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The effects of disability on households' economic livelihoods and poverty in Vietnam

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Abstract

Could households be both more vulnerable and more resilient to shocks depending on the type of shock experienced and the overall circumstances in which they live? If so, what policy implications can be drawn from such findings? We investigate both the immediate effects of shocks on household's income and assets, and the longer-term poverty dynamics of households with a disabled member (DH) and without a disabled member (NDH) in Vietnam. Additionally, we assess differences in behaviors and beliefs between these two household groups and the extent to which these differences can explain variations in the impact of shocks on their economic livelihoods. Our results indicate that DHs are more risk averse and believe they will face more health shocks than NDHs, but also experience a greater number of health shocks and total shocks. Examining the immediate impact of shocks, we find that DHs are more resilient in the face of health-related shocks, however, they face large income losses when confronted with weather and agricultural shocks. While these immediate effects may lead one to conclude that policies for DHs should address these natural shocks, our poverty dynamics analysis paints a different picture. Households with a disabled member that face one or more health shocks are significantly more likely to have experienced chronic or transitory poverty than households where a disability is not present. Yet, these households are no more likely to end up in poverty when faced with shocks outside of the health domain. This suggests that the greater number of cumulative shocks, primarily driven by more frequently experienced health shocks, makes them more vulnerable to natural shocks than NDHs and weakens their overall resiliency. Thus, the cumulative number of health shocks may be the strongest determinant of poverty in the long run for DHs, and policies aimed at reducing poverty need to account for the unique experiences of these households.

Keywords: Poverty dynamics, Disability, Cumulative shocks, Risk preferences, Panel data, Vietnam

JEL: D13, I32, I12

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1   Introduction

Although poverty has decreased over the past several decades, 9.3% of people still live in extreme poverty (The World Bank, 2022). Vulnerability to poverty remains an important policy issue, especially in many developing countries (Naudé et al., 2008). Furthermore, the COVID-19 pandemic has halted the long decline in the extreme poverty rate. In 2020, the global population living in extreme poverty increased by an estimated 70 million people (The World Bank, 2022). In order to continue to reduce poverty in the coming years, it is necessary to better understand its causes and identify particular groups which may be more susceptible to falling into and remaining in poverty.

Households with a disabled family member may be one group that is more vulnerable to poverty. Households with a disabled member may have unique experiences, face distinct challenges, exhibit different beliefs (e.g., risk attitudes), or behave differently (e.g., coping strategies employed) when exposed to shocks. In particular, their repeated and cumulative exposure to health shocks may affect their economic resiliency in distinct ways that can shed light on poverty dynamics at play for vulnerable households more generally. The existing literature suggests that individuals are more or less likely to end up in poverty due to (i) initial endowments (Dercon, 1998; Carter and May, 2001; Maluccio et al., 2000), (ii) different attitudes and behaviors (Dercon, 1998; Zimmerman and Carter, 2003; Boucher et al., 2008) (iii) exogenous shifts in returns to endowments (Gunning et al., 2000), or (iv) the impact of shocks on welfare (Glewwe and Hall, 1998; Gertler and Gruber, 2002; Yamano and Jayne, 2002; Dercon, 2004). What is less clear is how these determinants of poverty interact and contribute to persistent disparities in both developing and developed countries.

Poverty dynamics have been an area of interest for over two decades (Baulch and Hoddinott, 2000; Carter and May, 2001; Barrett, 2005; Imai et al., 2011; Michler and Josephson, 2017; Ward, 2016). However, empirical studies that can provide insights for specific subgroups, in particular households with impaired/disabled members, remain sparse. Data on households with a disabled member are scarce, especially panel data that allows for studying behavior and welfare changes over time. Even when such data are available, poor households are more likely to be exposed to and affected by past health shocks, making it difficult to disentangle correlations and directional causality.

This paper makes use of a unique data set that surveys households in Vietnam over a 10-year period with information on the occurrence and severity of a disability within the household, income, assets, shocks, and coping strategies in order to assess the impact of shocks on households' economic livelihood, vulnerability, and resilience to poverty over time. Vietnam is particularly well-suited to examine the long-run effects of disability on poverty as more than 7% of, or 6.7 million, Vietnamese citizens report having at least some functional difficulties (UNFPA, 2011) and a higher percent of disabilities may be the result of exogenous shocks in Vietnam stemming from the consequences of the Vietnam War including bombings (Palmer et al., 2019) and exposure to chemical defoliants (e.g., Agent Orange). Both of which continue to impact people to this day. For instance, children of those exposed to Agent Orange are more likely to be born with birth defects such as spina bifida (Committee to Review the Health Effects in Vietnam Veterans Exposure to Herbicides, 1996), and over 66,000 people have been maimed by unexploded ordinances since the end of the war.[1]

We investigate both the immediate impact of shocks on household welfare and the longer-term poverty dynamics of households with a disabled member (DH) and without a disabled member (NDH) in Vietnam to develop a better understanding of not just the economic vulnerability but also the resiliency of households affected by disability. In particular, we analyze their ability to cope with and recover from different types of shocks and assess what efforts can be made to better support these vulnerable households. We address the following questions: Do DHs differ from NDHs in their beliefs about and

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[1]Please find a comprehensive report on unexploded ordinances here.

behaviors related to risk and shocks? How do different types of shocks impact the income and assets of these two groups? Do DH and NDH differ in their coping strategies, and do these differences explain which households move in and out of poverty? How do differences in beliefs, employment of different types of coping strategies, and variations in and frequency of shocks impact the economic resilience of DH and NDH households over time?

Our analysis distinguishes between health and natural shocks (e.g., weather and agricultural shocks), and analyzes the marginal and cumulative effect of shocks experienced. Households affected by disability might be more likely to face health shocks but should not differ in the probability of experiencing natural shocks. Observing income and asset losses due to both types of shocks allows us to test whether DHs and NDHs are differently affected by both types of shocks and why. For instance, DHs could be more adversely affected by weather shocks experienced by all households because they have different beliefs and behave fundamentally differently when faced with exogenous or unanticipated shocks. Alternatively, DHs may face a more complex and more persistent set of challenges than NDHs whether these shocks occur or not. Their past experiences might inform their beliefs and result in different risk preferences and behaviors observed at any point in time. They might be more resilient to each additional health shock experienced than NDHs, for instance, but the cumulative number of health shocks as well as additional unanticipated weather shocks experienced may make them less resilient in the longer-term, and prevent them from permanently moving out of poverty. DH households might therefore react differently to and be differently affected by shocks even when the socio-demographic makeup of these households is comparable to a household without a disabled member. Importantly, DHs could have developed more effective strategies to cope with health shocks than NDHs. Thus, they could both be more vulnerable to poverty compared to NDHs, and more resilient across at least some types of shocks.

Previous work examining the impact of disabilities has found that those living with a disability are less likely to be employed, have lower educational attainment, and have higher levels of multidimensional poverty (Mitra and Sambamoorthi, 2008; Mont and Cuong, 2011; Mitra et al., 2013; Mizunoya and Mitra, 2013). Bales (2013) examines the impact of health shocks that lead to a disability or death of a household member in Vietnam and the coping strategies employed to mitigate the impact on consumption. However, the paper does not assess the impact of additional shocks on the household following these health shocks. The impacts of disability are not limited to the individual but also extend to outcomes within the household. For instance, Mont and Nguyen (2013) find that children with a disabled parent are 16% less likely to attend school in Vietnam. Understanding how outcomes such as these occur has been impeded by a lack of quality data on disability status, particularly in a panel setting. Instead, many studies are limited to cross-sectional data or, at most, two waves of panel data. We use several waves of panel data over a ten-year period which captures information on the timing and severity of disabilities within a household. Given this unique data set on DHs, this paper first assesses how DHs and NDHs differ in their ex-ante beliefs and attitudes regarding risk and expectations of future shocks. We then analyze health shocks and natural shocks faced by these households, estimate the yearly impact of shocks on income and assets, and assess the vulnerability and resiliency of these households to different types of shocks. In addition, we evaluate the effectiveness of coping strategies implemented by DHs and NDHs to attenuate the impact of shocks. Finally, we analyze resulting poverty dynamics and assess which households are more or less likely to experience chronic or transitory poverty, and why.

Our results indicate that DHs are more risk averse and believe they will face more health shocks than NDHs, but are also experiencing more health shocks and more shocks overall. DHs are also more adversely affected when shocks occur, losing an additional 4.3%-6.2% of their yearly income with each additional shock endured compared to NDHs. However, income losses vary greatly by shock type. Although DHs face more health shocks than NDHs, NDHs lose more of their household income with each additional health shock endured. The impact of health shocks on DHs' income is smaller in magnitude and not significant. This suggests that DHs are more resilient to health shocks than NDHs. On the

other hand, DHs lose a larger share of their yearly income (26%) with each additional natural shock experienced than NDHs (1%). Thus, while DHs may be more resilient in the face of health shocks, the cumulative number of these health shocks weakens their overall resiliency, leading to large income losses when confronted with shocks outside of the health domain. In terms of assets, however, NDHs lose 0.5%-2.3% more of their asset shares than DHs for each shock faced. This loss of assets may hamper the income-generating capacity of these households in the future. We also find that DHs and NDHs differ in their coping strategies used. DHs are more likely to use formal insurance and rely on support from their social networks to cope with shocks. However, we do not find that reliance on social networks mitigates the impact of shocks on DHs, while the use of insurance seems to lessen the impact of shocks on assets for DHs but not for NDHs. Drawing down savings is the most successful coping strategy to lessen the impact of shocks on household income for both household groups.

Our analysis of poverty dynamics further indicates that DHs are more likely to be in transitory and chronic poverty with each additional health shock. However, they are no more likely to be in poverty when faced with one or more natural shocks. This finding further supports the notion that despite being resilient to health shocks, the cumulative number of shocks overwhelms their capacity to manage future shocks. In contrast, NDHs are more likely to be in chronic poverty than not in poverty for each natural shock they faced. We also find that NDHs are less likely to have experienced both transitory or chronic poverty if they are able to draw on their savings in response to a shock but this result does not hold for DHs. Instead, DHs are less likely to be in transitory poverty if they sold off assets to cope with a shock.

Taken together, our findings suggest that the cumulative effect of health shocks experienced may be the strongest determinant of poverty in the long run for DHs. DHs display greater resiliency to additional health shocks than NDHs, but the greater number of health shocks experienced over time makes them more vulnerable to poverty overall. We do find differences in beliefs and attitudes regarding risks for DHs and NDHs, but these differences accurately reflect their differing past and future exposure to shocks. Similarly, we do find differences in coping strategies used across households, but these once more might reflect differences in experiences and constraints introduced by the relatively higher number of shocks experienced by DHs over time. Our findings add important new insights to the poverty dynamics literature and urge researchers and policymakers alike to take the unique circumstances and experiences of DHs into account when designing and analyzing policies and support programs targeting these vulnerable households. Somewhat counter-intuitive when just looking at the immediate impact of each shock experienced, policies that further strengthen the resiliency of DHs in the health domain might be more effective than policies that offer uniform support for households to deal with weather shocks when targeting these households. Our results caution that reducing support in the health domain in favor of addressing natural or weather-related shocks that might be more likely to occur in the future, will increase the unequal burden carried by DHs across all shock domains and continue to keep them in poverty. DHs might need support to cope with unanticipated weather shocks to prevent them from falling into poverty, as well as additional support to handle the greater number of health shocks experienced to not remain trapped in poverty.

The remainder of the paper is structured as follows: Section 2 develops our definition of disability and connects the literature on disability, vulnerability, resilience, and poverty dynamics. Sections 3 and 4 describe the data and provide descriptive statistics for our variables of interest. Section 5 defines our econometric specifications. Sections 6 and 7 provide our main results and robustness checks respectively. Section 8 concludes with a discussion of possible pathways to strengthen support for households with a disabled member and future research needs.

2   Literature Review

2.1   Disability and Vulnerability to Poverty

While several definitions of disability exist (Nagi, 1969; Bernell, 2003; Mitra, 2006; Mont, 2007), our study uses a measure of disability developed by the Washington Group in 2011. This measure was introduced to standardize its definition to make reasonable comparisons of disability status and its related outcomes across countries (Madans et al., 2011). This definition allows individuals to define the extent to which they have difficulty conducting basic actions. This approach is related to the capability approach by Amartya Sen where capability is defined as "practical opportunity" and functioning takes on a broader definition of "activities and desirable states" such as "being free of HIV" or "being sheltered" (Mitra, 2006). The functioning approach, on the other hand, defines disability as the inability or limitation in performing social roles and tasks expected of an individual in a given environment (Nagi, 1969). These roles and tasks are often altered due to mental or physical limitations. For instance, an individual may not be able to accomplish her duties at work or may be incapable of completing a task such as lifting a 25-pound box. A disability is distinct from a physical impairment or functional limitation under this framework as the latter can be measured through an examination while the former is further defined by how functional limitations interact with other environmental elements (Bernell, 2003). Most notably, functional difficulties have the potential to limit the extent to which individuals can live independently in their environment and participate in the labor force, making them and their families more vulnerable to poverty.

Vulnerability to poverty can be broadly defined as "the likelihood that a shock will result in a decline in well-being" (World Bank, 2000). Households vulnerable to poverty have a level of welfare above the poverty line but their income and assets could quickly deteriorate in the presence of a shock, pushing them below the poverty line and, perhaps, permanently into poverty. A large theoretical and empirical literature exists that attempts to determine who is likely to be vulnerable to poverty over time (Calvo and Dercon, 2005; Grimm et al., 2016; Ligon and Schechter, 2003). Presently, studies are primarily limited to exploring short-run effects and largely ignore heterogeneity in terms of both shock incidence and type across different income levels (Araujo and Pabon, 2009; Heltberg et al., 2013; Wagstaff and Lindelow, 2010). Few studies take into account the initial conditions of households (e.g., disability), which may affect both the likelihood of experiencing a shock and its impact (Gloede et al., 2015). Our assessment of vulnerability in this paper focuses on households that are susceptible to poverty and, when faced with shocks, may lack the capacity to adequately recover and continue on their welfare path without hindrance. These households might require assistance from programs that protect them from the impact that unexpected shocks have on their overall well-being and prevent them from becoming trapped in poverty.

DHs may be more vulnerable to chronic or transitory poverty than NDHs for several reasons. The rate at which DHs experience shocks may be greater than NDHs particularly in the health domain as those with a disability may be more prone to additional health-related incidents. Mitra et al. (2016) find that households in Vietnam engage in vulnerability-enhancing mechanisms, including the sale of assets or decreased educational expenditures in order to cope with health shocks. The additional costs of living with a disability can be quite large and increase with the severity of the disability due to the need for additional health services and assistive devices (Mont and Cuong, 2011; Zaidi and Burchardt, 2005; Mitra et al., 2017; Morris and Zaidi, 2020; Schuelke et al., 2022). Households responding to shocks may also smooth expenditure by reducing consumption (Mitra et al., 2016; Meyer and Mok, 2019). Reduced consumption may negatively affect the productivity of household members, further lowering their income-generating potential. Household members may also have different attitudes and beliefs when considering risks or behaviors in response to shocks when a disability is present in the

home. These stressors, attitudes, and beliefs could leave the household more vulnerable to poverty in the long term.

On the other hand, DHs could also be more resilient to some shocks. Frequent exposure to shocks may allow DHs to update their beliefs and behaviors, and be able to better cope with each additional shock experienced over time. While the literature on the differing beliefs, attitudes, and behaviors of DHs and NDHs is scant or nonexistent, a few studies find that DHs are likely to sell off assets to address economic challenges and food insecurity in different ways than NDHs do (Huang et al., 2010; Asa et al., 2021).

2.2   Resilience to Shocks

Several studies have begun to examine resiliency in a development context to better understand poverty dynamics. The term resiliency has been borrowed from other disciplines (e.g., Holling (1961); Folke (2006) in ecology, Holling (1961) engineering, and Kaplan (2002); Luthar et al. (2000); Denhardt and Denhardt (2010); Wright et al. (2013); Martin and Sunley (2015) psychology). It can be defined as the capacity to persist in an environment where random events occur and vary in their duration, coverage, and impacts. Barrett and Constas (2014) expand the theory of resilience to international development where it is closely tied to vulnerability and poverty traps. They define development resilience as "the capacity over time of a person, household or other aggregate unit to avoid poverty in the face of various stressors and in the wake of myriad shocks." (Barrett and Constas, 2014). If this capacity remains high, then the unit is considered to be resilient.

Smith and Frankenberger (2018) find that capacities such as social and human capital, information, asset holdings, and safety nets, enhance households' resilience after flooding in northern Bangladesh. In a food insecure population in Malawi, Knippenberg et al. (2019) find the gender of the head of household and the geographic location are important characteristics that affect resiliency. Brück et al. (2019) find that conflict in the Gaza Strip diminished household resiliency mainly resulting from instability and inability to diversify income. Investigating the socio-economic resilience of households in Bangladesh to natural disasters, Akter and Mallick (2013) find that poor households suffer significantly more from shocks but this does not necessarily translate into lower resilience of these households.

While previous research has begun to document the capacity of households to remain resilient in the face of shocks and conflict, to our knowledge, no work exists that examines the resiliency of DHs. Furthermore, limited attention has been paid to the types of coping strategies employed by households that affect their resiliency in responding to shocks across different domains (e.g. health shocks or market shocks). Households may be more resilient to poverty over time due to the coping strategies at their disposal. Additionally, households may be resilient in the face of some shocks while remaining vulnerable to others (Southwick et al., 2014). Human, physical, and social capital, familiarity with, and ability to learn from past shocks, attitudes and beliefs, and lived experiences might affect overall resiliency and institutions may reinforce or diminish households' capacities to be resilient across various shock domains. We add to this literature by analyzing the extent to which DHs and NDHs differ in their vulnerability and resilience when faced with a diverse set of shocks and discuss how these potential differences impact poverty dynamics over time.

2.3   Poverty Dynamics

While cross-sectional studies based on survey data can tell us which individuals or households are poor or not poor, this static analysis of poverty masks important dynamics at play. In particular, such data are insufficient when trying to distinguish those that are chronically poor from those that are transiently poor. Currently, almost all studies of disability and poverty are limited to cross-sectional analyses. These

static poverty analyses are inadequate for two main reasons. First, a static measure of poverty may include households that have realized negative shocks but are only temporarily unfortunate and are not vulnerable to poverty otherwise. These households may have the capacity to recover from these shocks quickly and continue on their welfare trajectory without additional assistance. This method may also exclude those who recently experienced positive shocks but who are otherwise vulnerable to poverty and may require additional assistance to move away from their low equilibrium level of production. Therefore, these static measures are insufficient in determining the vulnerability and resiliency of households. Second, survey data is prone to measurement error, particularly when respondents report income or expenditures. Errors may arise when trying to recall estimates or impute values, or through distrust between respondent and enumerator, survey fatigue, etc. Measurement error may show that households were poor in one year and not poor in a subsequent year when in reality their poverty status may have remained unchanged.

Baulch and Hoddinott (2000) point to three specific dimensions that are necessary in order to properly capture poverty dynamics: 1) appropriate welfare measures used (i.e., income, expenditure, consumption, and assets), 2) accounting for changes over time (i.e. measuring chronic and transitory poverty requires at least three temporal observations), and 3) versatile methods used that can measure and summarize multiple dimensions of poverty (i.e. vulnerability and resilience). Those who are chronically poor are likely to remain in poverty unless assistance is given to them. They likely have difficulty moving out of poverty due to at least one of the following reasons: 1) limited ability to accumulate human capital, 2) exogenous endowment of low levels of physical capital, or 3) inability to generate sufficient income from productive assets (Barrett, 2005). Households that are transitorily poor may experience negative shocks that temporarily place them in poverty but their expected income lies above the poverty line in the absence of additional shocks experienced. Over time, these households could move out and stay out of poverty as additional draws from their income distribution are realized. Many households that experience poverty are likely to experience transitory rather than chronic poverty (Grootaert and Kanbur, 1995). While transitory poverty may be short-lived, severely negative shocks or the impact of accumulated negative shocks may push households into the range of destitution that might ultimately result in chronic poverty. Our analysis of poverty dynamics uses both income and assets as the welfare measure across 3 waves of data, as well as the impact of categorical shocks to assess the vulnerability and resilience of households to both chronic and transitory poverty.

By doing so, we attempt to address two distinct shortcomings in the current literature on poverty dynamics. The first is that of 'initial conditions'. The initial conditions a household finds itself in (e.g., its exogenous endowment of assets, access to markets, ethnic group, etc.) play a role in the income growth the household later experiences (Scott and Litchfield, 1994; Glewwe and Hall, 1998; Maluccio et al., 2000). We assess households where the initial condition of disability may play a role in determining income growth. A disability within the household may alter income growth through the extent to which the household member can participate in the labor market and the employment of other household members who may withdraw from the labor market to care for the disabled member. This initial condition may also impact the household's expenditure growth by providing care for a disabled member (e.g. through the purchase of assistive devices). Taken together, disability might make DHs more vulnerable to poverty than NDHs all else equal.

The second issue is the role of shocks in preventing households from escaping poverty and the lack of longitudinal studies that properly identify shocks and their cumulative impact on household welfare. To our knowledge, few longitudinal studies exist which are sufficiently long and able to properly identify both idiosyncratic and covariate shocks and their impact on household welfare over time in developing countries. Repeatedly experienced negative shocks can severely impact the welfare distribution a household finds itself in and need to be accounted for when trying to better understand poverty dynamics.

Only a few studies address the role of disability and implications regarding poverty dynamics (Shah-tahmasebi et al., 2011; Quintana and Malo, 2012; Park and Nam, 2018). None of these studies explore the role of shocks on welfare or focus on developing countries where well-functioning credit and insurance markets may be absent. We contribute to the literature on poverty dynamics by focusing on how the initial conditions of disability and the impact of several shock types affect contribute to poverty through a panel setting.

3 Data Description

This study uses micro data originating from the Thailand Vietnam Socio Economic Panel (TVSEP).[2] Despite recent growth and increases in overall household wealth, pockets of poverty persist in rural areas in both Thailand and Vietnam (Hardeweg et al., 2013). The TVSEP survey captures the living circumstances of these households since 2007. To date, eight waves have been conducted in total.

We use data from the 2008, 2010, 2013, 2016, and 2017 waves of the Vietnamese sample. The panel data cover events and outcomes for the survey year (e.g. yearly income, assets, etc.), as well as information on shocks experienced each year (inclusive of years when a survey was not administered). We focus our interest on the years between the 2010 and 2016 waves to track how DHs and NDHs have responded to shocks and transitions in and out of poverty over this time frame. The data were collected in the provinces of Thua Thien Hue, Ha Tinh, and Dak Lak in Vietnam. The households sampled in each province were randomly drawn based on a stratification process considering the heterogeneous agro-ecological conditions within the regions and are representative of the rural population in Vietnam.[3]

The household survey consists of nine sections covering individual information on household members (e.g., age, education, and health), as well as household-level information on expenditures; shocks; risks; income-earning activities such as farming, raising livestock, and fishing; the household financial situation; housing conditions; transfers received; and assets owned. We create a balanced sample of these households by including all households that completed all survey waves from 2008 to 2017. Additionally, we exclude a small number of households (33) for which further inspection of the recorded observations suggests measurement errors in the data provided. For instance, some households incorrectly report negative average income across the entire time period. In other cases, the assets lost from shocks far exceed their reported income or assets. Our final data set covers 1,407 households across 220 villages.

3.1 Main Variables

The key variables for our analysis are constructed measures of disability, the share of income and assets lost from shocks, daily per capita assets, risk attitudes, expectations of future shocks, shocks, coping strategies for shocks, reduced household consumption when faced with a shock, and household demographics.[4]

Disability. We assess disability by constructing an indicator variable following the definition of the Washington Group i.e., using a questionnaire-based measure of disability that allows respondents to self-report the physical or mental challenges they face. Respondents were asked to state whether they have "no difficulty", "some difficulty", "a lot of difficulty", or "cannot do at all" when seeing, hearing, walking or climbing stairs, remembering or concentrating, providing self-care, or understanding (e.g. communicating). We define a person to be affected by a disability if they have at least "some difficulty"

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[2]For more information, please refer to the project webpage.

[3]See Hardeweg et al. (2013) for a detailed overview of the sampling strategy.

[4]All monetary variables have been converted to 2005 purchasing power parity USD (PPP USD) equivalents.

across any of these 6 categories. Every household in which at least one member reports having "some difficulty" is categorized as a household with a disabled member.[5]

Income & Assets. We use several measures of income and assets. First, we construct an income measure from all income-generating activities in the survey and an asset value variable including the value of all assets owned by the household. In addition, we use the reported income and asset losses due to shocks. Second, to determine the effect of shocks we derive the share of income and the share of assets lost due to shocks based on the income/assets lost due to a shock divided by household income/assets.

Vulnerability to Poverty. To capture vulnerability to poverty, we examine the economic mobility of households over time. To construct this measure, households are grouped into being in (i) chronic poverty, (ii) transitory poverty, or (iii) never experiencing poverty based on daily per capita assets. We use the international poverty line at 2 PPP USD per capita per day as the cut-off for poverty (Cruz et al., 2015). This roughly corresponds with the regional cut-off for absolute poverty in Vietnam (General Statistics Office, 2017).[6]

Risk Attitude. Risk attitudes are captured on an 11-point scale between 0 and 10 where 0 means "unwilling to take risks" and 10 means "fully prepared to take risks". This self-reported measure of risk, first implemented by the German Socio-Economic Panel Study, has been shown to have predictive power for self-employment, stock investment, health choices, and risk-taking in incentivized lotteries (Dohmen et al., 2011). In fact, this survey-based measure of reporting risk attitudes has been shown to have greater external validity than experimental measures of risk attitudes.[7]

Shocks. Following Hardeweg et al. (2013) we differentiate between three different shock categories as reported in the survey: health shocks, natural shocks, and other shocks. Health shocks include accidents and illnesses experienced by household members. Natural shocks are comprised of flooding, drought, unusually heavy rainfall, crop and storage pests, livestock disease, landslides, and storms. The set of other shocks includes the death of a household member, property losses such as house damage, theft, and burglary, and market shocks such as the collapse of a business, a decrease in the price of outputs, an increase in the price of inputs, and a change in market regulations. The death of a household member is included in this third category of shocks as opposed to health shocks as we are interested in the ongoing shocks that may be related to disability.

   We chose to delineate shocks into these categories for three reasons. First, it is anticipated that DHs are more likely to face health shocks than NDHs all else equal. Thus, while health shocks impact income and asset holdings over time, these shocks may not be exogenous and the direction of causality is not easily established. Disability can be a result of a health shock or vice versa, which, in turn, might mean that a household is more likely to end up in poverty. Poverty might also lead to poor health and, ultimately, more health shocks experienced. Furthermore, given the presence of disabilities, households may develop different ex-ante and ex-post strategies to handle these shocks. Second, natural shocks are exogenous and thus, it is anticipated that these shocks are experienced in the same frequencies by all households regardless of their disability status. These shocks allow us to test if DHs and NDHs cope

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[5]We also consider a stricter definition of disability where respondents state having at least "a lot of difficulty". However, this stricter definition only restricts the set of DHs by two observations compared to the definition used in our main analysis. Our regression estimates under this stricter definition are nearly identical thus we do not present them here.

[6]As an alternative measure, households' vulnerability to poverty is captured by differentiating households into four groups: (i) households that stayed below the poverty line in subsequent years, (ii) households moving into poverty, (iii) households moving out of poverty, and (iv) households remaining out of poverty.

[7]For a review please see Schildberg-Hörisch (2018).

differently when exposed to exogenous shocks at the same frequency. These truly exogenous shocks can give us a better understanding of the impacts of exposure, risk attitudes, expectations of future shocks, and preventive and reactive strategies on household income and asset losses. Third, we include additional shocks that may impact the income and assets of households and household poverty dynamics. Similar to health shocks, these additional shocks may not be strictly exogenous as circumstances and household decisions might impact the realization of these shocks. In the analysis, we use the total number of shocks across all three categories as well as the number of shocks separated by category. We make these delineations as we are interested in examining the average impact of any additional shock experienced as well as the cumulative impact of all shocks experienced by a household. Additionally, we want to disentangle the effect of different types of shocks and at the same time differentiate between exogenous shocks and potentially endogenous shocks. Separating shocks into these different categories allows us to examine vulnerability and resilience of DHs and NDHs across these shock categories.

We also use information about households' expectations regarding future shocks. This allows us to compare households' expectations to the actual realization of shocks. Again, we separate the total number of shocks expected and the three shock categories.

Coping Strategies. Households report a variety of coping strategies used to deal with shocks. We group coping strategies into two categories: ex-ante and ex-post. Ex-ante coping strategies are reported together as "preventative strategies" because households state implementing each individual strategy very infrequently. The ex-ante coping strategies include preventative medical treatments (e.g., vaccinations), collective action for infrastructure, contract insurance, investments in travel safety (e.g. wearing a helmet), buffer stocks, and income source diversification. The remaining coping strategies are all ex-post: using formal insurance, using savings, taking up an additional occupation, borrowing from an informal moneylender, diversifying the agricultural portfolio, receiving help from the government, reducing production inputs, borrowing from village funds, selling assets, borrowing from a formal bank, or receiving support from their social network. It should also be noted that several ex-post strategies such as selling assets, borrowing from a formal bank, and receiving support from social networks combine multiple ex-post coping strategies reported in the survey. For instance, selling assets includes the selling of livestock, land, storage (such as rice), and other assets. Borrowing from a formal bank includes borrowing from a commercial bank and two state-owned banks (the Vietnam Bank for Agriculture and Rural Development and the Vietnam Bank for Social Policies). Support from social networks includes receiving help or borrowing from relatives and friends/neighbors.

4 Descriptive Statistics

Descriptive statistics of the data are presented for our baseline (2010) and endline (2017) waves in Tables 1 and 2. We report the summary statistics for DHs and NDHs separately to assess how these households may differ across observable characteristics over time. Table 1 shows that DHs lose a significantly greater share of their assets but not income than NDHs on average. DHs also experienced significantly more shocks in this wave on average (0.244). DHs report a risk attitude of 3.79 and NDHs report a risk attitude of 4.38 indicating that households with a disabled member are significantly more likely to be risk averse. DHs and NDHs do not significantly differ in their level of income and assets in this baseline wave. DHs have smaller household sizes, are 18.5% less likely to have children, and the head of household is 4.4% less likely to be married than NDHs.[8] We do not find statistically significant

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[8]According to OECD (2019) and Bühler et al. (2020) children are defined as household members who are younger than 15 years of age based on the legal age where individuals can be employed according to federal law.

mean differences in the gender, marital status, years of schooling, or employment in a non-agricultural activity of the household head nor do we find the expectations of future shocks or reduction of consumption due to shocks to differ.

Table 1: Summary Statistics for Households in 2010 Wave

	DH				NDH				T-test Means
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Difference
Share of Income Lost from Shocks	0.38	0.39	0	1	0.35	0.37	0	1	0.033
Share of Assets Lost from Shocks	0.13	0.28	0	1	0.09	0.22	0	1	0.042*
Shocks	1.50	0.98	0	5	1.26	0.68	0	4	0.244***
Perceived Shocks	14.17	11.14	0	68	13.36	10.28	0	68	0.811
Risk Attitudes	3.79	2.76	0	10	4.38	2.70	0	10	-0.597***
Income (USD)	6500.64	11289.36	-16515.19	158643.05	6184.16	6343.76	-7653.55	78735.28	316.478
Lagged Reduction in Consumption	1.14	1.16	0	6	1.27	1.34	0	12	-0.131
Assets (USD)	5079.76	13548.32	28.38	221442.68	5225.53	6409.40	21.28	79295.63	-145.775
Household Size	4.13	1.73	1	10	4.38	1.61	1	11	-0.252*
Presence of Children	0.52	0.50	0	1	0.71	0.45	0	1	-0.185***
Gender	0.81	0.39	0	1	0.86	0.35	0	1	-0.045
School Years	10.33	3.36	1	17	10.00	3.41	1	18	0.338
Marital Status	0.84	0.37	0	1	0.88	0.32	0	1	-0.044
Non-Agricultural Employment	0.30	0.46	0	1	0.26	0.44	0	1	0.044
Observations	299				1108				

Notes: ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 2 presents the descriptive statistics for DHs and NDHs in the 2017 wave. Overall, we find that differences between the two groups become more pronounced than at baseline. In 2017, both households experienced fewer shocks than in the baseline year but DHs continue to report 0.25 more shocks on average than NDHs ($p < 0.01$). Both groups report a greater willingness to take risks than in the baseline year. NDHs continue to be more willing to take risks on average, however, and the mean difference between the two groups grew larger. They amount to 0.31 of a standard deviation and are likely due to the present and cumulative differences in experiences. Consistent with the lower number of shocks reported for 2017, both groups also report a higher level of income and assets than the base year on average, but DHs continue to report significantly fewer assets than NDHs. Although not reported here, these patterns are consistently observed across the remaining survey waves as well.

Table 2: Summary Statistics for Households in 2017 Wave

	DH				NDH				T-test Means
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Difference
Share of Income Lost from Shocks	0.23	0.30	0	1	0.21	0.29	0	1	0.026
Share of Assets Lost from Shocks	0.07	0.21	0	1	0.04	0.16	0	1	0.027
Shocks	1.22	1.19	0	7	0.97	1.02	0	7	0.251***
Perceived Shocks	13.22	12.37	0	87	12.06	10.97	0	104	1.158
Risk Attitudes	5.44	2.73	0	10	6.24	2.42	0	10	-0.800***
Income (USD)	9025.95	11023.77	103.25	103392.98	10368.11	12016.09	-19103.56	153167.09	-1342.160
Lagged Reduction in Consumption	1.37	1.25	0	5	1.33	1.20	0	7	0.045
Assets (USD)	8412.27	11383.37	52.68	107066.37	10824.94	12314.02	162.43	191175.72	-2412.663**
Household Size	3.70	1.81	1	11	3.82	1.57	1	11	-0.120
Presence of Children	0.52	0.50	0	1	0.71	0.46	0	1	-0.184***
Gender	0.76	0.43	0	1	0.80	0.40	0	1	-0.047
School Years	9.92	3.33	2	17	10.15	3.35	1	18	-0.225
Marital Status	0.75	0.43	0	1	0.82	0.38	0	1	-0.069*
Non-Agricultural Employment	0.25	0.44	0	1	0.23	0.42	0	1	0.020
Observations	299				1108				

Notes: ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Figure 1 is a first attempt to capture poverty dynamics for both types of households over time. Panel (a) reports the share of households that have experienced chronic poverty, transitory poverty, or have not experienced poverty at all between 2010 and 2016 and is the analysis used to study poverty dynamics in our regression framework. DHs are slightly more likely to have faced some form of poverty as 4% and 2% more of these households live in chronic or transitory poverty than NDHs. Panel (b) shows how DHs and NDHs households have moved in and out of poverty over time. The share of households that stay in or move into poverty is roughly the same for DHs and NDHs in the 2010 base year. However, the share of DHs in these poverty groups is greater than the share of NDHs across the three other survey waves. While, in general, poverty is trending down over time, it is doing so at a significantly slower rate for DHs than NDHs. Furthermore, in some years, a larger share of DHs households move into poverty and remain in poverty thereafter (e.g., 2013). The relatively higher number of shocks experienced for DHs also translates into a smaller share of DHs households moving out of poverty each year. [9]

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[9]These trends might have continued or been exacerbated, and the overall downward trend may have slowed or even reversed in 2020 following the COVID-19 pandemic. Additional waves of the TVSEP data are not available to date.

Figure 1: Share of Households by Poverty Status

(a) Share of Households Facing Chronic and Transitory Poverty

(b) Share of Households Moving In and Out of Poverty Across Waves
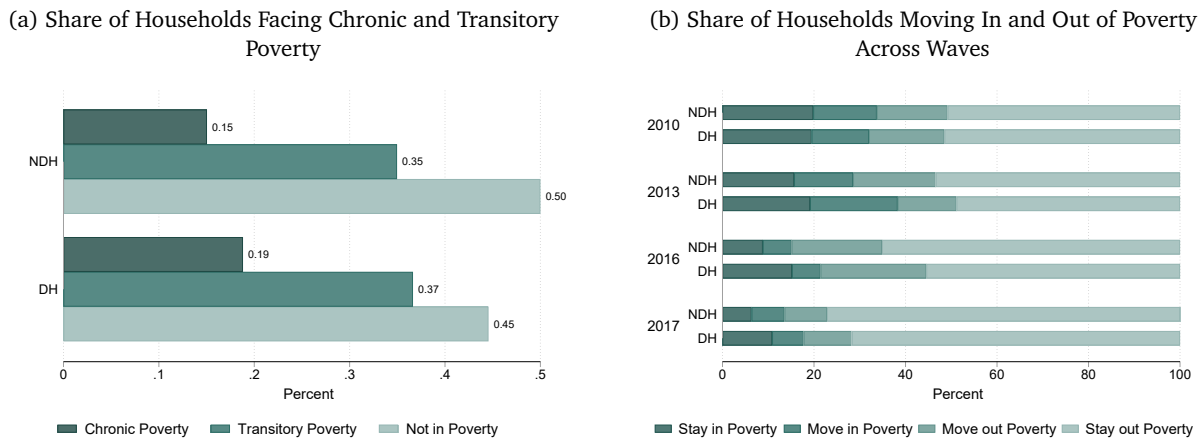
Note: Own illustrations. The poverty line is defined as income < 2 USD pc/day.

4.1   Risk Attitudes

Differences in risk attitudes between DHs and NDHs may lead to different sets of behaviors and strategies such as engaging in lower return activities (Boucher et al., 2008), avoiding riskier coping strategies such as borrowing from formal or informal lenders at the risk of defaulting on loan payments, or investing more time or financial resources into coping strategies where the costs of implementation may exceed the benefits. In addition to the detected mean differences in risk attitudes, we test for differences in the overall distribution of risk preferences. Figure 2, displays a histogram of risk attitudes for DHs (left) and NDHs (right) in the 2010 wave. The responses for DHs are skewed more to the left than NDHs, further indicating that these households are more risk averse than NDHs. The graphs illustrate that these two distributions are dissimilar but we can further reject the equality of the two distribution functions in a Kolmogorov-Smirnov test ($p = 0.001$) (Kolmogorov, 1933; Smirnov, 1948). It is important to note that the household member with a disability may not be the survey respondent but this simple comparison across DHs and NDHs shows that these households have different risk attitudes at the beginning of our survey which may lead to different behaviors across groups. What remains unclear is whether these differences are a result of living with a disabled family member.

Figure 2: Risk Attitudes of Households with (left) and without (right) Disabilities in 2010
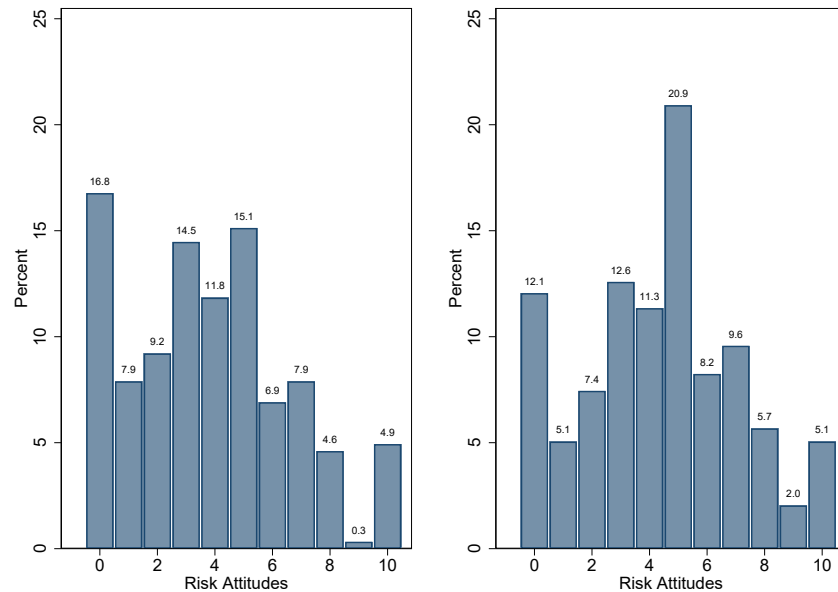
Note: Risk attitudes measured on an 11-point scale where 0 means "unwilling to take risks" and 10 means "fully prepared to take risks"

These differences in risk attitudes could be a result of differences in circumstances and experiences. To control for potential differences in observable characteristics, we run an ordered probit regression of risk attitudes on having a disabled member in the household. We control for (log) household assets, reduced household consumption, the number of household members, children in the household, the age, gender, marital status, and years of schooling of the head of household, and whether or not the head of household is engaged in agriculture. We also include province-level fixed effects and clustered standard errors at the household level. The regression suggests that the presence of a disability in the household is associated with a decrease in risk-taking attitudes. We plot the average marginal effect of having a member of the household with a disability and the probability of each level of risk-taking in Figure 3. We find that members of DHs are more likely to state a risk attitude between 0 and 4 than members of NDHs and are less likely to state risk attitudes of 5 or greater. Each level is statistically significant. At the extreme ends, DHs are 3.6% more likely to state a willingness to take risks of 0 and are 2% less likely to state a willingness to take risks of 10. This finding is robust across multiple specifications. If we are correct in our assumption that disability in Vietnam is exogenous and randomly assigned across households such as through exposure to Agent Orange, this analysis provides a first indication that differences in risk attitudes across these households are a result of differences in experiences and progressively more binding constraints.

4.2 Perceived Shocks

We can test this hypothesis further by analyzing people's subjective beliefs regarding the likelihood of future shocks. Differences in perceived shocks might be a misjudgment or a result of differing past (and future) experiences. Our data allow us to distinguish whether DHs are in general more risk averse, or whether they are more risk averse under specific circumstances only, and perhaps rightfully so. Table 3 reports summary statistics for DHs' and NDHs' beliefs about future shocks within our three shock

Figure 3: Conditional Marginal Effect of Disability on Risk Attitudes
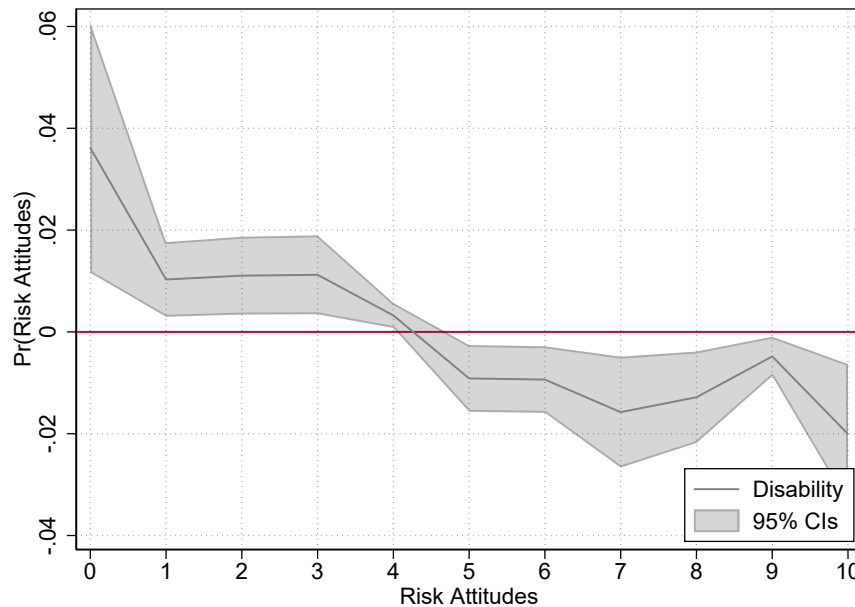
Notes: We plot the conditional marginal effect of disability on the households' risk attitudes in the 2010 base year.

categories in the 2010 baseline year.[10] Note that using the 2010 baseline year allows for a comparison between the realized shocks experienced between 2010 and 2015 and the perception of shocks faced over that period. DHs anticipate 0.8 more health shocks occurring within the household on average compared to NDHs ($p < 0.01$) but do not differ in their subjective expectations of natural or other shocks in a statistically meaningful way. DHs also expect to face slightly more total shocks on average over the five-year period than NDHs, although this difference is not statistically significant.

Table 3: Perceived Frequency of Shocks over 5 Years by Category in 2010 Baseline Year

	DH				NDH				T-test Means
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Difference
Health Shocks	3.07	2.48	0	12	2.27	2.27	0	11	0.800***
Natural Shocks	9.44	8.42	0	35	9.53	7.99	0	41	-0.092
Other Shocks	1.65	3.35	0	24	1.55	3.07	0	26	0.104
Total Shocks	14.17	11.14	0	68	13.36	10.28	0	68	0.812

Notes: Maximum value of frequency recorded in 2010 TVSEP survey is "more than 5 in 5 years". Thus, means presented in this table can be viewed as a lower bound for the mean perceived frequencies of shocks over the following five years. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

We also run ordered probit regressions of the expected future health, natural, and total shocks with the same demographic controls used when analyzing risk attitudes. These regressions also include province-level fixed effects and standard errors are clustered at the household level. We plot the condi-

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[10]Households were asked about the same realized and future shocks with the exception of one. Households were not asked how likely they believe it is that a household member would die in the next five years but were asked to report if that shock had occurred within the household.

tional average marginal effect of disability for subjective future shocks in Figure 4. In Panel A, we see that DHs are significantly less likely to believe they will face 0 or 1 health shocks in the next 5 years and more likely to believe they will face between 4 to 10 health shocks than NDHs. DHs are 10.8% less likely to believe they will experience 0 health shocks. At the maximum, DHs are 4.6% more likely to believe they will face 6 health shocks over the next 5 years compared to NDHs. It is important to note that DHs experience more health shocks than NDHs, and these differences in beliefs in expected health shocks align appropriately with experienced shocks over this time period. Panel B plots the average marginal effect of disability on expectations of future natural shocks. In contrast to the analysis of health shocks, we find no statistical relationship between the two, suggesting that both types of households do not have differing expectations of these exogenous shocks. Finally, Panel C illustrates that DHs are not any more likely to anticipate more total shocks in the next five years. Thus, while DHs anticipate more health shocks they do not differ in their subjective beliefs regarding shocks overall compared to NDHs.

Figure 4: Conditional Marginal Effect of Disability on Perceived Shocks
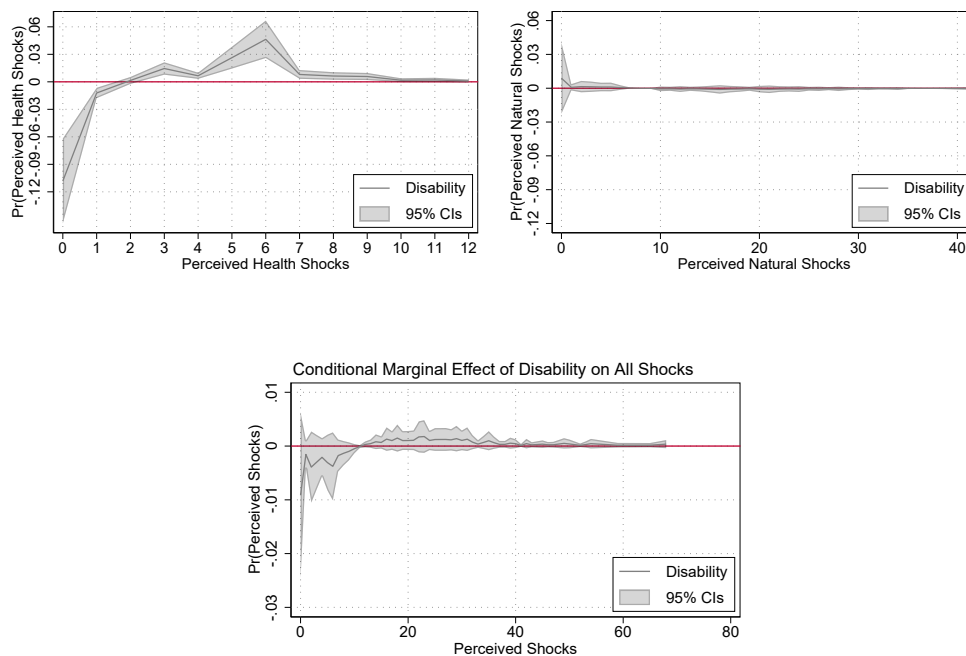
Notes: We plot the conditional marginal effect of disability on the households' perceived number of health shocks (Panel A), natural shocks (Panel B), and all shocks (Panel C) in the 2010 base year.

4.3   Experienced Shocks

Differences in the perceived as well as the actual number of shocks can have significant implications for poverty dynamics. For instance, unanticipated shocks can have immediate and long-term impacts on households' income and assets, especially when households had already experienced a large number of shocks in the past. They may shift households into poverty or prevent them from moving out of poverty, despite the fact that these households have become more resilient and anticipated a larger number of shocks across at least some domains. While households might learn how to cope with one

type of shock they repeatedly experience and reduce the future impact of each of these additional shocks, their capacity to deal with each shock will be diminished by the cumulative number of shocks experienced. Furthermore, having to cope with shocks repeatedly in one domain, will likely limit their ability to pay attention to and cope with shocks occurring in another domain. In particular, households with a disabled member may be more vulnerable to unanticipated natural shocks, despite being more resilient to health shocks. Our unique data lets us compare the perceived number of shocks across shock categories with the actual number of shocks experienced. Table 4 reports the average number of shocks faced by households across our different shock categories between 2010 and 2015 for DHs and NDHs. Indeed, DHs experience 0.33 more health shocks than NDHs on average ($p < 0.01$). DHs also report experiencing slightly fewer (0.115) natural shocks than NDHs but 0.021 more shocks in the "other" shock category than NDHs but these differences are not statistically significant. Overall, DHs face 0.232 more shocks over this five-year period than NDHs on average ($p < 0.10$), and these differences could explain the observed differences in perceptions.

Table 4: Realized Frequency of Shocks by Category between 2010 and 2015

	DH				NDH				T-test Means
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Difference
Health Shocks	1.22	1.05	0	5	0.89	1.04	0	8	0.326***
Natural Shocks	1.39	1.31	0	6	1.49	1.36	0	9	-0.115
Other Shocks	0.64	0.92	0	5	0.62	0.86	0	5	0.021
Total Shocks	3.24	2.08	0	11	3.00	2.12	0	16	0.232*

Notes: ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Each shock experienced by DHs and NDHs may differ in the magnitude of its impact on household income and assets. Both the frequency and magnitude of losses dictate the poverty dynamics of households. Table 5 displays descriptive statistics as a first step to assess the impact of shocks on income and assets. Panel A displays the average impact of shocks on income while Panel B displays their impact on assets. NDHs report having lost about 800 USD more on average than DHs ($p < 0.10$). However, DHs have a lower yearly average income on average to begin with. Thus, DHs may lose a greater share of their income when faced with a shock relative to NDHs. Our regression analysis needs to account for this, using income loss relative to a household's overall income.

Table 5: Income and Asset Loss due to Shocks between 2010 and 2015 (in USD)

	DH				NDH				T-test Means
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Difference
Panel A. Shocks on Income									
Health Shocks	1009.14	2124.35	0	16464.32	1773.45	6388.11	0	101563.6	-764.312*
Natural Shocks	2526.46	8269.40	0	114918.07	2870.22	8424.96	0	203127.20	-343.761
Other Shocks	2656.78	6388.33	0	57459.04	2728.46	7909.06	0	97870.40	-71.683
All Shocks	3847.13	11837.55	0	172377.11	4616.27	14093.47	0	310684.81	-769.141
Panel B. Shocks on Assets									
Health Shocks	1448.71	16289.63	0	230000	261.89	798.43	0	7360	1186.815
Natural Shocks	354.70	1203.36	0	9200	395.96	1396.67	0	21160	-41.260
Other Shocks	609.86	2313.28	0	18400	582.45	1888.60	0	24198.8	27.408
All Shocks	1600.48	14135.15	0	230000	744.18	2553.85	0	42320	856.299

Notes: ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

4.4 Reported Coping Strategies

The implementation of coping strategies by households can mitigate income and asset losses. Households might differ in their coping strategies used either because of differences in beliefs and attitudes or because of differences in the availability and accessibility of these strategies across households. Table 6 summarizes the average number of times DHs and NDHs reported using a coping strategy to manage the impact of a shock between 2010 and 2015. We find that households report not doing anything more than they report any other ex-post coping strategy. Overall, we find very few statistically significant differences in reported coping strategies such as taking up an additional occupation, using savings, selling assets, etc. across households. DHs households are significantly more likely to rely on insurance and receive greater support from social networks as a coping strategy on average than NDHs. This could be interpreted as another indication that these households are more vulnerable to poverty overall and cannot solely rely on household savings and to mitigate the greater number of shocks experienced.

Table 6: Use of Coping Strategies by Households with and without a Disability

	DH	NDH	T-test Means
	Mean	Mean	Difference
Did Nothing	1.97	2.05	-0.075
Used Preventative Strategies	10.18	10.21	-0.035
Used Insurance	0.47	0.27	0.199**
Used Savings	0.67	0.66	0.005
Took Up Additional Occupation	0.71	0.74	-0.036
Borrowed from Informal Moneylender	0.18	0.20	-0.016
Diversified Agricultural Portfolio	0.23	0.15	0.077
Received Help from Government	0.12	0.10	0.026
Reduced Production Inputs	0.05	0.04	0.005
Borrowed from Village Funds	0.06	0.02	0.038
Sold Assets	0.56	0.44	0.123
Borrowed from Formal Bank	0.29	0.26	0.030
Support from Social Network	1.65	1.23	0.419**
Observations	299	1108	

Notes: ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

5 Empirical Analysis

Our descriptive analysis suggests that DHs and NDHs differ in the type and frequency of shocks experienced, as well as in their corresponding beliefs and behaviors. Further analysis of these differences in a regression framework allows us to assess the relative importance of these differences in understanding realized income and asset losses. We jointly examine all shocks faced by these households and also run separate regressions for the impact of health shocks and natural shocks.

The baseline OLS regression specification for the impact of shocks on the share of household income can be written as follows:

$$Y_{ijt} = S'_{ijt}\alpha + B'_{ijt}\beta + X'_{ijt}\gamma + \zeta_j + \varepsilon_{ijt} \tag{1}$$

where Y_{ijt} is the share of income lost by household i in province j and year t due to shocks. Specifically, the share of income is the lost income due to shocks divided by the yearly average income reported by the households across this five-year time period. We use this average to smooth out fluctuations over time allowing for a more appropriate assessment of the impact of a shock. S_{ijt} is a vector of the number of shocks and shocks^2 experienced by a household in a given year. The term shocks^2 allows for non-

linear effects due to additional shocks experienced in a particular year. B_{ijt} is a vector of the beliefs of a household, i.e., risk attitudes and expectations of future shocks, and X_{ijt} is a set of demographic control variables. We also include ζ_j as a province-fixed effect to control for differences across provinces and standard errors are clustered at the household level.

To assess differences in behaviors that could reduce the impact of shocks on household income, we also run a separate set of OLS regressions that add households' reported coping strategies. We define this specification as:

$$Y_{ijt} = S'_{ijt}\alpha + B'_{ijt}\beta + X'_{ijt}\gamma + C'_{ijt}\delta + \zeta_j + \varepsilon_{ijt} \tag{2}$$

The set of indicator variables, C_{ijt}, captures coping strategies used to mitigate the impact of shocks. We recognize that the employment of coping strategies may lead to concerns regarding endogeneity as the severity of the shocks on household income may partially determine the coping strategies employed by the households and the availability and accessibility of coping strategies may determine the degree to which the shock impacts income. Thus, we present separate results with and without their inclusion.

We estimate both income and asset losses. Analyzing asset losses in addition to income losses might be the first step to understanding the cumulative effect of shocks and losses experienced. Lost assets may play an important role in understanding whether households move in and out of poverty over time. They do not only limit households' ability to cope with shocks, the loss of productive assets will further decrease households' earnings potential. These OLS regressions mirror equations 1 and 2 using the share of household assets lost to shocks in a given year as the dependent variable but we remove the log of household assets from the right-hand side. As with the income regressions, we present these results with and without coping strategies.

Finally, we employ a multinomial logit (MNL) model to examine poverty dynamics over time. This allows us to assess how shocks, beliefs, and coping strategies may impact welfare over the entire five-year period as compared to the above-described year-by-year analysis. These MNL regressions are defined as:

$$\Pr(Y_i = j) = \frac{e^{\left(S'_i\alpha_j + B'_i\beta_j + X'_i\gamma_j + C'_i\delta_j\right)}}{\sum_{k=0}^{2} e^{\left(S'_i\alpha_l + B'_i\beta_l + X'_i\gamma_l + C'_j\delta_l\right)}}, \quad j = 0, 1, 2 \tag{3}$$

where Y_i is three unordered categories of poverty transition:

Y_0 households never in poverty

Y_1 households in chronic poverty

Y_2 households in transitory poverty

Following the methodology laid out by Baulch and Hoddinott (2000), a household is classified as never being in poverty, Y_0, if its daily per capita assets are greater than 2 USD for each survey wave between 2010 and 2016. Chronic poverty, Y_1, is defined as $\frac{1}{T}\sum_{t=1}^{3} I_i < Z$ where t is the number of waves where assets are reported between 2010 and 2016, I_i is the asset level for household i in a given wave, and Z is the poverty threshold (daily per capita assets < 2 USD), i.e., the intertemporal average assets over time is below the poverty threshold. Note that these households are not 'always poor', but the set of households that are 'always poor' (i.e. households whose yearly per capita assets are always below the poverty threshold) is a subset of the households living in chronic poverty. In contrast, a household is defined to be in transitory poverty if its assets are less than Z in any given wave but its average intertemporal asset level exceeds the poverty threshold. Y_0 is the base category where each coefficient is restricted to 0, therefore the results for Y_0 are not reported. S_i denotes the number of shocks that occurred between 2010 and 2015, B_i denotes the beliefs of the household in 2010 (i.e. the

risk attitude and expected number of future shocks), X_i captures a set of observable characteristics of the household in 2010, C_i is a set of dummy variables for coping strategies equal to one if the household ever used a particular strategy between 2010 and 2015 to deal with a shock and zero otherwise. We include a set of coping strategies that significantly affect yearly income and asset losses, namely, the use of insurance and savings, help received from the government, and the selling of assets.

While the MNL is typically used to assess poverty dynamics, a few caveats should be acknowledged both regarding poverty dynamics and the MNL. First, poverty dynamics are sensitive to the type of welfare measure used. Here, we use assets as the welfare measurement. This is our preferred measure as it is less variable or prone to measurement error than other measurements such as reported income. Additionally, levels of assets are typically used in the poverty trap literature to define those living in a low- or high-equilibrium state where those with productive assets lower than the high equilibrium state are in or vulnerable to being in the low-equilibrium state. We report the results of the MNL using household income as the welfare measure in the appendix. Second, poverty dynamics are dependent on the choice of the poverty threshold. Here we use the threshold of daily per capita assets less than 2 USD which is the global poverty threshold (using 2011 dollars). Finally, an underlying assumption of the MNL model is the independence of irrelevant alternatives (IRR). This assumption states that the coefficients in one state are independent of the other states. The MNL model also uses unordered categories which disregards the ordering inherent in poverty transitions.

6   Results

6.1   Income & Asset losses

Our main findings of the yearly impact of shocks on household income are summarized in Figure 5 where panel (a) displays the coefficients of shocks on the share of household income across the shock domains without including coping strategies while panel (b) shows the results with the inclusion of coping strategies. We find that DHs lose a significantly larger share of their income when faced with an additional shock than NDHs on average, and this result is robust to the inclusion of coping strategies. When analyzing shocks separately by category, DHs seem more resilient to health shocks than NDHs, however. Each additional health shock experienced results in a smaller share of income lost for DHs as compared to NDHs. It is the greater cumulative number of health shocks experienced that may leave DHs more vulnerable to shocks outside of the health domain. We find that DHs are much more vulnerable to natural shocks. Each additional shock experienced in this domain is estimated to result in a significantly greater share of income lost for DHs than NDHs.

Tables 7 and 8 report the full regression results (with and without the inclusion of coping strategies respectively) for the share of lost income when a household experienced at least one shock in a given year. The results for DHs are reported in even-numbered columns while the results for NDHs are reported in odd-numbered columns. In the first two columns of Table 7, we report the share of household income lost from all shocks considered in this analysis.

We find that DHs' and NDHs' total income loss increases by 12.1% and 7.8% of their household income for each additional shock experienced in a given year on average. The average number of shocks experienced in a year conditional on experiencing at least one shock is 1.57 and 1.49 for DHs and NDHs respectively. Thus, conditional on experiencing at least one shock, DHs and NDHs respectively lose approximately 19% and 11.6% of their annual income due to shocks on average. We do not detect significant diminishing or increasing income losses as a result of each additional shock when households experience several shocks in a given year. Expected future shocks, rather than allowing households to better prepare for these shocks and to mitigate their impact on income, seem to result in higher income losses on average. Each additional shock experienced as well as each additional perceived

Figure 5: Share of Income Lost Across Shock Categories

(a) No Coping Strategies

(b) Coping Strategies

NDHs   DHs
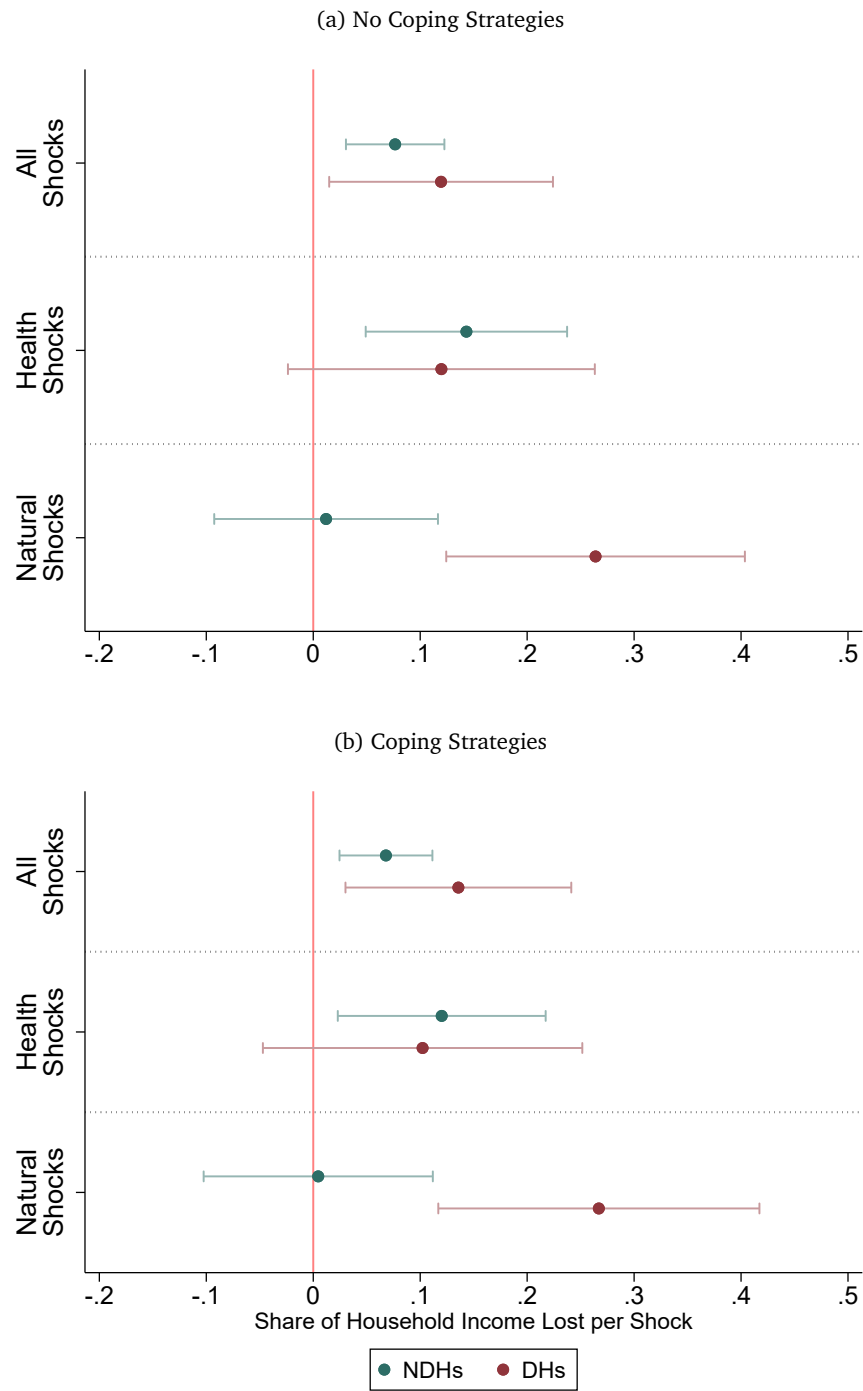
Notes: Plot of the coefficients of each additional shock on the share of household income by shock type. Panel displays the coefficients excluding coping strategies from the regression while Panel B includes coping strategies. A positive coefficient indicates a loss in the share of household income. While a negative coefficient would indicate a gain in income.

shock is associated with an increase in income loss for both types of households. This indicates that households may be vulnerable to poverty and cannot fully overcome the impact of additional shocks on the households even if they can anticipate them. We also find that DH households who are more willing to take risks experience less of an income loss on average, while we do not detect significant differences for NDHs. DHs who are more willing to take risks may be seeking out additional coping strategies that can mitigate the impact of shocks either in the short or long term and we include coping strategies reported in alternative regression specifications.

In contrast, we detect that NDHs that reported having reduced their consumption to handle shocks previously lose a significantly smaller share of their income, but do not detect similar significant effects for DHs. NDHs may be engaging in income smoothing, a strategy that may not be available to some DHs if they are already consuming at a subsistence level. The share of income lost is reduced for NDHs if the head of household is not engaged in agricultural employment, indicating that households with income generated in non-agricultural sectors may be less vulnerable to shocks. We further find that as the value of assets held by DHs increases, these households report losing a significantly higher share of their income. We do not observe a similar significant effect for NDHs. Differences in household size, whether children belong to the household, and the gender, years of schooling, and marital status of the head of household do not significantly affect the share of income lost by either type of household.

The share of income lost varies considerably by shock type. In columns (3) and (4) we find that each additional health shock experienced significantly increases NDHs' share of income lost by 14.3%, while the coefficient for DHs is not statistically significant. This suggests that DHs could be more resilient in handling these shocks and may have developed strategies to cope with shocks in this domain. The lack of significance might also be a result of the smaller sample size of DHs, but it is worth noting that the magnitude of the effect is smaller than the effect for NDHs. Furthermore, the total effect of health shocks is greater for NDHs than DHs even at the extreme end of health shocks experienced in a given year (4) after accounting for significant nonlinearities in the impact of health shocks across DHs and NDHs giving further evidence that DHs are more resilient to these shocks. The difference may indicate that DH households are able to access government and insurance programs in Vietnam designed to assist vulnerable populations that NDHs do not have access to (Bonnet et al., 2012; Cuong et al., 2015; USAID, 2015; Liebenehm, 2018) and that these programs do mitigate income losses to some extent. DH might engage in other behaviors that reduce their income loss from health shocks, an aspect we will test when adding coping strategies to our regression analysis. As in our analysis of the total number of shocks experienced, we find that DHs who are more willing to take risks experience less of an income loss on average when faced with health shocks.

In columns (5) and (6), we find that DHs' share of income lost is 26.4% (or about $1,790 USD) with each additional natural shock experienced. We do not find statistically significant differences in income loss reported for NDHs, on the other hand. DHs seem considerably less resilient to these types of shocks. It is possible that DHs are able to successfully mitigate the impact of health shocks, but are not able to handle additional shocks outside of the health domain. As DHs face more shocks on average than NDHs they may simply be overwhelmed once shocks within this domain occur. We do find that a greater willingness to take risks, larger household sizes, more years of schooling for the household head, and non-employment in agriculture diminish the impact of natural shocks on household income for DHs.

Our regressions reported in Table 8 add coping strategies across shock types. Including these coping strategies results in a 0.9% increase in the point estimates for each shock experienced by DHs. But the inclusion of these coping strategies results in a decrease in the effects of each shock on the share of income lost for NDHs of 1%. This may suggest that the set of coping strategies available for DHs is not sufficient in overcoming these shocks. We find that the use of savings is an effective coping strategy for both household types and mitigates a larger percentage of income lost for DHs than NDHs. On the

Table 7: Share of Average Yearly Household Income Lost (without Coping Strategies)

	All Shocks		Health Shocks		Natural Shocks	
	NDH	DH	NDH	DH	NDH	DH
Shocks (Count)	0.078***	0.121**	0.143***	0.116	0.012	0.264***
	(0.023)	(0.054)	(0.049)	(0.072)	(0.053)	(0.071)
Shocks^2	-0.002	-0.012	-0.033***	-0.026*	0.023	-0.048***
	(0.005)	(0.013)	(0.011)	(0.016)	(0.015)	(0.017)
Perceived Shocks	0.001**	0.002**	-0.000	0.002	0.002**	0.002
	(0.000)	(0.001)	(0.000)	(0.002)	(0.001)	(0.002)
Risk Attitudes	0.002	-0.007**	0.003	-0.006*	0.002	-0.008*
	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.004)
Lagged Reduction in Consumption	-0.010**	0.012	-0.015*	0.009	0.001	-0.007
	(0.005)	(0.012)	(0.009)	(0.015)	(0.007)	(0.015)
Log of Assets	0.007	0.018**	-0.002	-0.004	0.008	0.020*
	(0.005)	(0.008)	(0.005)	(0.006)	(0.006)	(0.011)
Household Size	-0.002	-0.005	0.001	-0.001	-0.003	-0.014*
	(0.003)	(0.005)	(0.003)	(0.004)	(0.004)	(0.008)
Presence of Children	0.008	0.035	0.011	0.010	0.007	0.031
	(0.012)	(0.022)	(0.011)	(0.014)	(0.013)	(0.026)
Gender	-0.006	-0.030	-0.021	0.004	0.004	0.019
	(0.019)	(0.040)	(0.014)	(0.020)	(0.021)	(0.033)
School Years	0.000	-0.002	-0.000	0.002	0.001	-0.007**
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.003)
Marital Status	-0.015	0.009	0.007	-0.001	-0.019	0.038
	(0.019)	(0.038)	(0.013)	(0.020)	(0.022)	(0.031)
Non-Agricultural Employment	-0.027***	-0.029	-0.009	-0.028**	-0.025*	-0.046**
	(0.010)	(0.018)	(0.010)	(0.011)	(0.013)	(0.021)
Observations	2915	802	980	355	1936	460
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: OLS regression with province fixed effects and standard errors clustered at the household level. Dependent variable in All Shocks columns is the share of income lost from all shocks household faced each year. Dependent variable in Health Shocks columns is the share of income lost from health related shocks household faced each year. Dependent variable in Natural Shocks columns is the share of income lost from natural shocks household faced each year. Standard errors in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

other hand, the use of insurance mitigates the share of income lost for NDHs by 7.3% on average while the point estimate for this coping strategy is not significant for DHs. This is important to note as DHs are statistically more likely to use insurance than NDHs but it does not seem to effectively lessen the impact of shocks and is contrary to our previously considered explanation for the detected resiliency of DHs in the health domain. Several coping strategies are significant but have positive coefficients including: taking up an additional occupation and borrowing from a formal bank as well as diversifying agricultural portfolios for NDHs. However, the estimates for these variables are difficult to disentangle and might point to issues of endogeneity when including coping strategies. It is possible that these coping strategies mitigate the impact of shocks on household income but not to a large enough extent. It is also possible that these coping strategies are only pursued when households face large shocks that severely impact their income.

The inclusion of coping strategies in columns (3) and (4) slightly decreases the coefficients of shocks for both household types. Again we find the coefficient for health shocks across DHs is not significant. However, for NDHs the income loss decreases to 13.1% when faced with each additional shock. For health shocks, willingness to take risks is associated with a greater share of lost income for NDHs while DHs lose a smaller share. Households without a disabled member who received help from the government experience a significant reduction in the share of income lost on average. The estimates for borrowing from an informal moneylender, village funds, a formal bank, and receiving support from social networks are all statistically significant coping strategies for NDHs. However, these coping strategies have positive coefficients. Again, it is difficult to disentangle the relationship between the share of lost income and these coping strategies due to endogeneity issues. The coefficients and significance levels of these coping strategies are almost all greater than those reported in column (1). This result again highlights the potential endogeneity of these coping strategies. The only strategy that displays a significant relationship for DHs is diversifying the agricultural portfolio of the household which was only employed by 12 households over this time period to mitigate the impact of health shocks. No other coping strategies significantly impact lost incomes in the presence of a health shock. We do not find significant effects for the use of savings or insurance across both household groups. These results suggest that government and insurance programs designed to assist vulnerable groups are not blunting the impact of health shocks and are not driving the coefficient on health shocks for DHs. Instead, it seems that these programs may not be adequately assisting these households.

Columns (5) and (6) report the impact of natural shocks on the share of household income lost. We find similar estimates for shocks as in the previous table. DHs lose 26.1% of their yearly income ($p < 0.01$). While natural shocks do not significantly impact the share of income lost from shocks for NDHs. This again suggests that DHs are not as resilient in the face of these truly exogenous shocks as NDHs as the may be overwhelmed by the greater amount of cumulative shocks faced. DHs who sell off assets are able to reduce the impact of natural shocks. The coefficients for sales of assets are much greater here than in columns (2) or (4) suggesting that DHs primarily rely on this strategy for natural shocks only. NDHs who are able to rely on insurance in the face of natural shocks are able to reduce income losses by 6.2% for each shock experienced. Diversifying agricultural portfolios, borrowing from a formal bank and receiving support from social networks all have positive signs and are statistically significant coping strategies for NDHs. While borrowing from a formal bank or taking up an additional occupation in response to a natural shock are positive and significant for DHs. The coefficients on borrowing from a formal bank are larger than in columns (1)-(4) which suggests that both types of households primarily access credit from formal lenders in the face of these natural shocks.

We conducted a similar analysis for asset losses and summarized our findings in Figure 6. Panel (a) reports the coefficients without the inclusion of coping strategies and panel (b) includes coping strategies. Overall, we find that NDHs assets are reduced by 2% for each shock experienced, while we do not detect changes in assets held by DHs. This might partially be a result of differences in the

Table 8: Share of Average Yearly Household Income Lost (with Coping Strategies)

	All Shocks		Health Shocks		Natural Shocks	
	NDH	DH	NDH	DH	NDH	DH
Shocks (Count)	0.068***	0.130**	0.131***	0.109	0.015	0.261***
	(0.023)	(0.054)	(0.049)	(0.076)	(0.002)	(0.073)
Shocks²	-0.001	-0.013	-0.031***	-0.023	0.019	-0.049***
	(0.005)	(0.013)	(0.011)	(0.017)	(0.015)	(0.017)
Perceived Shocks	0.001	0.002*	-0.000	0.002	0.001**	0.001
	(0.000)	(0.001)	(0.000)	(0.002)	(0.001)	(0.002)
Risk Attitudes	0.001	-0.007**	0.003*	-0.005*	0.002	-0.008**
	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)
Lagged Reduction in Consumption	-0.005	0.017	-0.022***	-0.008	0.007	0.000
	(0.005)	(0.011)	(0.007)	(0.009)	(0.007)	(0.014)
Coping Strategies (Indicators)						
Used Preventative Strategies	0.010	-0.006	-0.001	-0.011	0.000	0.015
	(0.012)	(0.025)	(0.010)	(0.018)	(0.011)	(0.024)
Used Insurance	-0.073***	-0.021	-0.017	-0.010	-0.062**	-0.038
	(0.011)	(0.024)	(0.011)	(0.017)	(0.027)	(0.084)
Used Savings	-0.024**	-0.069***	0.007	-0.019	-0.022	-0.057
	(0.012)	(0.022)	(0.011)	(0.016)	(0.018)	(0.051)
Took Up Additional Occupation	0.025**	0.042*	0.005	0.028	0.017	0.061**
	(0.011)	(0.024)	(0.013)	(0.033)	(0.011)	(0.025)
Borrowed from Informal Moneylender	0.022	-0.030	0.036*	-0.005	0.012	0.104
	(0.020)	(0.030)	(0.019)	(0.025)	(0.026)	(0.066)
Diversified Agricultural Portfolio	0.045**	-0.012	0.120	-0.032*	0.041*	-0.001
	(0.020)	(0.026)	(0.081)	(0.018)	(0.022)	(0.031)
Received Help from Government	0.022	-0.038	-0.074*	-0.045	0.019	0.040
	(0.026)	(0.047)	(0.042)	(0.036)	(0.031)	(0.061)
Reduced Production Inputs	0.020	-0.026	—	—	0.032	0.006
	(0.040)	(0.044)			(0.051)	(0.051)
Borrowed from Village Funds	0.030	0.022	0.126***	-0.001	0.012	-0.066
	(0.055)	(0.067)	(0.047)	(0.046)	(0.151)	(0.059)
Sold Assets	-0.015	-0.003	-0.008	0.027	0.001	-0.065*
	(0.012)	(0.025)	(0.010)	(0.024)	(0.019)	(0.035)
Borrowed from Formal Bank	0.101***	0.080**	0.098***	0.011	0.124***	0.137*
	(0.021)	(0.033)	(0.031)	(0.028)	(0.030)	(0.071)
Support from Social Network	0.013	0.002	0.037***	0.002	0.057***	-0.012
	(0.010)	(0.018)	(0.010)	(0.016)	(0.018)	(0.035)
Observations	2915	802	980	355	1936	460
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: OLS regression with province fixed effects and standard errors clustered at the household level. Dependent variable in All Shocks columns is the share of income lost from all shocks household faced each year. Dependent variable in Health Shocks columns is the share of income lost from health related shocks household faced each year. Dependent variable in Natural Shocks columns is the share of income lost from natural shocks household faced each year. Number of shocks, shocks², lagged reduction in consumption, and lagged recovery variables are count variables and all coping strategies are indicator variables. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

value and composition of assets held by these households and the fact that DHs are more vulnerable to poverty overall. Each additional shock experienced may not reduce their assets in the short run as they already hold a limited amount. The coefficients are not significant when broken down into the health and natural shock categories.[11]

6.2 Dynamic Poverty Measures

The results of the poverty dynamics regressions are reported as relative risk ratios in Tables 9 (without coping strategies) and 10 (with coping strategies). Columns (1) and (3) compare the outcomes for those living in chronic poverty compared to those never in poverty for NDHs and DHs respectively. Columns (2) and (4) compare the outcomes for households in transitory poverty and never living in poverty. Overall, we find that DHs are more likely to experience both transitory and chronic poverty with each additional health shock experienced but are not any more likely to be in poverty when they experience shocks across other categories. NDHs are more likely to be in chronic poverty than to have never been in poverty with each additional health and natural shock experienced but the point estimate for health shocks is much larger for DHs. This suggests that it is the cumulative number of shocks, primarily driven by health shocks, which makes DHs vulnerable to poverty. This is somewhat contrary to the year-by-year regressions reported previously and further suggests that while DHs can be more resilient to health shocks in the short term, it is the cumulative effect of these shocks that ultimately traps DHs in poverty.

DHs are 78-90% more likely to live in chronic poverty and 65-86% more likely to live in transitory poverty for each health shock experienced. NDHs are only 53-60% and 27-35% more likely to live in chronic and transitory poverty for each health shock experienced respectively. NDHs are also 36% more likely to live in chronic poverty for each natural shock they face. We do not find a statistically significant effect of 'other' shocks and this result holds across both specifications. Furthermore, DHs are 4.1% more likely to be in chronic poverty than to never be in poverty with each additional perceived shock. These households anticipate 14.2 shocks on average and thus are 58% more likely to be in chronic poverty than to never be in poverty on average. Although they correctly anticipate more frequently experienced shocks, DHs may lack the capacity to properly manage or cope with these shocks. Although DHs become less likely to be in chronic poverty as they become more willing to take risks, this effect is larger and more pronounced for NDHs. We do detect additional poverty dynamics for NDHs as well. These households are 34% more likely to be in chronic poverty than to never experience poverty and 22% more likely to be in the transitory poverty group if they reported reducing their consumption. Both types of households are also less likely to be in poverty if the head of household is male, and we find that households are more likely to not be in poverty when their human capital increases overall. DHs and NDHs are more likely to belong to the 'never in poverty' group than in the chronic or transitory groups for each year of schooling received by the head of household and NDHs are less likely to be in either poverty group if the head of household is engaged in non-agricultural employment.

Our findings in Table 10 show the impact of coping strategies on poverty dynamics. Our main results described above are robust to the inclusion of coping strategies but these results add additional insights. DHs are 2.2 times more likely to be in chronic poverty if they accessed insurance, suggesting that currently available insurance programs do not effectively address chronic poverty. DHs are also 58% less likely to be in transitory poverty if they sold assets to cope with a shock. Asset smoothing, when used as a necessary short-term strategy to stave off poverty may leave these households even more vulnerable to poverty in the future. In contrast, NDHs are 55% and 25% more likely to be in the 'never in poverty' group than to be in chronic or transitory poverty if they are able to cope with shocks by drawing on their savings, an effect not detected for DHs. On the other hand, NDHs are 76% more likely to be in chronic poverty if they relied on government assistance to cope with a shock.

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[11]The full regression results are reported in Tables 1 and 2 in the appendix.

Figure 6: Share of Assets Lost Across Shock Categories

(a) No Coping Strategies

(b) Coping Strategies
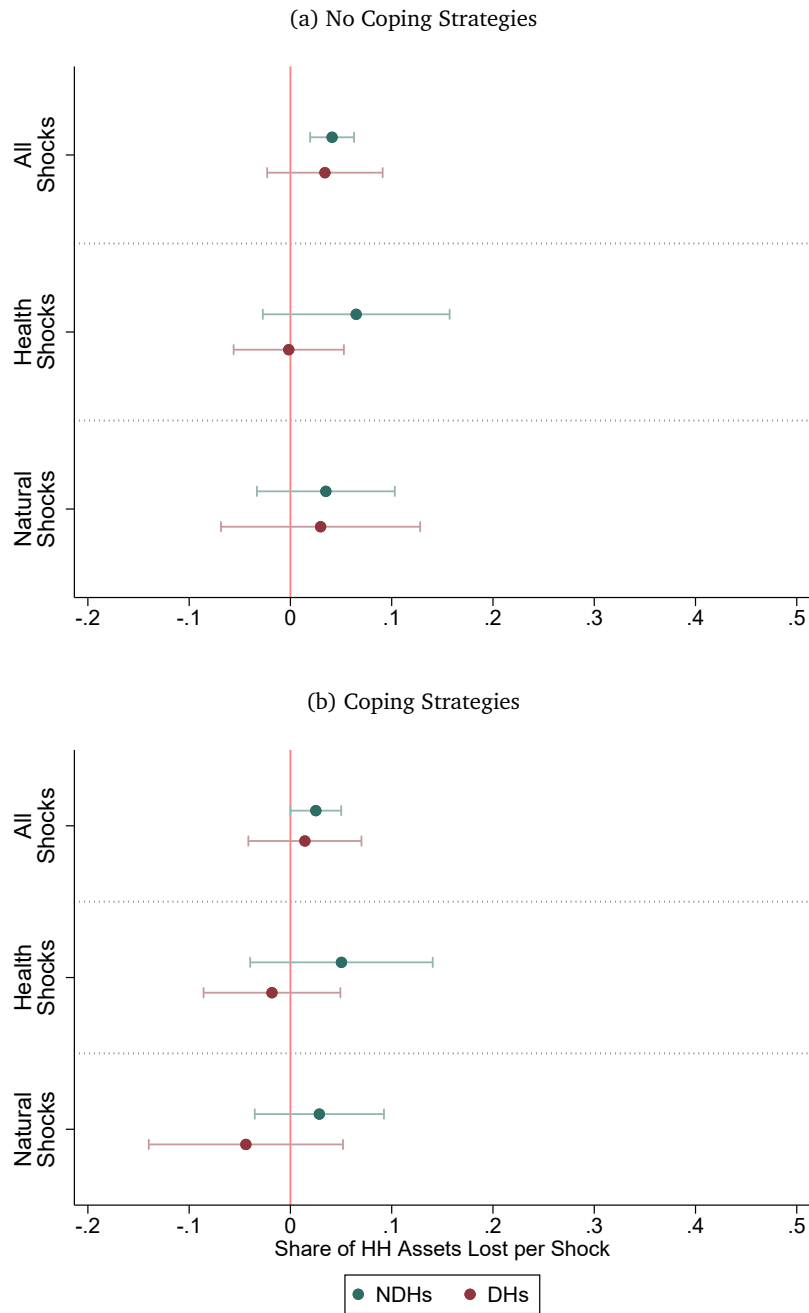
Notes: Plot of the coefficients of each additional shock on the share of household assets by shock type. Panel displays the coefficients excluding coping strategies from the regression while Panel B includes coping strategies. A positive coefficient indicates a loss in the share of household assets. While a negative coefficient indicates a gain in assets.

Table 9: Multinomial Logit Poverty Dynamics (without Coping Strategies)

	NDH		DH	
	Chronic	Transitory	Chronic	Transitory
Health Shocks	1.533***	1.270***	1.899***	1.653***
	(0.132)	(0.103)	(0.319)	(0.274)
Natural Shocks	1.362***	1.034	0.900	0.936
	(0.091)	(0.068)	(0.120)	(0.114)
Other Shocks	1.016	0.939	0.783	0.892
	(0.104)	(0.091)	(0.140)	(0.139)
Baseline Measurements and Demographics (2010)				
Perceived Shocks	1.000	0.996	1.041**	1.022
	(0.009)	(0.007)	(0.016)	(0.015)
Risk Attitudes	0.789***	0.906***	0.811***	0.960
	(0.033)	(0.028)	(0.053)	(0.056)
Lagged Reduction in Consumption	1.337***	1.224***	1.105	1.042
	(0.111)	(0.089)	(0.137)	(0.125)
Gender	0.470***	0.581**	0.404**	0.549
	(0.113)	(0.127)	(0.166)	(0.220)
School Years	0.775***	0.856***	0.701***	0.844***
	(0.023)	(0.022)	(0.042)	(0.048)
Non-Agricultural Employment	0.699*	0.587***	1.094	0.604
	(0.151)	(0.113)	(0.400)	(0.210)
Observations	1108		299	

Notes: Multinomial logit regression with province fixed effects and standard errors clustered at the household level for 2017 wave of households. The base group is households who are not in poverty (average daily per capita asset level greater than 2 USD and no year in which daily per capita assets were less than 2 USD) in each wave of the TVSEP panel data prior to 2017. Transitory poverty is defined as a household that has an average daily per capita asset level greater than 2 USD but who had at least one year where daily per capita assets were less than 2 USD prior to 2017. Chronic poverty is defined as having an average daily per capita asset level less than 2 USD prior to 2017. We use total shocks between 2010 and 2015 and the measurements and demographics reported in the 2010 wave. Exponentiated coefficients with standard errors in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 10: Multinomial Logit Poverty Dynamics (with Coping Strategies)

	NDH		DH	
	Chronic	Transitory	Chronic	Transitory
Health Shocks	1.597***	1.348***	1.775***	1.859***
	(0.155)	(0.121)	(0.343)	(0.351)
Natural Shocks	1.359***	1.050	0.916	1.036
	(0.091)	(0.069)	(0.134)	(0.140)
Other Shocks	1.047	0.969	0.814	0.985
	(0.111)	(0.094)	(0.146)	(0.157)
Baseline Measurements				
and Demographics (2010)				
Perceived Shocks	1.000	0.996	1.041**	1.021
	(0.010)	(0.008)	(0.017)	(0.016)
Risk Attitudes	0.787***	0.906***	0.807***	0.968
	(0.032)	(0.029)	(0.053)	(0.059)
Lagged Reduction				
in Consumption	1.316***	1.242***	1.040	1.058
	(0.113)	(0.091)	(0.139)	(0.128)
Gender	0.489***	0.592**	0.384**	0.484*
	(0.119)	(0.130)	(0.161)	(0.198)
School Years	0.781***	0.859***	0.690***	0.838***
	(0.023)	(0.022)	(0.042)	(0.048)
Non-Agricultural				
Employment	0.720	0.585***	1.130	0.541*
	(0.159)	(0.113)	(0.432)	(0.193)
Coping Strategies (Indicators)				
Insurance	1.433	1.013	2.166*	1.130
	(0.359)	(0.231)	(0.994)	(0.479)
Savings	0.450***	0.750*	0.651	0.607
	(0.091)	(0.130)	(0.243)	(0.213)
Received Help				
from Government	1.765*	0.956	1.461	0.503
	(0.603)	(0.305)	(0.916)	(0.296)
Sold Assets	0.934	0.772	0.888	0.419***
	(0.180)	(0.136)	(0.321)	(0.140)
Observations	1108		299	

Notes: Multinomial logit regression with province fixed effects and standard errors clustered at the household level for 2017 wave of households. The base group is households who are not in poverty (average daily per capita income greater than 2 USD and no year in which daily per capita income was less than 2 USD) in each wave of the TVSEP panel data prior to 2017. Transitory poverty is defined as a household that has an average daily per capita income greater than 2 USD but who had at least one year where daily per capita income was less than 2 USD prior to 2017. Chronic poverty is defined as having an average daily per capita income less than 2 USD prior to 2017. We use total shocks between 2010 and 2015 and the measurements and demographics reported in the 2010 wave. Exponentiated coefficients with standard errors in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

7   Robustness Checks

We explore a number of alternative specifications to test the robustness of our main findings. Disabilities may be the result of an exogenous shock or may be anticipated as individuals age over time. We consider a more restrictive alternative measure of disability that only includes the set of households faced with an unexpected disability. Our main results are robust to this alternative disability measure. We also test several alternative regression specifications for yearly income and asset losses including levels and log forms of the dependent variable, remove coping strategies related to borrowing to address potential endogeneity issues associated with the recorded coping strategies, and use count and demeaned versions of the explanatory variables. Our results reported here are robust to these alternative specifications and results not included in the appendix are available upon request.

When analyzing poverty dynamics, we also run MNL regressions using income as the welfare measure of interest. Here, we categorize households as being in chronic poverty, transitory poverty, or not in poverty based on daily per capita income (2 USD PPP) when generating the poverty line. Tables 3 and 4 display the results of these poverty dynamic regressions. The results are qualitatively the same, although somewhat less pronounced. We find significant effects of health shocks and transitory income for DHs but the impact of health shocks on chronic poverty is only significant in one specification. NDHs are more likely to be in chronic poverty for each health shock experienced but these shocks do not significantly affect the likelihood of being in transitory poverty. Overall, coefficients are larger for DHs than NDHs once more. We also find that while NDHs are more likely to be in chronic poverty if they faced additional natural shocks, DHs are not. Finally, we run two additional regressions where households are classified as being always in poverty, never in poverty, or moving in and out of poverty over our analyzed time period, using both income and assets as the welfare measure. Our results reported here are robust to this alternative specification and available upon request.

8   Discussion and Conclusion

Drawing on rich household panel data, this paper assesses how households with and without a member living with a disability (DHs and NDHs) in Vietnam are differentially impacted by shocks in order to develop a better understanding of the long-term vulnerability of DH to poverty. In particular, this paper assesses differences in beliefs and behaviors across these household groups, differences in the immediate impact of shocks on household income and assets, the extent to which differences in household beliefs and behaviors mitigating or exacerbating income and asset losses stemming from shocks, and the impact of shocks on the longer-term poverty dynamics across these households.

We find that DHs are less willing to take risks and expect more health shocks in the future, but also experience more health and total shocks than NDHs. DHs seem to update their risk attitudes and shock expectations appropriately as they continually face more shocks than households without a disabled member. We also find that these households are more resilient to each additional health shock experienced in the short run, but that the larger or cumulative number of these shocks experienced overwhelms and exposes them to poverty in the long run. We document that DHs are more resilient to health shocks than NDHs, suggesting that these households have developed some expertise on how to cope with these shocks. Allocating more attention and resources to coping with these shocks might leave these households more vulnerable to unexpected shocks, such as natural shocks, leading to a larger share of income loss for DHs when faced with natural shocks as compared to NDHs. The use of savings is what we detect as the most effective coping strategy for DHs in yearly income share regressions. NDHs can effectively diminish the impact of shocks on household income through the use of both savings and insurance. It is important to note that DHs are more likely to use insurance programs in response to a shock. Still, the use of insurance does not significantly diminish the impact of shocks on household

income. This finding implies that existing disability-related insurance programs are not sufficient to ensure that these households successfully mitigate the greater number of shocks they experience.

Furthermore, we find that while poverty has decreased over time for both DHs and NDHs, DHs are much more likely to be in chronic or transitory poverty for each additional health shock experienced than NDHs. This finding strengthens our argument that despite greater resilience to health shocks, DHs are vulnerable to poverty due to the cumulative effect of health shocks experienced over time. These shocks lower DHs' ability to accumulate productive assets and limit the income-generating capacity and ability of these households to build up savings over time.

One potential limitation of our study is the self-reported nature of the shocks. Households may differ in reporting what constitutes a shock. Households must recall the shocks they experienced dating back as far as three years. Therefore, the data is based on the recall of respondents which is subject to measurement error. Another issue is the extent to which these reported shocks are exogenous. While the weather and agricultural shocks are plausibly exogenous, reporting of shocks might not be. Future research could combine self-reported data with additional data capturing weather-related shocks, such as satellite data, to determine the extent to which households with and without a member living with a disability are differently impacted by the same shock.

Our analysis has important policy implications and suggests additional assistance is needed, both to lift DHs out of poverty and to prevent them from falling into poverty. Existing and newly proposed interventions will need to be carefully reviewed and considered. Combined, they will have to do both, strengthen DHs already-developed expertise in dealing with health shocks to lift households out of poverty and reduce the effect of unexpected natural shocks to prevent households from falling into poverty.

Expansion of existing disability-related benefits and insurance programs can alleviate the burden of health shocks on household income. Individuals with "severe and extremely severe" disabilities are entitled to a Disability Allowance ranging between $18-$30 USD per month. However, this program only covers about 41% of people living with a severe disability or 10% of people living with any disability, and the allowance may be insufficient as it only covers approximately 32% of the minimum living standard level. The government further subsidizes the health insurance premium for individuals with "severe and extremely severe" disabilities. Those with less than severe disabilities are not entitled to social health insurance. This insurance covers the cost of 95% of eligible medical expenses but only 13% of rehabilitation services but does not cover the cost of most assistive devices(Banks et al., 2018).

Vietnamese culture typically dictates that family members serve as primary caregivers, and these expectations will negatively affect other household members and children of persons living with a disability. Increasing access and affordability of in-home health services such as home modifications and assistive devices, as well as out-of-family caregivers can lower the burden of family members caring for disabled members. The reduced burden placed on family members can allow them to shift their resources toward income-generating activities for the household.

The expansion of vocational training and work programs for persons living with disabilities can further increase the income-generating ability of households and make them less vulnerable to poverty in the long term. The Ordinance on Disabled Persons (ODPs) manages vocational training centers. However, they operate under a limited budget. Government Employment Service Centers are further required by the ODPs to provide job counseling and other services that benefit disabled persons. This service is underutilized by those living with a disability due to physical and attitudinal barriers (ILO, 2011). Establishing programs that reduce physical and informational barriers and develop trust and buy-in by DHs is a necessary step in increasing the efficiency of these programs.

Currently, national programs that address natural shocks are almost non-existent in Vietnam. Agricultural insurance pilot programs backed by the national government ran from 2011 to 2014 but were not expanded due to high operational costs and low demand by growers. While steps have been taken to

increase demand for agricultural insurance programs, the government could also take a more proactive role in establishing formal insurance mechanisms. Access to agricultural insurance can protect households engaged in agriculture from large income losses due to natural shocks and reduce the number of households that remain and transition into poverty. Establishing risk management tools for households that are vulnerable to natural shocks will be imperative as these shocks are likely to become more frequent and severe due to climate change. However, if they come at the expense of reducing other welfare programs that disproportionately target DHs, these policies might exaggerate the already observed differences in poverty dynamics for DHs as compared to NDHs. Perhaps most importantly, our observed short and longer-term differences in income and asset losses stemming from significant differences in circumstances and experiences among households living with and without disabilities suggest that if the goal is to provide targeted relief and long-term support to DHs, policymakers should seek input from affected households and incorporate their expertise.

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Appendices

Table 1: Share of Average Yearly Household Assets Lost (without Coping Strategies)

	All Shocks		Health Shocks		Natural Shocks	
	NDH	DH	NDH	DH	NDH	DH
Shocks (Count)	0.043***	0.038	0.064	0.001	0.039	0.044
	(0.011)	(0.029)	(0.047)	(0.029)	(0.035)	(0.052)
Shocks^2	-0.005**	-0.003	-0.015	-0.001	-0.002	-0.002
	(0.002)	(0.007)	(0.011)	(0.006)	(0.010)	(0.014)
Perceived Shocks	0.000	0.000	0.000	0.001	-0.001*	-0.001
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Risk Attitudes	-0.001	-0.003	-0.001	-0.001	-0.001	-0.003
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Lagged Reduction in Consumption	0.006*	0.015*	0.008	-0.009	0.005	0.010
	(0.003)	(0.008)	(0.008)	(0.007)	(0.004)	(0.012)
Household Size	-0.001	-0.008**	0.001	-0.004	0.001	-0.009**
	(0.002)	(0.003)	(0.002)	(0.004)	(0.002)	(0.004)
Presence of Children	-0.000	0.002	0.002	0.016	-0.003	0.002
	(0.006)	(0.011)	(0.006)	(0.013)	(0.006)	(0.012)
Gender	0.010	-0.010	-0.008	-0.006	-0.009	-0.000
	(0.011)	(0.019)	(0.006)	(0.009)	(0.012)	(0.031)
School Years	-0.002*	-0.003**	0.000	0.001	-0.003***	-0.005***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)
Marital Status	-0.015	-0.002	-0.011	-0.003	0.003	-0.008
	(0.012)	(0.020)	(0.009)	(0.011)	(0.012)	(0.034)
Non-Agricultural Employment	0.001	0.028*	-0.001	0.020	-0.004	0.033
	(0.006)	(0.015)	(0.005)	(0.013)	(0.005)	(0.021)
Observations	2915	802	982	355	1941	457
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: OLS regression with province fixed effects and standard errors clustered at the household level. Dependent variable in All Shocks columns is the share of assets lost from all shocks household faced each year. Dependent variable in Health Shocks columns is the share of assets lost from health related shocks household faced each year. Dependent variable in Natural Shocks columns is the share of assets lost from natural shocks household faced each year. Standard errors in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 2: Share of Average Yearly Household Assets Lost (with Coping Strategies)

	All Shocks		Health Shocks		Natural Shocks	
	NDH	DH	NDH	DH	NDH	DH
Shocks (Count)	0.036***	0.013	0.055	0.002	0.043	-0.007
	(0.011)	(0.028)	(0.047)	(0.031)	(0.034)	(0.051)
Shocks^2	-0.005**	0.000	-0.013	-0.000	-0.005	0.008
	(0.002)	(0.006)	(0.011)	(0.007)	(0.009)	(0.014)
Perceived Shocks	0.000	0.000	0.000	0.001	-0.001*	-0.002
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Risk Attitudes	-0.001	-0.003	-0.001	-0.001	-0.001	-0.002
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Lagged Reduction in Consumption	0.005	0.012	0.007	-0.009	0.005	0.007
	(0.003)	(0.008)	(0.007)	(0.008)	(0.004)	(0.010)
Coping Strategies (Indicators)						
Used Preventative Strategies	-0.008	-0.003	0.006	-0.010	-0.002	-0.006
	(0.007)	(0.014)	(0.005)	(0.013)	(0.012)	(0.012)
Used Insurance	-0.008	-0.024*	-0.002	-0.005	0.008	0.009
	(0.010)	(0.014)	(0.006)	(0.013)	(0.026)	(0.030)
Used Savings	0.005	0.009	-0.006*	-0.008	0.004	0.012
	(0.007)	(0.018)	(0.003)	(0.005)	(0.010)	(0.028)
Took Up Additional Occupation	0.010	0.014	-0.008**	0.011	0.007	0.014
	(0.007)	(0.016)	(0.003)	(0.021)	(0.007)	(0.016)
Borrowed from Informal Moneylender	0.004	0.043	0.019	0.026	-0.012*	0.111
	(0.012)	(0.032)	(0.015)	(0.025)	(0.006)	(0.079)
Diversified Agricultural Portfolio	-0.004	0.014	-0.006	-0.013	-0.006	0.036**
	(0.009)	(0.023)	(0.005)	(0.010)	(0.007)	(0.017)
Received Help from Government	0.031	0.167**	-0.025**	-0.008	0.034*	0.230***
	(0.019)	(0.071)	(0.011)	(0.016)	(0.018)	(0.090)
Reduced Production Inputs	-0.001	-0.025	—	—	0.026	-0.023
	(0.022)	(0.021)			(0.028)	(0.020)
Borrowed from Village Funds	0.068	0.058	-0.005	0.016	0.096*	0.247
	(0.042)	(0.086)	(0.008)	(0.017)	(0.054)	(0.202)
Sold Assets	0.015	0.003	0.017*	0.012	0.003	0.013
	(0.009)	(0.017)	(0.009)	(0.013)	(0.007)	(0.022)
Borrowed from Formal Bank	0.025*	0.080**	0.017	0.022	0.016	0.028
	(0.013)	(0.036)	(0.014)	(0.036)	(0.014)	(0.029)
Support from Social Network	0.016**	0.023*	0.008*	0.011	0.021**	0.069**
	(0.007)	(0.013)	(0.005)	(0.009)	(0.010)	(0.027)
Observations	2915	802	982	355	1941	457
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: OLS regression with province fixed effects and standard errors clustered at the household level. Dependent variable in All Shocks columns is the share of assets lost from all shocks household faced each year. Dependent variable in Health Shocks columns is the share of assets lost from health related shocks household faced each year. Dependent variable in Natural Shocks columns is the share of assets lost from natural shocks household faced each year. Number of shocks, shocks^2, lagged reduction in consumption, and lagged recovery variables are count variables and all coping strategies are indicator variables. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Multinomial Logit Poverty Dynamics (without Coping Strategies)

	NDH		DH	
	Chronic	Transitory	Chronic	Transitory
Health Shocks	1.263**	1.063	1.324	1.342**
	(0.124)	(0.080)	(0.238)	(0.193)
Natural Shocks	1.450***	1.099	1.029	0.989
	(0.114)	(0.064)	(0.135)	(0.113)
Other Shocks	1.015	0.977	0.959	0.790
	(0.125)	(0.084)	(0.209)	(0.128)
Baseline Measurements				
and Demographics (2010)				
Perceived Shocks	1.008	1.002	1.034*	1.005
	(0.010)	(0.007)	(0.020)	(0.014)
Risk Attitudes	0.919	1.015	1.033	0.969
	(0.048)	(0.031)	(0.088)	(0.056)
Lagged Reduction				
in Consumption	1.336***	1.253***	1.068	1.013
	(0.123)	(0.081)	(0.151)	(0.119)
Log of Assets	0.355***	0.531***	0.275***	0.568***
	(0.044)	(0.052)	(0.060)	(0.108)
Gender	1.213	1.096	0.782	0.639
	(0.383)	(0.228)	(0.415)	(0.241)
School Years	0.863***	0.967	0.812***	0.889**
	(0.030)	(0.023)	(0.052)	(0.046)
Non-Agricultural				
Employment	0.400***	0.506***	0.363*	0.615
	(0.115)	(0.087)	(0.190)	(0.195)
Observations	1108		299	

Notes: Multinomial logit regression with province fixed effects and standard errors clustered at the household level for 2017 wave of households. The base group is households who are not in poverty (average daily per capita income greater than 2 USD and no year in which daily per capita income was less than 2 USD) in each wave of the TVSEP panel data prior to 2017. Transitory poverty is defined as a household that has an average daily per capita income greater than 2 USD but who had at least one year where daily per capita income was less than 2 USD prior to 2017. Chronic poverty is defined as having an average daily per capita income less than 2 USD prior to 2017. We use total shocks between 2010 and 2015 and the measurements and demographics reported in the 2010 wave. Exponentiated coefficients with standard errors in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 4: Multinomial Logit Poverty Dynamics (with Coping Strategies)

	NDH		DH	
	Chronic	Transitory	Chronic	Transitory
Health Shocks	1.358***	1.125	1.421*	1.344*
	(0.152)	(0.100)	(0.303)	(0.219)
Natural Shocks	1.447***	1.089	1.034	0.973
	(0.116)	(0.065)	(0.145)	(0.119)
Other Shocks	1.025	0.978	0.945	0.794
	(0.131)	(0.085)	(0.210)	(0.131)
Baseline Measurements **and Demographics (2010)**				
Perceived Shocks	1.008	1.002	1.034*	1.006
	(0.010)	(0.007)	(0.020)	(0.014)
Risk Attitudes	0.919	1.016	1.031	0.967
	(0.048)	(0.031)	(0.095)	(0.056)
Lagged Reduction in Consumption	1.329***	1.229***	0.996	1.024
	(0.127)	(0.081)	(0.154)	(0.122)
Log of Assets	0.373***	0.541***	0.263***	0.575***
	(0.047)	(0.054)	(0.061)	(0.111)
Gender	1.191	1.092	0.783	0.648
	(0.376)	(0.228)	(0.407)	(0.251)
School Years	0.869***	0.969	0.812***	0.895**
	(0.030)	(0.023)	(0.054)	(0.047)
Non-Agricultural Employment	0.380***	0.528***	0.374*	0.653
	(0.110)	(0.093)	(0.197)	(0.210)
Coping Strategies (Indicators)				
Insurance	1.044	0.775	0.881	0.754
	(0.287)	(0.162)	(0.410)	(0.264)
Savings	0.537**	0.700**	0.417*	0.948
	(0.132)	(0.112)	(0.188)	(0.300)
Received Help from Government	1.874*	1.358	1.152	2.439*
	(0.640)	(0.381)	(0.712)	(1.272)
Sold Assets	0.804	1.286	2.202*	0.909
	(0.200)	(0.204)	(0.956)	(0.280)
Observations	1108		299	

Notes: Multinomial logit regression with province fixed effects and standard errors clustered at the household level for 2017 wave of households. The base group is households who are not in poverty (average daily per capita income greater than 2 USD and no year in which daily per capita income was less than 2 USD) in each wave of the TVSEP panel data prior to 2017. Transitory poverty is defined as a household that has an average daily per capita income greater than 2 USD but who had at least one year where daily per capita income was less than 2 USD prior to 2017. Chronic poverty is defined as having an average daily per capita income less than 2 USD prior to 2017. We use total shocks between 2010 and 2015 and the measurements and demographics reported in the 2010 wave. Exponentiated coefficients with standard errors in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.