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The Impact of Parental Health Shocks on Child Schooling and Labor: Evidence from Thailand

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Abstract

This paper uses household panel data from the Thai Socio-Economic Surveys of 2012 and 2017 to examine the effects of parental health shocks on child education and labor. Three measures of parental health are analyzed: chronic illness, hospitalization, and self-reported health problem. The results show that illness of the parents decreases school enrollment and leads to fewer years of education completed. Additionally, it finds that paternal illness has a relatively more detrimental effect on children's educational outcomes than maternal illness, especially for the educational attainment. Girls are less likely to have attended school if any parent self-reported having any health problems. Parents' chronic illness increases the probability of entering the labor force for youths aged 15 and over; however, only maternal illness increases their time spent at work. Households having both parents hospitalized are most likely associated with the significant decrease in household income and education expenditures. The results suggest that targeted government support to low-income families affected by major illnesses of parents could help them to maintain their children in school.

JEL classification: I14, I24, O15

Keywords: education, child labor, human capital, health shocks, Thailand

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1. Introduction

Serious illnesses and hospital admissions can adversely affect the economic wellbeing of a household−especially in developing countries where most people have low and uncertain incomes and are not covered by formal health insurance. Adults with poor health are often associated with lower labor productivity, thereby leading to a significant decline in family income but simultaneously an increase in out-of-pocket medical expenditures (Gertler and Gruber, 2002; Sparrow et al., 2014). Furthermore, in the absence of well-developed financial markets, only a small proportion of households can borrow money from formal financial institutions against unexpected health care costs and loss of income (Dercon and Krishnan, 2000; Wagstaff and Lindelow, 2014). This suggests that parental health shocks can have a negative intergenerational effect on human capital investment of their children (Alam, 2015; Gertler and Gruber, 2002; Lim, 2020; Wagstaff, 2007; Woode, 2017). More explicitly, households with ill adults tend to adopt several self-insurance strategies to cope with income shocks, including a health shock, such as drawing their savings, selling productive assets, and reducing educational expenditure. It is, therefore, expected that children living with parents who suffer from a chronic illness or health problem are more likely to drop out of school to work for their families, often by working in low-wage or insecure employment.

Recent empirical studies have shown that the effects of parental illness on education and child labor are substantially negative and appear to vary by the gender of parent and child.[2] As the primary income earner of the family, paternal illness may have a greater negative impact on child's educational and long-term adulthood outcomes than maternal illness. However, some studies accentuate the maternal roles in non-financial supports for her children such as preparing meals, teaching homework, and taking care of health and hygiene

[2] However, Le and Nguyen (2017) find little evidence that parental health has a significant effect on children's cognitive and non-cognitive outcomes in Australia. More specifically, only paternal mental illness is associated with lower child development outcomes.

at home. Consequently, one may conjecture that child schooling outcomes can also be strongly affected by maternal health shocks (Bratti and Mendola, 2014; Chen et al., 2009; Luca and Bloom, 2018).[3] For example, Bratti and Mendola (2014) find that children living with ill mothers, but not ill fathers, have a lower likelihood of being enrolled in school.

However, there has been little discussion in Thailand on how and the extent to which parental health shocks transmit to human capital accumulation of children. Thailand is a particularly interesting setting to examine because it is one of few developing countries that the government has implemented the Universal Health Coverage (UHC), initially launched in 2002, by guaranteeing that all citizens can access quality health care services regardless of their ability to pay. More specifically, in 2021, the UHC covered 70.7 percent of its national population who were not eligible for other formal health insurance schemes, which consist of (1) the Civil Servant Medical Benefit Scheme (CSMBS), (2) the Social Security Scheme (SSS), (3) the Local Government Officer Scheme (LGO), and (4) the Private School Teacher Scheme (PVT), respectively (National Health Security Office, 2022). Hence, it is currently evident that nearly all Thai citizens (99.4 percent) are able to access formal health insurance schemes.

Although Thailand's social health insurance schemes potentially decrease the likelihood of catastrophic health expenditure, additional medical costs and loss of earnings associated with parental severe illness can seriously impede their investment in children's education. Not surprisingly, it was reported that working to support their families is still the most important reason contributing to the dropout rate during the academic year at upper secondary level in Thailand, which accounts for almost one-third of all students enrolling in

[3] Using the household survey data from Indonesia, Luca and Bloom (2018) find that not only do healthy mothers improve child's educational outcomes including school attendance and grade completion, but they also contribute to the increased earnings and better employment status of their spouses.

senior high schools over the past five years (2017-2021) (Office of the Basic Education Commission, 2022).

The purposes of this paper are twofold: first, to rigorously investigate the impact of parental health shocks on child education and labor; secondly, to explore the differential effects of paternal and maternal health shock on son's and daughter's schooling and labor outcomes. The data are taken from two waves (2012, 2017) of panel household Socio-Economic Survey (SES) of Thailand. Child fixed effects models are applied to estimate the causal effect of parental health on child's educational and labor-market outcomes by controlling for individual unobserved time-invariant attributes. The research results contribute to growing evidence on the relationship between parental health shocks and children's education and labor supply changes in developing countries. Moreover, the empirical results could have important policy implications for improving social health protection so as to alleviate the negative consequences of parental health shocks on the welfare of next generation in Thailand, as well as in other developing countries with similar economic conditions.

Overall, this paper finds that parental health shocks significantly decrease schooling investment for children between ages 7 and 18 years at the time of the 2012 survey. However, the magnitude of paternal health appears to be larger on child educational and labor outcomes than maternal health. Paternal illness has a negative impact on girls' school enrollment but not for boys', indicating some evidence of son preference. Only maternal illness increases both the labor force participation and the number of working hours perform by children aged 15 and over. Furthermore, Thai households appear to be most vulnerable to the hospitalization of parents, which causes substantial declines in household income and education expenditures.

The rest of this paper is organized as follows. Section 2 briefly discusses literature on the effects of parental health on child education and labor. Section 3 describes the data set and

sample characteristics. Section 4 presents the empirical strategy used in this paper. Section 5 reports and discusses the estimation results. The last section concludes the paper with relevant policy implications.

2. Related Literature

Extensive research has documented that unexpected and catastrophic health-related expenditures result in household financial hardship in developing countries since access to social health insurance is often limited. As a result, most households are often forced to use self-insurance strategies to cope with idiosyncratic health shocks, but potentially at the expense of future welfare, such as productive asset sales, borrowing from informal sources, and increased child labor (Gertler and Gruber, 2002; Jacoby and Skoufias, 1997; Kochar, 1995; Mitra et al., 2016; Wagstaff and Lindelow, 2014). Recent studies have also investigated the role of parental health on several child human capital outcomes for different developing countries (Bazen and Salmon, 2010; Dillion, 2013; Dinku et al., 2018; Mendolia et al., 2019; Mont and Nguyen, 2013). Moreover, some empirical investigations indicate that paternal health shocks have more negative impacts on child schooling and labor than maternal health shocks (Alam, 2015; Lim, 2020; Luca and Bloom, 2018). Using longitudinal survey data of households in Tanzania, Alam (2015) observes that only father's illness has a significantly detrimental effects on child schooling. Likewise, Dhanaraj (2016) highlights the importance of paternal health shocks on child schooling and its heterogeneous effects by age group in India.

The substantial and devastating effects of paternal health shocks on child education have also been noticed in Indonesia (Lim, 2020; Luca and Bloom, 2008). Luca and Bloom (2018) investigate the extent to which parental health affects household well-being. Their results point to the evidence of son preference in that ill fathers decreases the likelihood that

the daughter is enrolled in school, but not their son. Lim (2020) further this idea by focusing on the effects of parental chronic illness on child education, indicating that the enrollment of girl is worsen by poor paternal health. On average, the findings of the two studies suggest that paternal health shocks are often associated with a large drop in household income, thus leading to decreased expenditures on their children's education.[4]

In contrast, Bratti and Mendola (2014) find that only maternal illness decreases the likelihood of being enrolled in school with 6.9 percentage points−lower than children living with healthy mothers in Bosnia and Herzegovina. Additionally, they observe that maternal illness increases child labor in response to rising medical expenses. Using household panel from Vietnam, Mendolia et al. (2019) report that children living with unhealthy mothers are less likely to attend school, but more likely to engage in labor market activities. Further, the estimated impacts are more pronounced among girls and children aged 15-18. Sun and Yao (2010) study the impact of household adults' health shocks on child schooling in rural China, finding that a family health shock increases the likelihood of not attending middle school for children who have completed primary education, with a larger effect for girls.

Some studies have concentrated on the effects of parental death on children's schooling (Cas et al., 2014; Chen et al., 2009; Gertler et al., 2004). Chen et al. (2009) find that maternal death has a larger impact on college attainment than that of paternal death in Taiwan. Their results point to the importance of non-financial support of a mother in improving child's cognitive abilities. By contrast, Cas et al. (2014) report that child schooling is more adversely affected by the unanticipated death of a father than that of a mother resulting from the 2004 tsunami in Indonesia. The deleterious impacts of paternal death are more pronounced for

[4]It should be noted that child's education is partially considered as a consumption good, so household's education expenditure is expected to decline following a decrease in household income arising from a health shock. Additionally, there are also non-monetary costs resulting from parental sickness that ill parents tend to spend less time on taking care of children and helping them with homework, thus lowering the academic achievement of their children (Gertler et al., 2004).

older children (age 15-17) than younger children (age 9-14). Furthermore, Gertler et al. (2004) find that a parent's death has a significant negative effect on child's education investment in Indonesia, regardless of paternal or maternal death and the child gender.

Even though there is a consensus of negative percussions of parental health shocks on children's human capital in the literature, little is known regarding asymmetric effects across the parent's gender, child's age and gender, and socioeconomic status of the household. To the best of my knowledge, this paper is one of the first to systematically evaluate the potential effects of parental health shocks on investment in child education based on micro-level panel data for Thailand. The current empirical results shed light on the intergenerational consequences of parental poor health status on human capital formation of their children. In addition, the results could inform policymakers and practitioners in strengthening Thailand's social safety nets for healthcare and education in order to mitigate adverse effects of major health shocks, particularly for poor households with school-age children.

3. Data and Summary Statistics

3.1 Data

This paper uses two rounds of the Thai panel Socio-Economic Survey (SES) in 2012 (Round 5) and 2017 (Round 6), conducted by National Statistical Office of Thailand (NSO). The panel SES is a nationally representative survey of approximately 6,000 households for each survey round, where the sample is stratified into provinces and administrative areas (urban/rural). The survey contains comprehensive information on housing and assets, income from agriculture, the occurrence of economic shocks, and demographics at the household level. It also collects detailed individual-level information on age, gender, relationship to the head of household, education level, employment, illness and healthcare utilization, and income and expenditures. To examine the effects of parental health shocks on child schooling

and labor, the analysis of this paper is restricted to children aged 7-18 at the time of the fifth round (2012) survey who were living with both parents in the 2012 and 2017 survey rounds. Thus, the resulting sample is a balanced panel of 966 children from 753 households.

In the panel SES, respondents were asked whether they had any major chronic diseases such as cancer, diabetes, heart and blood vascular, stroke, and mental disorders. The respondents with some chronic diseases were further asked to report the two most serious illnesses they had been diagnosed. The survey also asked all household members whether they were admitted to hospital during the previous 12 months and those being admitted were further asked for the duration of hospital stay for the last previous visit. In addition to chronic illness and hospitalization, all household members age 15 and over were required to self-evaluate their health status on five dimensions, consisting of mobility, self-care, usual activities, pain and discomfort, and anxiety and depression at the time of the interview.[5] More specifically, three levels of coding (having no problems, having some problems, and inability to perform) were used to evaluate for each health dimension. It should be noted that this measure is closely related to the Activities of Daily Living (ADL) index used in the literature (e.g., Bratti and Mendola, 2014; Gertler and Gruber, 2002; Lim, 2020; Luca and Bloom, 2018).

In this paper, two educational outcomes are examined: school enrollment and years of education completed. School enrollment status is based on whether the child was attending school at the time of survey. Regarding educational attainment, an individual's highest level of education was recorded in eight categories: 1) primary or below, 2) primary, 3) lower secondary, 4) upper secondary, 5) vocational certificate and diploma, 6) university/college, 7) master's degree, and 8) doctoral degree. Such data can be converted to years of education

[5] Note that this health measure is analogous to the European Quality of Life 5-Dimension 3-Level (EQ-5D-3L), which is initially developed by the EuroQol Group.

based on Thailand's education system. Moreover, household members aged 15 and above were asked about their employment status and the number of working hours per week. To disentangle the effects of parental health shocks on child labor, this paper focuses on the subsample of children aged 15 and over. Other control variables are grouped into three main categories: (1) child characteristics which include age and gender; (2) parental characteristics which include age and education of father and mother; (3) household characteristics which include households headed by a female, household size, region of residence, and household wealth (proxied by home ownership, number of rooms, and availability of safe water).

3.2 Summary Statistics

Table 1 reports the summary statistics of key variables used in the analysis by survey round. Roughly 93 percent of children aged from 7 to 18 are currently enrolled in school in the 2012 survey round and the enrollment of this cohort subsequently declines to around 70 percent in 2017. It may be implied that most Thai children are likely to engage in the labor market after completing secondary education instead of pursuing their further studies. Among the sample of 966 children: 55 percent are males and 45 percent are females. Consistent with the school enrollment rate, the proportion of children aged 15 and over being active in the labor force markedly increases from 13.9 percent to almost one-third during the same time span. However, it is observed that the average working hours per week of children falls considerably by 14.2 percent from 41.6 to 30.6 hours over the two survey rounds.

Insert Table 1 here

As also shown in Table 1, the proportions of sampled children who have either a father or mother suffering from any chronic illnesses range from 13.4 percent to 20.3 percent in the panel SES data. It should be further noted that the incidence of maternal chronic illness is

slightly higher than paternal chronic illness, and only 3.2 percent of children live with both parents who suffer from chronic diseases (e.g., cancer, diabetes, stroke, and mental disorders). A much lower proportion of parents (less than 4 percent), however, report having been admitted to a hospital in the past 12-month period. The average lengths of stay for those admitted are on the rise, reaching 12.5 days for father and 10.2 for mother as of 2017. Parents who self-reported with some problems or inability to perform for each health dimension are classified as having a health problem. On average, about 12 percent of children live with a parent who reported at least one health problem. However, it is important to note that data for father's and mother's self-reported health problems were missing considerably (42.0 percent and 24.5 percent, respectively) because they were not present at home at the time of scheduled interview.

Furthermore, it is observed that more than 80 percent of the sampled children live in their own house with an average of three rooms per household. The average household size is 4.8, the number of children aged 15 and under is 1.0 per family, and roughly one-fifth of children reside in female-headed households in the 2017 survey round. The mean per capita monthly household expenditure (expressed in 2017 prices) increases from 4,851 baht in 2012 to 5,166 baht in 2017, with an annual growth rate of 1.3 percent. However, its standard deviation is quite high, suggesting evidence of expenditure heterogeneity across the sampled households. Additionally, the majority of parents (almost 60 percent) have completed primary education or lower, while only 10 percent have completed university or higher.

4. Empirical Strategy

The analysis of this paper is primarily based on the theoretical framework developed by Becker and Tomes (1986) and Currie (2009) that explores possible impact pathways of parental resources on human capital investment in children. Following the recent literature

(Bratti and Mendola, 2014; Alam, 2015; Luca and Bloom, 2018; Mendolia et al., 2019), the individual fixed effects approach is used to identify the causal effects of parental health on children's educational and labor-market outcomes. The key advantage of this approach is to mitigate the possible endogeneity of parental health by taking into account unobserved time-invariant factors that are often correlated with both parental health status and child human capital outcomes. For example, parents with higher discount rates are less likely to invest in their own health and may choose not to send their children to school when facing a catastrophic health shock. The empirical analysis begins by estimating the fixed-effects linear model that relates parental health to educational and labor-market outcomes of children as:

$$Y_{iht} = \alpha_0 + \delta_i + \gamma_t + \beta_1 PF_{iht} + \beta_2 PM_{iht} + \eta \mathbf{X}'_{iht} + \varepsilon_{it} \qquad (1)$$

where Y_{iht} is the human capital outcome of interest for child i of household h at time t; δ_i denotes the individual (child) fixed effects; γ_t is the survey year fixed effects, and PF_{iht} and PM_{iht} represent father and mother's illness, respectively. Other explanatory variables are represented by a vector $\mathbf{X}'_{iht}$ which include individual and household characteristics such as child age and gender, parental education, age-gender household composition, and housing conditions of the household, and ε_{it} is the idiosyncratic error term.

Parameters β_1 and β_2 in Eq. (1) can be interpreted as the overall casual effects of a father and mother's health shock on the child's outcome of interest. One would expect negative signs of both parameters for child schooling equations since households with ill parents affected by a large decline in family income may be less able to afford education for their children. More specifically, this paper considers two educational outcomes: school enrollment and educational attainment.[6] The key explanatory variables in the model are the father's and mother's health shock. Furthermore, three binary indicators are constructed to

[6] As pointed out by Luca and Bloom (2018), a child' school enrollment reflects a short-term outcome associated with parental health shocks, whereas their educational attainment may be considered as a longer-term outcome.

measure whether a parent experience a health shock that take the value of one if he or she reported: (1) any chronic diseases, (2) a hospital admission during the past 12 month, and (3) having at least one health problem in the five following categories (mobility, self-care, usual activities, pain and discomfort, and anxiety and depression), and zero otherwise.

In addition, most empirical studies suggest that parental health shocks also lead to the increased labor supply of the other household members to supplement their household income, especially for young adult children. Hence, the two parameters (β_1 and β_2) are expected to be positive for the child labor equations, including the individual labor force participation, and number of working hours per week. Due to the data limitation, it is worthwhile to note that the regression analysis on child labor is confined to the subsample of children aged 15 and over at the time of survey (2012 and 2017).

To assess whether and the degree to which heterogeneity effects of parental health shocks on the particular outcome variable influenced by the child's gender, the regression model is modified by adding the interaction between the indicator for female and health status of the father and mother. The model to be estimated can then be specified as:

$$\begin{aligned} \mathrm{Y}_{\mathrm{iht}} = \alpha_0 + \delta_{\mathrm{i}} + \gamma_{\mathrm{t}} + \beta_1 \mathrm{PF}_{\mathrm{iht}} + \beta_2 \mathrm{PM}_{\mathrm{iht}} + \beta_3 \mathrm{PF}_{\mathrm{iht}} * \mathrm{Female}_{\mathrm{iht}} \\ + \beta_4 \mathrm{PM}_{\mathrm{iht}} * \mathrm{Female}_{\mathrm{iht}} + \eta \mathbf{X}'_{\mathrm{iht}} + \varepsilon_{\mathrm{it}} \end{aligned} \quad (2)$$

where $\mathrm{Female}_{\mathrm{iht}}$ is a dummy variable that takes a value of one for a female child and zero for a male child.

The parameters β_3 and β_4 in Eq. (2) represent the differential effects of parental health shocks on the outcomes of sons and daughters. To summarize, the empirical specifications presented above enable one to quantify the effects of parental health shocks on key children's human capital outcomes using household panel data.

5. Results and Discussion

5.1 Effects of parental health shocks on child schooling

This section presents the regression results investigating the effects of parental health on child's school enrollment status and the highest years of education attainted. The key explanatory variables of interest are maternal health, paternal health, and their interaction. In this paper, three different measures of parental health shocks are analyzed: (i) chronic diseases, (ii) hospital admission, and (iii) self-reported health problem. The choice of explanatory variables follows the recent studies discussed in the literature review section, including child's age, father' age and education, mother's age and education, indicators for household wealth, household size, and age and gender of household members. Specifically, a total of twelve regressions were run for each child's educational outcome with a particular measure of parental health from the ordinary least squares (OLS) and fixed-effects (FE) estimations.

Table 2 provides the average effect of a particular measure of parental health on educational outcomes of children using the OLS and FE specifications.[7] The OLS estimates for separate maternal and paternal health shocks on child schooling are shown in columns 1 and 3 of Table 2, where robust standard errors clustered at the individual level are in parentheses. As can be seen, the estimation results indicate that almost all parental health measures have no significant effect on child schooling, except for the coefficient of the dummy variable indicating both parents being admitted in hospital. More specifically, it decreases with the likelihood of children being enrolled in school by 18.3 percentage points

[7] It should be further noted that most explanatory variables included but not shown in Table 2 have significant expected signs. For example, children of highly educated parents or live in wealthier households are more likely to attend school and have higher years of education completed, while children from households having more school-age siblings have the higher probability of dropping out of school. Due to space constraint, the full regression results are not reported here but can be obtained from the author upon request.

and leads to a reduction of 3.2 years in the highest grade attained compared to children residing with healthy parents, both statistically significant at least the 0.05 level.

Insert Table 2 here

As mentioned previously, the fixed-effects specification is preferred in estimating the potential causal effects of parental health on child outcomes since it accounts for unobserved time-invariant individual and household factors to alleviate the endogeneity concern. The FE results in columns 2 and 4 of Table 2, however, reveal that all three measures of parental health shocks have detrimental impacts on both child's current enrollment status and grade attainment for Thai children aged 7 to 18 years. For example, mother's chronic illness leads to 0.4 fewer years of education completed for their children than those with healthy mothers. Additionally, children of ill fathers based on their self-report health status have 1.0 fewer years of education, which is statistically significant at the 0.01 level, while maternal illness has a smaller negative coefficient (-0.4), but statistically insignificant. Overall, children's educational outcomes are negatively affected by parental poor health status, with a larger extent for the educational attainment of children.

A further investigation is conducted to assess the differential effects of parental health shocks on schooling outcomes of sons and daughters. To explore this possibility, the interaction terms between three alternative indicators of parental health shocks and the female child were added to the regression model, as specified in Eq. (2). The FE estimates of parental health shocks on child schooling by gender are given in Table 3. It was found that girls with ill fathers, as measured by self-reported health, are 39.9 percentage points less likely to be enrolled in school, which is somewhat larger than the estimate of ill mothers (a decrease of 32.1 percentage points) compared to those with healthy parents. Notice that the two estimates are statistically significant at least the 0.10 level. It could be inferred therefore that there is

supportive evidence of son preference. Furthermore, this finding may be mainly attributable to a cultural tradition in Thailand as well as in other Asian countries that a daughter is expected to be the main caregiver for the ill parent (e.g., Gertler et al., 2004; Mont and Nguyen, 2013). In contrast, no significant gender differences were observed in determining educational attainment of children for all three different measures of parental health shocks. Lastly, it is noticeable that the FE estimates of parental health on child schooling outcomes are very similar to those shown in columns 2 and 4 of Table 2.

Insert Table 3 here

Subsequently, to examine whether and the extent to which parental health shocks have different effects on child schooling by age groups, the separate FE regressions are estimated for two age-cohort groups. Specifically, the younger cohort includes children of primary school age (7-12 years), and the older cohort are children of secondary school age (13-18 years) in the fifth round (2012) of the Thai panel SES. Table 4 displays the FE estimation results for the younger and older cohorts. It was found that the probability of being enrolling in school decreases by 45.5 percentage points for the younger cohort children whose both parents have a health problem, and by 23.4 percentage points if only mother reported any health problem. Hence, it can be concluded that such adverse effects on child schooling appear to be substantially larger as both of their parents are in poor health. Furthermore, the results in panel A of Table 4 show that having both parents with chronic illness results in around 0.7 fewer years of education completed than their counterparts living with healthy parents, only significant at the 0.10 level. However, the dummy variable indicating both parents being admitted to hospital is excluded for the younger cohort regressions since all values are zero.

Insert Table 4 here

As shown in columns 3 and 4 of Table 4, the FE estimates for the older cohort (aged 13-18 in 2012) indicate, on average, that educational attainment is markedly reduced by almost 2.0 years for children of unhealthy fathers. Moreover, their enrollment status is disproportionately affected if both parents have been admitted to hospital during the past 12 month, with a decrease of 55.3 percentage points, both highly significant at the 0.01 level. Overall, the results point to evidence of differential effects of parental health shocks on human capital of children by age groups in Thailand. More specifically, school enrollment for the younger cohort is negatively associated with mother's self-reported health problem, albeit to a lesser extent, whereas educational attainment for the older cohort is more negatively correlated with poor paternal health. The results discussed above also echo recent studies conducted in other developing countries (e.g., Alam, 2015; Luca and Bloom, 2018; Lim, 2020) that paternal illness appears to have a relatively large impact on child schooling outcomes.

5.2 Effects of parental health shocks on child labor

The analysis is extended to consider the effects of parental health shocks on youth (aged 15-23 years) labor force participation and number of weekly working hours. Following Mendolia et al. (2019), a linear probability model is used to estimate the labor force participation equation, where the dependent variable is a binary indicator that equals one if a youth engaged in the labor market, and zero otherwise. In addition, a linear regression model is developed to relate parental health to hours worked among the employed youths. Table 5 reports the OLS and FE estimates of parental illness on the two labor-market outcomes obtained from eight separate regressions with robust standard errors clustered at the individual level. Note that the indicator of a parental health shock based on self-reported health status is

excluded from the analysis because there were very few observations with information on parents' health problems and the number of working hours.[8] The FE estimates for the labor force participation equation (Table 5, column 2) reveal that parents' chronic illness is significantly positively associated with child labor. For example, paternal chronic illness contributes to a 21.7 percentage points increase in the likelihood of entering the labor force, and its impact is statistically significant at the 0.01 level. Meanwhile, children of chronically ill mothers are more likely to enter the labor market, but the magnitude appears to be much smaller (0.03) with a lower level of significance.

Insert Table 5 here

Additionally, it finds that the probability of entering the labor force increases by 23.6 percentage points among youth between ages of 15 and 23 years if both parents suffer from any chronic diseases. These results are comparable to Bratti and Mendola (2014) who reported that maternal illness increases the probability of child employment by 7.4 percentage points for children aged 15-24 in Bosnia and Herzegovina. However, it is somewhat surprising that the hospitalization of a parent has no significant effect on the child's labor market entry, as illustrated in panel B of column 2 in Table 5. Although the OLS regression coefficients of parental hospital admission have the same sign as the FE estimates, only mother's hospital admission has a positive impact on child labor participation with a 15.1 percentage points, which is statistically significant at the 0.10 level.

Turning to the impact of parental health on hours worked by children, the OLS and FE regression estimates are reported in columns 3 and 4 of Table 5. It is noticeable that the observations are restricted to children aged 15 and above who are currently active in the labor

[8] Likewise, the indicator of both parents being admitted to hospital is also dropped from the model since most observations are zero.

market with positive working hours. Hence, the number of observations decrease by almost three-fourths compared with the sample used in the labor force participation equation. On average, the results demonstrate that mother's chronic illness leads to an increase of 5.3-5.5 working hours performed by children (about 14 percent of the mean working hours), and the two coefficients are statistically significant at the 0.10 level. In addition, this finding seems consistent with the estimate reported by Alam (2015) that child labor hours (both domestic and market work) increase by 11 percent for children living with ill mothers. Despite having expected positive signs, none of the OLS and FE coefficients of incidence of parents' hospital admission has a significant effect on labor hours of children.

5.3 Effects of parental health shocks on household income and expenditures

The main results from the previous sections indicate that both maternal and paternal health shocks negatively affect children's school attendance and grade attainment, but increase the incidence of child labor. More importantly, these negative consequences tend to be magnified when both parents are in poor health. The final analysis looks at the effects of parental health shocks on household income and consumption expenditures. It is generally hypothesized that a severe parental health shock leads to the significant decline in household income and changes in spending patterns so as to smooth consumption. Moreover, it is plausible the increase in health expenditures associated with parental health shocks may be potentially offset by the decreased in education expenditures, which may undermine children's educational advancement.

Insert Table 6 here

Table 6 presents the regression coefficients of a particular indicator of parental health on household income and consumption from the household fixed-effects specifications. Four

dependent variables are used in the analysis: household income, total consumption expenditures, health expenditures, and education expenditures, where all variables are measured by per capita values (in logarithm) expressed in 2017 prices. Robust standard errors clustered at the household level are given in parentheses. The results show that per capita household income is significantly decreased by 72.2 percent ($e^{-1.28}$-1) if both parents experienced a hospital admission in the previous 12-month period, which is statistically significant at the 0.01 level.

The coefficients of other indicators of parental health are negative as expected, although these estimates are not statistically significant. Either father or mother being admitted in hospital increase household consumption expenditures approximately 19.2 percent, both statistically at least the 0.10 level. Furthermore, it is important to note that this estimate increases to 38.4 percent when both parents had been admitted to hospital. Therefore, it can be inferred that although there is a very small chance of having either parent admitted to hospital (about 2-4 percent, see also Table 1), it contributes to significant and costly impacts on household income and consumption among Thai households with school age children.

Columns 3 and 4 of Table 6 reports the FE estimation results for two expenditure categories of interest including health and education at the household level. The results suggest that both father's illness and mother's illness increase household health expenditures for all three different measures of parental health. Additionally, households with ill parents are more likely to spend less on education expenditures, with a somewhat larger effect for paternal illness on household education expenditures. For instance, paternal chronic illness is significantly associated with a 47.7 percent reduction in per capita education expenditures. These estimates are consistent with those found by Sparrow et al. (2014) that the illness of a family member results in the coincidence of the decrease in household income with the large

increase in out-of-pocket health payments for Indonesian households. Additionally, Luca and Bloom (2018) find that only father illness leads to a significant decline in per capita education expenditure about 15.9 percent. However, none of the indicators of parental illness using self-reported health on education expenditures is significantly different from zero. Overall, there is a strong possibility that households with ill parents are adversely affected by the large increase in medical expenditures, then they tend to have lower household resources allocated to children's education, which help explain the observed results for child schooling and labor in Thailand.

6. Conclusion

This paper has investigated the effects of parental health shocks on children's education and labor, using a panel dataset from Thailand for 2012 and 2017. Three alternative measures are used to gauge parental health status, which consists of (1) chronic illness, (2) hospital admission, and (3) self-reported poor health, respectively. Taking the advantage of panel data, the main results of this paper are primarily based on the fixed-effects specifications to obtain more precise estimates. The results have shown that both maternal and paternal health shocks have a significant negative impact on the two educational outcomes of children: enrollment status and years of education attained. The estimated impacts are robust across different types of parental health measures.

The results have also provided suggestive evidence of gender disparity in favor of sons that daughters are less likely to have attended school when any parent self-reported at least one health problems, while no systematic gender differences were observed for the educational attainment. Moreover, the educational outcomes for the older cohort (ages 13 to 18) are more negatively affected by paternal illness than maternal illness. Parents with chronic diseases appear to be the key determinants of the child labor, with a larger extent for paternal

illness. However, only maternal chronic illness increases the working hours of children about 5.5 hours per week (a 14 percent increase). Overall, the empirical evidence has established a substantial intergenerational effect that parental illness can seriously worsen human capital outcomes of Thai children, even though almost all Thai citizens are covered by formal health insurance schemes, of which more than two-thirds were covered by the universal health coverage scheme.

Therefore, in addition to the provision of quality universal health coverage, specific government support, such as cash transfers, school fees deferment and reduction, and school supplies, would help low-income families afflicted by severe health shocks to maintain their expenditures on child education. However, the current study was limited by the availability of data on children's time allocation to household chores and market work, as well as parents' time spent with their children. For example, it is possible that children of ill parents may be still enrolled in school, but they are more likely to spend their time in domestic chores, such as cleaning the house, cooking or preparing meals, and taking care of younger siblings. Thus, the empirical estimates of parental health on child labor tend to be underestimated, especially for the effect of maternal illness. Further research is needed to explore the differential effects of parental health shocks on child education and labor across health insurance schemes and its impact on children's health and academic achievement. Such results would inform policymakers and practitioners for improving social safety nets to mitigate the negative consequences of catastrophic health events on children's welfare.

References

Alam, S. A. (2015). Parental health shocks, child labor and educational outcomes: Evidence from Tanzania. *Journal of Health Economics, 44*, 161-175.

Bazen, S., & Salmon. (2010). The impact of parental health on child labor: The case of Bangladesh. *Economics Bulletin, 30*(4), 2549-2557.

Becker, G. S., & Tomes, N. (1986). Human capital and the rise and fall of families. *Journal of Labor Economics, 4*(3, Part 2), S1-S39.

Bratti, M., & Mendola, M. (2014). Parental health and child schooling. *Journal of Health Economics, 35*, 94-108.

Cas, A. G., Frankenberg, E., Suriastini, W., & Thomas, D. (2014). The impact of parental death on child well-being: Evidence from the Indian Ocean Tsunami. *Demography, 51*(2), 437-457.

Chen, S. H., Chen, Y. C., & Liu, J. T. (2009). The impact of unexpected maternal death on education: First evidence from three national administrative data links. *American Economic Review, 99*(2), 149-153.

Currie, J. (2009). Healthy, wealthy, and wise: Socioeconomic status, poor health in childhood, and human capital development. *Journal of Economic Literature, 47*(1), 87-122.

Dercon, S., & Krishnan. (2000). In sickness and in health: Risk sharing within households in rural Ethiopia. *Journal of Political Economy, 108*(4), 688-727.

Dhanaraj, S. (2016). Effects of parental health shocks on children's schooling: Evidence from Andhra Pradesh, India. *International Journal of Educational Development, 49*, 115-125.

Dillon, A. (2013). Child labor and schooling responses to production and health shocks in northern Mali. *Journal of African Economies, 22*(2), 276-299.

Dinku, Y., Fielding, D., & Genç, M. (2018). Health shocks and child time allocation decisions by households: Evidence from Ethiopia. *IZA Journal of Labor Economics, 7*(1), 1-23.

Gertler, P., & Gruber, J. (2002). Insuring consumption against illness. *American Economic Review, 92*(1), 51-70.

Gertler, P., Levine, D. I., & Ames, M. (2004). Schooling and parental death. R*eview of Economics and Statistics, 86*(1), 211-225.

Jacoby, H. G., & Skoufias, E. (1997). Risk, financial markets, and human capital in a developing country. *The Review of Economic Studies, 64*(3), 311-335.

Kochar, A. (1995). Explaining household vulnerability to idiosyncratic income shocks. *American Economic Review, 85*(2), 159-164.

Le, H. T., & Nguyen, H. T. (2017). Parental health and children's cognitive and non-cognitive development: New evidence from the longitudinal survey of Australian children. *Health Economics, 26*(12), 1767-1788.

Lim, S. S. (2020). Parental chronic illness and child education: Evidence from children in Indonesia. *International Journal of Educational Development, 73*, 102099.

Luca, D. L., & Bloom, D. E. (2018). *The returns to parental health: Evidence from Indonesia.* (No. w25304). National Bureau of Economic Research.

Mendolia, S., Nguyen, N., & Yerokhin, O. (2019). The impact of parental illness on children's schooling and labor force participation: Evidence from Vietnam. *Review of Economics of the Household*, *17*, 469-492.

Mitra, S., Palmer, M., Mont, D., & Groce, N. (2016). Can households cope with health shocks in Vietnam?. *Health Economics, 25*(7), 888-907.

Mont, D., & Nguyen, C. (2013). Does parental disability matter to child education? Evidence from Vietnam. *World Development, 48*, 88-107.

National Health Security Office. (2022). *NHSO Annual Report Fiscal Year 2021*. National Health Security Office, Bangkok.

Office of the Basic Education Commission. (2022). *Thailand Education Statistics*. Retrieved from https://www.obec.go.th/archives/817817.

Sparrow, R., de Poel, E. V., Hadiwidjaja, G., Yumna, A., Warda, N., & Suryahadi, A. (2014). Coping with the economic consequences of ill health in Indonesia. *Health Economics, 23*(6), 719-728.

Sun, A., & Yao, Y. (2010). Health shocks and children's school attainments in rural China. *Economics of Education Review*, *29*(3), 375-382.

Wagstaff, A. (2007). The economic consequences of health shocks: Evidence from Vietnam. *Journal of Health Economics, 26*(1), 82-100.

Wagstaff, A., & Lindelow, M. (2014). Are health shocks different? Evidence from a multi-shock survey in Laos. *Health Economics*, *23*(6), 706-718.

Woode, M. E. (2017). Parental health shocks and schooling: The impact of mutual health insurance in Rwanda. *Social Science & Medicine, 173*, 35-47.

Table 1 Sample Summary Statistics of Key Variables

Variable	2012			2017		
	Mean	**SD**	**Obs.**	**Mean**	**SD**	**Obs.**
Dependent variables						
Currently enrolled in school (%)	0.930	0.256	966	0.698	0.459	966
Years of education completed	6.184	2.344	966	9.282	3.017	966
Child labor (aged 15 and over, %)	0.139	0.346	331	0.306	0.461	732
Weekly working hours (aged 15 and over)	41.630	15.580	46	35.703	16.131	224
Parental health variables						
Father has a chronic illness (yes=1)	0.134	0.340	966	0.185	0.389	966
Mother has chronic illness (yes=1)	0.154	0.361	966	0.203	0.402	966
Both parents have a chronic illness (yes=1)	0.049	0.215	966	0.083	0.276	966
Father admitted to hospital (yes=1)	0.030	0.171	966	0.032	0.176	966
Mother admitted to hospital (yes=1)	0.042	0.202	966	0.019	0.135	966
Father's length of stay in hospital (yes=1)	4.586	4.917	29	12.484	29.111	32
Mother's length of stay in hospital (yes=1)	6.659	10.674	41	10.167	23.241	18
Father self-reported at least one health problem (yes=1)	0.098	0.298	559	0.111	0.314	533
Mother self-reported at least one health problem (yes=1)	0.171	0.377	748	0.108	0.311	748
Control variables						
Female (%)	0.447	0.497	966	0.447	0.497	966
Child's age	12.707	3.373	966	17.379	3.364	966
Female headed household (%)	0.197	0.398	966	0.178	0.383	966
Number of children aged 0-15	1.488	0.997	966	0.973	1.003	966
Number of males aged 18-59	1.290	0.584	966	1.577	0.784	966
Number of males aged 60 and over	0.038	0.192	966	0.077	0.266	966
Number of females aged 18-59	1.253	0.545	966	1.492	0.729	966
Number of females aged 60 and over	0.083	0.279	966	0.111	0.333	966
Household size	4.438	1.445	966	4.771	1.754	966
Father's age	44.712	6.664	966	49.420	6.676	966
Father completed primary education or lower (%)	0.572	0.495	966	0.577	0.494	966
Father completed secondary education (%)	0.240	0.427	966	0.249	0.433	966
Father completed vocational certificates (%)	0.083	0.276	966	0.081	0.273	966
Father completed university or higher (%)	0.105	0.306	966	0.093	0.291	966
Mother's age	41.619	6.410	966	46.314	6.407	966
Mother completed primary education or lower (%)	0.601	0.490	966	0.598	0.490	966
Mother completed secondary education (%)	0.218	0.413	966	0.248	0.432	966
Mother completed vocational certificates (%)	0.071	0.258	966	0.057	0.232	966
Mother completed university or higher (%)	0.109	0.311	966	0.096	0.295	966
House owned (yes=1)	0.824	0.381	966	0.865	0.341	966
Number of rooms	2.937	1.225	966	3.135	1.171	966
Household had piped water supply (yes=1)	0.759	0.428	966	0.846	0.361	966
Per capita monthly household expenditure (baht)	4,850.7	3,678.3	966	5,165.6	6,298.8	966
Rural area (%)	0.588	0.492	966	0.512	0.500	966
Bangkok and vicinity (%)	0.176	0.381	966	0.176	0.381	966
Central (%)	0.208	0.406	966	0.209	0.407	966
North (%)	0.124	0.330	966	0.123	0.329	966
Northeast (%)	0.315	0.465	966	0.316	0.465	966
South (%)	0.177	0.382	966	0.176	0.381	966

Table 2 Effects of Parental Health Shocks on Child Schooling

	School enrollment		**Years of education completed**	
	(1) OLS	(2) FE	(3) OLS	(4) FE
Panel A: Parents with chronic illness				
Father with a chronic illness	0.015	-0.025	0.190	0.046
	(0.024)	(0.037)	(0.139)	(0.202)
Mother with a chronic illness	0.008	0.035	0.005	-0.396**
	(0.023)	(0.036)	(0.133)	(0.191)
Both parents with a chronic illness	-0.003	-0.002	-0.387	-0.154
	(0.047)	(0.069)	(0.254)	(0.357)
Number of Observations	1,932	1,932	1,932	1,932
Panel B: Parents being admitted to hospital				
Father being admitted	0.019	0.031	0.146	0.131
	(0.037)	(0.050)	(0.278)	(0.272)
Mother being admitted	-0.026	-0.022	-0.253	-0.287
	(0.039)	(0.059)	(0.195)	(0.314)
Both parents being admitted	-0.183**	-0.517***	-3.207***	-0.279
	(0.082)	(0.095)	(0.441)	(0.481)
Number of Observations	1,932	1,932	1,932	1,932
Panel C: Parents with a health problem				
Father in poor health	0.036	-0.125	-0.290	-1.048***
	(0.064)	(0.129)	(0.289)	(0.400)
Mother in poor health	-0.005	-0.090	-0.069	-0.352
	(0.042)	(0.114)	(0.289)	(0.529)
Both parents in poor health	-0.082	0.219	0.301	0.630
	(0.089)	(0.201)	(0.458)	(0.780)
Number of Observations	754	754	754	754

Notes: ** significant at 0.05 level and *** significant at 0.01 level. Each column in each panel represents a separate regression. Fixed effects are at the individual (child) level. Other covariates not shown are child 'age and age squared, household size, number of children (aged 5 and below), age-gender household composition, father's age and education, mother's age and education, and a set of dummy variables indicate household wealth, administrative areas, and survey years. Robust standard errors clustered by child are reported in parentheses.

Table 3 Fixed Effects Estimates of Parental Health Shocks on Child Schooling by Gender

	School enrollment (1)	**Years of education completed** (2)
Panel A: Parents with chronic illness		
Father with a chronic illness	-0.016	-0.064
	(0.047)	(0.257)
Mother with a chronic illness	0.049	-0.514**
	(0.049)	(0.219)
Both parents with a chronic illness	-0.005	-0.125
	(0.069)	(0.352)
Father with a chronic illness * Girl	-0.021	0.241
	(0.064)	(0.352)
Mother with a chronic illness * Girl	-0.029	0.251
	(0.064)	(0.324)
Number of Observations	1,932	1,932
Panel B: Parents being admitted to hospital		
Father being admitted	0.077	-0.238
	(0.079)	(0.409)
Mother being admitted	0.024	-0.345
	(0.103)	(0.379)
Both parents being admitted	-0.469***	-0.206
	(0.129)	(0.548)
Father being admitted * Girl	-0.086	0.707
	(0.100)	(0.528)
Mother being admitted * Girl	-0.079	0.093
	(0.122)	(0.598)
Number of Observations	1,932	1,932
Panel C: Parents with a health problem		
Father in poor health	-0.003	-0.997**
	(0.141)	(0.456)
Mother in poor health	-0.215*	-0.781
	(0.126)	(0.525)
Both parents in poor health	0.219	0.551
	(0.199)	(0.800)
Father in poor health * Girl	-0.399*	0.066
	(0.205)	(0.834)
Mother in poor health * Girl	-0.321**	1.115
	(0.153)	(0.757)
Number of Observations	754	754

Notes: * significant at 0.10 level, ** significant at 0.05 level and *** significant at 0.01 level. Each column in each panel represents a separate regression. Fixed effects are at the individual (child) level. Other covariates not shown are child 'age and age squared, household size, number of children (aged 5 and below), age-gender household composition, father's age and education, mother's age and education, and a set of dummy variables indicate household wealth, administrative areas, and survey years. Robust standard errors clustered by child are reported in parentheses.

Table 4 Fixed Effects Estimates of Parental Health Shocks on Child Schooling by Age Group

	Younger cohort (Aged 7-12 in 2012)		**Older cohort (Aged 13-18 in 2012)**	
Dependent variable:	School enrollment (1)	Years of education completed (2)	School enrollment (3)	Years of education completed (4)
Panel A: Parents with chronic illness				
Father with a chronic illness	-0.022	-0.180	-0.020	0.271
	(0.032)	(0.199)	(0.067)	(0.288)
Mother with a chronic illness	-0.019	0.105	0.092	-0.298
	(0.031)	(0.220)	(0.063)	(0.285)
Both parents with a chronic illness	0.036	-0.660*	-0.064	-0.179
	(0.057)	(0.390)	(0.115)	(0.502)
Number of Observations	938	938	994	994
Panel B: Parents being admitted to hospital				
Father being admitted	0.036	0.014	0.059	0.207
	(0.036)	(0.295)	(0.084)	(0.383)
Mother being admitted	0.026	-0.150	-0.008	-0.139
	(0.045)	(0.311)	(0.103)	(0.383)
Both parents being admitted			-0.553***	0.557
			(0.157)	(0.623)
Number of Observations	938	938	994	994
Panel C: Parents with a health problem				
Father in poor health	-0.252	-0.448	-0.037	-1.977***
	(0.199)	(0.295)	(0.179)	(0.481)
Mother in poor health	-0.234**	0.070	-0.001	-0.648
	(0.117)	(0.447)	(0.213)	(0.844)
Both parents in poor health	-0.455*	0.025	-0.035	1.562
	(0.237)	(0.559)	(0.300)	(1.348)
Number of Observations	383	383	371	371

Notes: * significant at 0.10 level, ** significant at 0.05 level and *** significant at 0.01 level. Each column in each panel represents a separate regression. Fixed effects are at the individual (child) level. Other covariates not shown are child 'age and age squared, household size, number of children (aged 5 and below), age-gender household composition, father's age and education, mother's age and education, and a set of dummy variables indicate household wealth, administrative areas, and survey years. Robust standard errors clustered by child are reported in parentheses.

Table 5 Effects of Parental Health Shocks on Child Labor

	Labor force participation		Weekly working hours	
	(1) OLS	(2) FE	(3) OLS	(4) FE
Panel A: Parents with chronic illness				
Father with a chronic illness	-0.059	0.217***	-3.774	-3.659
	(0.039)	(0.080)	(4.404)	(4.196)
Mother with a chronic illness	-0.029	0.033*	5.318*	5.469*
	(0.039)	(0.081)	(2.932)	(2.827)
Both parents with a chronic illness	0.080	0.236*	-2.890	-1.639
	(0.067)	(0.142)	(6.243)	(5.858)
Number of Observations	1,063	1,063	270	270
Panel B: Parents being admitted to hospital				
Father being admitted	-0.008	-0.027	1.981	2.441
	(0.065)	(0.125)	5.020	(5.078)
Mother being admitted	0.151*	0.219	3.499	3.705
	(0.091)	(0.144)	5.962	(5.754)
Number of Observations	1,063	1,063	270	270

Notes: * significant at 0.10 level and *** significant at 0.01 level. Each column in each panel represents a separate regression. Fixed effects are at the individual (child) level. Other covariates not shown are child 'age and age squared, household size, number of children (aged 5 and below), age-gender household composition, father's age and education, mother's age and education, and a set of dummy variables indicate household wealth, administrative areas, and survey years. Robust standard errors clustered by child are reported in parentheses.

Table 6 Effects of Parental Health Shocks on Household Income and Consumption

Dependent variable (per capita in logarithm)	Household income (1)	Total Exp. (2)	Health exp. (3)	Education exp. (4)
Panel A: Parents with chronic illness				
Father with a chronic illness	-0.147	-0.002	0.289	-0.390*
	(0.129)	(0.067)	(0.327)	(0.222)
Mother with a chronic illness	-0.176	-0.002	0.675**	0.037
	(0.128)	(0.069)	(0.280)	(0.209)
Both parents with a chronic illness	-0.102	-0.157	-0.360	-0.761*
	(0.197)	(0.124)	(0.494)	(0.395)
Number of Observations	1,506	1,506	1,506	1,506
Panel B: Parents being admitted to hospital				
Father being admitted	-0.288	0.176*	1.051**	-0.775**
	(0.211)	(0.099)	(0.454)	(0.384)
Mother being admitted	-0.140	0.175**	1.639***	-0.293
	(0.254)	(0.069)	(0.424)	(0.394)
Both parents being admitted	-1.280***	0.325***	1.826***	-2.303**
	(0.257)	(0.078)	(0.439)	(0.539)
Number of Observations	1,506	1,506	1,506	1,506
Panel C: Parents with a health problem				
Father in poor health	-0.123	0.052	1.817*	-0.702
	(0.303)	(0.242)	(1.084)	(0.496)
Mother in poor health	-0.407	0.134	0.342	-0.405
	(0.318)	(0.242)	(0.714)	(0.401)
Both parents in poor health	-0.157	-0.336	1.372	0.755
	(0.446)	(0.315)	(1.391)	(0.815)
Number of Observations	1,162	1,162	1,162	1,162

Notes: * significant at 0.10 level, ** significant at 0.05 level and *** significant at 0.01 level. Each column in each panel represents a separate regression. Fixed effects are at the household level. Other covariates not shown are household size and a set of dummy variables indicate administrative areas and survey years. Robust standard errors clustered by household are reported in parentheses.