269***
	(4.363)	(0.013)	(0.009)	(0.012)	(0.010)	(0.005)
Observations	64,205	64,205	64,205	64,205	64,205	64,205
R-squared	0.896	0.813	0.692	0.883	0.873	0.582
Adjusted R-squared	0.880	0.784	0.645	0.865	0.854	0.518
F stat	9.966	19.45	2.110	40.62	8.676	5.858
Mean of dependent variable	774.4	5.956	3.119	18.28	5.864	0.288

Note: The table shows the sensitivity of the labour supply of the spouse of the household-head due to an incidence of illness shock to the household-head, head's son and head's daughter, after controlling for spouse's own illness shock. The illness shock is an indicator variable that is 1 if the individual reports an illness in the corresponding month. Each specification includes household, year, household-year and village-month fixed effects. The standard errors are clustered at the household level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Appendix

Table A1: Impact of Illness Shock on Labour Outcomes

VARIABLES	(1) Earnings	(2) Wage Labour	(3) Own-Farm	(4) Domestic	(5) Livestock	(6) Others
Illness (1 if serious illness days > 0)	-167.274***	-1.121***	-0.262***	-0.787***	-0.408*	0.132
	(50.132)	(0.198)	(0.077)	(0.245)	(0.226)	(0.202)
Constant	3,924.976***	18.806***	7.975***	13.884***	11.241***	5.498***
	(3.059)	(0.012)	(0.008)	(0.024)	(0.023)	(0.068)
Observations	121,046	120,347	111,908	205,512	110,299	18,695
R-squared	0.874	0.737	0.735	0.936	0.926	0.895
Adjusted R-squared	0.852	0.691	0.680	0.925	0.913	0.857
F stat	11.13	32.02	11.63	10.37	3.268	0.424

Note: Each column represents the results from our preferred regression specification for the mentioned dependent variable. Each specification includes individual, year, individual-year, and village-month fixed effects. The dependent variables are the wage earnings of an individual, and the number of days an individual worked in wage labour and home production activities, in a given month. The illness shock is an indicator variable that is 1 if the individual reports an illness in the corresponding month. The standard errors are clustered at the village level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table A2: Impact of Number of Ill Days on Labour Outcomes

VARIABLES	(1) Earnings	(2) Wage Labour	(3) Own-Farm	(4) Domestic	(5) Livestock	(6) Others
Serious Illness Days	-66.672***	-0.464***	-0.081***	-0.313***	-0.273***	0.178***
	(7.203)	(0.044)	(0.026)	(0.066)	(0.098)	(0.054)
Constant	3,925.458***	18.812***	7.967***	13.889***	11.267***	5.424***
	(1.155)	(0.007)	(0.006)	(0.017)	(0.024)	(0.036)
Observations	121,046	120,347	111,908	205,512	110,299	18,695
R-squared	0.875	0.739	0.735	0.936	0.927	0.896
Adjusted R-squared	0.852	0.692	0.680	0.926	0.913	0.858
F stat	85.67	109.7	10.01	22.19	7.739	11.05

Note: Each column represents the results from our preferred regression specification for the mentioned dependent variable. Each specification includes individual, year, individual-year, and village-month fixed effects. The dependent variables are the wage earnings of an individual, and the number of days an individual worked in wage labour and home production activities, in a given month. The illness shock is the number of seriously ill days in the corresponding month. Each column represents the results from our regression specification for the mentioned dependent variable. The standard errors are clustered at the village level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table A3: Impact of Number of Ill Days on Labour Supply in Home Production

VARIABLES	(1) Own-Farm	(2) Domestic	(3) Livestock	(4) Others
Serious Illness Days	-0.081***	-0.313***	-0.273***	0.178***
	(0.018)	(0.019)	(0.029)	(0.025)
Constant	7.967***	13.889***	11.267***	5.424***
	(0.004)	(0.005)	(0.007)	(0.017)
Observations	111,908	205,512	110,299	18,695
R-squared	0.735	0.936	0.927	0.896
Adjusted R-squared	0.680	0.926	0.913	0.858
F stat	19.60	271.1	90.45	50.94
Mean of dependent variable	7.949	13.81	11.20	5.542

Note: Each column represents the the results from our preferred regression specification for the mentioned dependent variable. Each specification includes individual, year, individual-year, and village-month fixed effects. The dependent variables are the individual's monthly days of work in own-farm, domestic, livestock and other activities respectively. The illness shock is the number of seriously ill days in the corresponding month. The standard errors are clustered at the household level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table A4: Impact of Illness Shock on Hours of Work

VARIABLES	(1) Wage Labour	(2) Own-Farm	(3) Domestic	(4) Livestock	(5) Others
Illness (1 if serious illness days > 0)	-0.021	-0.013	0.034	-0.030	-0.097
	(0.016)	(0.079)	(0.037)	(0.040)	(0.222)
Illness x Female	0.039	-0.058	-0.171***	0.059	0.792
	(0.030)	(0.123)	(0.054)	(0.050)	(0.578)
Constant	7.402***	3.955***	3.245***	2.238***	3.489***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)
Observations	120,276	26,409	59,409	31,862	4,841
R-squared	0.776	0.761	0.839	0.779	0.885
Adjusted R-squared	0.737	0.693	0.809	0.731	0.829
F stat	1.044	0.286	6.291	0.715	0.942

Note: Each column represents the the results from our preferred regression specification for the mentioned dependent variable. Each specification includes individual, year, individual-year, and village-month fixed effects. The dependent variable is the average number of daily hours worked by the individual in wage labour market and home production activities. The illness shock is an indicator variable that is 1 if the individual reports an illness in the corresponding month. The standard errors are clustered at the household level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table A5: Impact of Illness Shock on Household Earnings

VARIABLES	(1) Household Earnings	(2) Household Earnings	(3) Household Earnings (per-capita)	(4) Household Earnings (per-capita)
Illness reported by Head	-214.341***	-217.489***	-75.660***	-74.011***
	(65.490)	(66.167)	(22.206)	(22.661)
Illness reported by Head's Spouse	4.892	-1.500	-11.037	-10.023
	(100.883)	(94.979)	(28.793)	(27.834)
Illness reported by Head's Son		-24.081		-53.211
		(163.845)		(46.105)
Illness reported by Head's Daughter		300.212		46.060
		(196.667)		(44.505)
Constant	5,095.275***	5,090.287***	1,767.240***	1,768.194***
	(10.120)	(15.489)	(3.145)	(4.112)
Observations	75,900	75,900	75,900	75,900
R-squared	0.870	0.870	0.849	0.849
Adjusted R-squared	0.851	0.851	0.826	0.826

Note: Each column represents the the results from our preferred regression specification for the mentioned dependent variable. Each specification includes household, year, household-year, and village-month fixed effects. The dependent variable is the total (and per-capita) household wage earnings in a given month. The illness shock is an indicator variable that is 1 if the individual reports an illness in the corresponding month. The standard errors are clustered at the household level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table A6: Impact of Illness Shock on Son's Labour Supply

VARIABLES	(1) Earnings	(2) Wage Labour	(3) Own-Farm	(4) Domestic	(5) Livestock	(6) Others
Illness reported by Head	-31.903	-0.061	-0.050	0.105	-0.047	0.081*
	(32.371)	(0.139)	(0.071)	(0.079)	(0.063)	(0.042)
Illness reported by Head's Spouse	10.128	-0.285**	0.044	0.093	0.010	-0.013
	(45.254)	(0.137)	(0.064)	(0.072)	(0.072)	(0.029)
Illness reported by Head's Son	-205.123***	-1.370***	-0.036	0.003	-0.152**	0.104**
	(42.299)	(0.158)	(0.083)	(0.075)	(0.067)	(0.041)
Illness reported by Head's Daughter	-73.431	-0.390	-0.313	0.174	0.032	0.115
	(58.318)	(0.290)	(0.218)	(0.173)	(0.150)	(0.082)
Constant	2,894.256***	13.067***	3.292***	4.574***	3.538***	0.460***
	(7.128)	(0.022)	(0.013)	(0.012)	(0.010)	(0.006)
Observations	40,140	40,140	40,140	40,140	40,140	40,140
R-squared	0.883	0.843	0.773	0.863	0.842	0.730
Adjusted R-squared	0.864	0.817	0.735	0.841	0.816	0.686
F stat	7.728	19.90	0.726	1.008	1.529	2.885
Mean of dependent variable	2875	12.92	3.281	4.594	3.524	0.476

Note: The table shows the sensitivity of labour supply of the son of the household-head due to an incidence of illness shock to the head, head's spouse and head's daughter, after controlling for son's own illness shock. Each column represents the results from our regression specification for the mentioned dependent variable. Each specification includes household, year, household-year and village-month fixed effects. The standard errors are clustered at the household level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table A7: Impact of Illness Shock on Daughter's Labour Supply

VARIABLES	(1) Earnings	(2) Wage Labour	(3) Own-Farm	(4) Domestic	(5) Livestock	(6) Others
Illness reported by Head	-21.719	-0.128	0.001	-0.059	0.074	0.081
	(17.757)	(0.113)	(0.092)	(0.130)	(0.087)	(0.056)
Illness reported by Head's Spouse	-35.262*	-0.248*	0.119	-0.097	0.074	0.083*
	(18.252)	(0.150)	(0.081)	(0.119)	(0.083)	(0.046)
Illness reported by Head's Son	4.810	0.182	0.021	-0.301	0.068	0.177**
	(18.362)	(0.157)	(0.149)	(0.188)	(0.127)	(0.081)
Illness reported by Head's Daughter	-15.233	-0.240	-0.178*	-0.779***	-0.065	0.109*
	(19.445)	(0.167)	(0.098)	(0.152)	(0.084)	(0.059)
Constant	508.630***	4.548***	1.391***	13.831***	3.215***	0.434***
	(3.691)	(0.028)	(0.024)	(0.032)	(0.017)	(0.013)
Observations	14,199	14,199	14,199	14,199	14,199	14,199
R-squared	0.860	0.827	0.687	0.877	0.878	0.699
Adjusted R-squared	0.830	0.791	0.622	0.851	0.853	0.636
F stat	1.714	1.882	1.665	7.149	0.548	2.552
Mean of dependent variable	501.3	4.492	1.384	13.70	3.226	0.474

Note: The table shows the sensitivity of labour supply of the daughter of the household-head due to an incidence of illness shock to the head, head's spouse and head's son, after controlling for daughter's own illness shock. Each column represents the results from our regression specification for the mentioned dependent variable. Each specification includes household, year, household-year and village-month fixed effects.The standard errors are clustered at the household level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.